which is of a type found useful in previous work with *Drosophila* life curves:

$$\log q_x = -1.0783 + .7041x - .0452x^2 + 1.5080 \log x.$$

It is evident from the data of Table I that the fit is reasonably good, probably as good as one could expect with observations so rough in respect of age at death.

The next step is to calculate a *Proales* life table in terms of centiles of the life span rather than in absolute age. This was done in the same manner as in the earlier paper, and the results, so far as concerns the survivorship function l_x, are shown in Table II.

In order that it may be seen how the forces of mortality operate in *Proales* as compared with man and *Drosophila*, the diagram shown as Figure 1 is presented.

Comparing the three curves, we note the following points:

1. The *Proales* curve lies above the other two at all parts of the comparable life span. This means that out of 1,000 individuals starting together at biologically equivalent points in the life span (*i. e.*, at the age when q_x is a minimum for each organism) at any subsequent age centile there will be more surviving rotifers than men, and more surviving men than flies.

2. The median durations of life, or, put in another way, the ages prior to which just 500 of the 1,000 individuals starting together will have died, are approximately:

For *Proales*,	74 % of the equivalent life span.
For Man,	62 % of the equivalent life span.
For *Drosophila*,	42.5% of the equivalent life span.

3. The comparison the other way about indicates that when 50 per cent. of the equivalent life spans have been passed there are still surviving:

In *Proales*,	93.0% of the individuals starting.
In Man,	68.5% of the individuals starting.
In *Drosophila*,	38.0% of the individuals starting.

The outstanding thing about the life curve for *Proales* from Miss Noyes's figures is that it approaches nearer to the theoretically possible right-angled form, in which all the individuals live to a given age x and then all die at once, than any other that has yet been observed. Whether this is the result of (*a*) the greater uniformity of environment, on the average, for the *Proales* under the experimental conditions than for the other forms, or (*b*) the greater uniformity of the population in genetic constitution, consequent upon the fact that *Proales* reproduces parthenogenetically and that all of Miss Noyes's cultures were descended from at most not over six different individuals, or (*c*) a combination of both, can not be definitely stated. Both of the factors mentioned undoubtedly do in some degree operate to produce the form of life curve exhibited. There is need for data regarding the mortality of other organisms. It is an interesting commentary on the development of biology that the distribution of mortality in respect of age is known for only three species of animal life with sufficient accuracy to permit the formation of age-specific death rates, and hence of a life table. Into every discussion of the problem of evolution, and into every attempt to determine its causes, there must necessarily enter the question of the mortality of the forms being dealt with. There seems no good reason for indefinitely continuing to handle the matter by the current methods, which are either to make large *a priori* guesses about the distribution of mortality in the particular case, or to assume that it is the same as that of man. In the nearly universal neglect of the problem of mortality and duration of life, biologists have missed an interesting and obviously important field.

RAYMOND PEARL
CARL R. DOERING

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

SECTION M—ENGINEERING

Vice-president and Chairman, F. M. Feiker.
Retiring Vice-president, J. B. Tyrrell.
Secretary, L. W. Wallace; Federation of American Engineering Societies, Brookings Building, 26 Jackson Square, Washington, D. C.

Engineering was represented at the fourth Boston meeting of the American Association for the Advancement of Science in two of the sections—in Section K (Social and Economic Sciences), of which Dr. Henry S. Graves, of the Yale Forest School, Yale University, is vice-president and chairman, and in Section M (Engineering), of which Mr. F. M. Feiker,

vice-president, McGraw-Hill Company, Inc., New York, is vice-president and chairman.

The keynote of the joint session between Section M and Section K was "The relation of the engineer to conservation." John T. Black, State Health Commissioner, Hartford, Conn., presented a paper on conservation with reference to industrial waste; William S. Murr, of New York City, spoke on the conservation of power. Due to badly delayed train schedules, both Mr. O. C. Merrill, secretary of the Federal Water Power Commission, Washington, D. C., and General Harry Taylor, in charge of Government Flood Control Works, Corps of U. S. Army Engineers, Washington, D. C., were unable to present their papers. Mr. Merrill was to have spoken on the federal water power policy and its results, and Dr. Taylor was to have presented a paper on problems of flood control.

The afternoon meeting of Section M opened with an address paper by Mr. J. B. Tyrrell, of Toronto, Canada, retiring vice-president for Section M, who presented a remarkable paper on the "Growth of the mining industry in Canada." Mr. Tyrrell's address constituted an effective summing up of the mineral resources of that great section of the North American continent, and he pointed out the historical development of the mining industry in Canada with many dramatic allusions to early mining ventures and the later surveys made by the Geological Survey of Canada. Gold was discovered many years after the earlier explorers and trappers had overlooked it. In one case on the Hudson Bay trail the feet of the trappers wore smooth the vein of gold in the rock, and during the fall and winter the trappers going in and out of the wilderness polished the undiscovered vein with their moccasins.

The keynote of the afternoon meeting of Section M was "The place of the engineer in civilization," the principal paper being presented by Dr. Ira N. Hollis, president of the Worcester Polytechnic Institute. Dr. Hollis pointed out that from the dawn of history the emphasis has been placed upon the man who produces, and that the root names for producer in several of the earlier languages are synonymous with our definition of the term *engineer*. One phase or another of engineering activity enters into practically all the other arts and sciences. Doctor Hollis instanced the factor of transportation and communication as one vitally touching life and activities of men in all walks of life, and pointed out the engineer's place in the further development of transportation and communication systems in the world. Mr. Tyrrell, retiring vice-president, in his address, referred to the part that steam railway transportation has played in the development of the mining industry as a practical illustration of the engineer's place in utilizing our natural resources. Dr. Hollis, as did Mr. Warrington Emerson, another speaker of the afternoon, pointed out the need of the engineer's analytical study of facts for the solution of present-day problems, and both emphasized the idea that indirectly the engineer, because of his control of the instrument of production, is deeply concerned with present-day civilization.

The paper by Professor C. F. Scott, of Yale University, president of the Society for the promotion of Engineering Education, on "New phases of engineering education," was presented in Professor Scott's absence by Dr. Dugald C. Jackson. Professor Scott indicated that because engineering was coming to take such a large place in our modern life, it was essential that the training of engineers be approached with a new viewpoint of the engineer's place in the community.

The several contributions emphasized that the next step in engineering is to relate the problems of the material advance in civilization to the human problems of civilization. The engineer has an opportunity for leadership in approaching these human problems, which have grown out of his own contributions in increasing the perplexity of life, if he will apply the logic of his thinking with the understanding that human problems are problems of emotion, as well as of logic.

In the evening Calvin W. Rice, Secretary of the American Society of Mechanical Engineers, presented an illustrated address on the "Engineering and scientific development of South America."

SECTION N—MEDICAL SCIENCES

Vice-president and Chairman, Francis Weld Peabody.

Retiring Vice-president, A. B. Macallum.

Secretary for the Boston Meeting, A. J. Goldfarb; College of the City of New York, New York, N. Y.

(*Report by A. J. Goldfarb*)

Following a plan recently adopted by the section, there was held on Friday afternoon a session of invited papers on parasitology and entomology as these subjects are related to medical science. The new plan contemplates the bringing together of a group of men of science not specially provided for in any other organization, and it emphasized the unity of science in general. Somewhat as the geneticists of the Botanical Society of America and of the American Society of Zoologists have organized the Joint Genetics Section, it is planned that Section N may serve a very useful purpose to American science by bringing together research workers in the various scientific fields that contribute to medical science. This movement, together with the recent formation of the genetics section just mentioned, illustrates a new tendency in scientific organization, to form groups on the basis of fundamental relationships in the scientific results to be achieved and the general methods to be employed, rather than simply on the basis of the classification of the organisms or materials studied.

The new plan for Section N was first tried in the session at Boston. The program for that session was based on the fundamental relationships that hold between certain fields of medical science and those of parasitologists and entomologists. Dr. A. B. Macallum, of McGill University, retiring vice-president for the section, gave the vice-presidential address on "The necessity for advanced research on the intestinal mucosa, the great gateway of disease of the body," and medical science was also represented by Dr. Richard P. Strong, of the Harvard Medical School, who presented an invitation paper on "Some aspects of disease associated with the fields of zoölogy, entomology and parasitology." Entomology was represented by invitation papers by Dr. C. T. Brues, of the Bussey Institution, and by Dr. L. O. Howard, of the U. S. Department of Agriculture. Dr. Brues brought out the interesting fact that evidence is very strong for regarding poliomyelitis (infantile paralysis) as being spread mainly by rats and insects. Dr. C. A. Kofoid, of the University of California, and Dr. C. W. Stiles, of the U. S. Public Health Service, represented parasitology by invitation papers. The former spoke on "Incidence of the human intestinal protozoan infections in the United States," and the latter considered "Some medico-zoölogical phases of our immigration problems." Each speaker dealt on the inter-relations among the allied fields represented in the program, suggesting problems that might well be considered by those in related fields outside of his own. The program as a whole furnished an excellent example of the recent emphasis on the need of cooperation among scientific men.

The session was very well attended, there being 120 persons present, and great interest was manifest. It was voted that the general plan here tried for the first time should be adhered to for the future work of Section N.

SECTION O—AGRICULTURE

Vice-president and chairman, R. W. Thatcher.

Retiring vice-president, Jacob G. Lipman.

Secretary, P. E. Brown, Iowa State College, Ames, Iowa.

(Report by P. E. Brown)

Section O of the association met on Wednesday afternoon of the Convocation Week with an invitation program by representatives of various of the societies affiliated with the section. The address of the retiring vice-president for the section was given by Dr. J. G. Lipman, of the New Jersey Agricultural Experiment Station. Dr. Lipman read a paper on "Tendencies in agricultural research." He discussed the subject in a most comprehensive way, calling attention to the accomplishments of the past years, the demands of the present, the causes for these demands, and the way in which research is meeting the complicated problems of present-day agriculture. Dr. C. V. Piper presented a paper on "The forage situation in the United States," in which he discussed forage production in its broad relation to agriculture and emphasized the significant aspects of forage crop problems. Professor E. N. Wentworth discussed "The relation of genetics to the business of agriculture," showing the significance of the problems that the livestock interests have called upon the geneticists to

solve. Dr. B. L. Hartwell enumerated some of the crop production problems which need attention and which are characterized by the title of his paper, "Between the lines of science in crop production." Dr. T. L. Lyon gave a paper entitled "A note on the correlation of crop response to potassium and calcium in certain soils."

President R. A. Pearson, of the Iowa State College, was elected vice-president and chairman for the section, and Dr. H. J. Wheeler, of Boston, was elected to the section committee. The section voted to affiliate with the Union of Biological Societies.

THE AMERICAN SOCIETY OF AGRONOMY

President, S. B. Haskell.

Secretary, P. E. Brown, Iowa State College, Ames, Iowa.

(Report by P. E. Brown)

The American Society of Agronomy held its winter meeting on Friday of the Convocation Week, with an attendance of about seventy-five. The program consisted of a symposium on "Soil toxicity in its relationships to economic crop production," arranged by B. L. Hartwell. Ten papers were presented on various phases of the toxicity problem—particularly organic and inorganic compounds, acidity, susceptibility, methods of diagnosis, immunity and some physiological aspects of the problem. The speakers included Dr. Oswald Schreiner, Dr. A. L. Whiting, Dr. A. G. McCall, Professor F. W. Morse, Dr. P. L. Gile, Dr. W. P. Kelley, Dr. G. N. Hoffer, Dr. R. W. Thatcher and Dr. B. E. Livingston. The program continued throughout the day, and lively discussions followed each paper, interest centering especially on the problems of soil acidity and the relation of aluminum to toxicity.

A joint dinner with Section O, arranged by a committee of the New England agronomists, was given at the Boston City Club on Thursday evening. About forty-five attended and enjoyed a carefully planned New England dinner. An extensive program was presided over by Dr. C. R. Ball, toastmaster.

Director S. B. Haskell, president of the society and local representative, was largely responsible for the success of the dinner and of the meeting.

THE AMERICAN SOCIETY FOR HORTICULTURAL SCIENCE

President, J. C. Blair.

Secretary, C. P. Close, College Park, Md.

(Report of C. P. Close)

Professor J. H. Gourley, of the Ohio Agricultural Experiment Station, Wooster, Ohio, was elected president of the society for 1923. The following were elected as vice-presidents: Professor G. F. Potter, Durham, N. H., Professor H. A. Jones, Berkeley, Calif., and Professor T. G. Bunting, Macdonald College, Quebec. Professor C. P. Close was elected (to succeed himself) as secretary, and Professor R. E. Marshall was elected assistant secretary.

The society met in Room 2-180, of the Massachusetts Institute of Technology, the sessions beginning Wednesday morning, December 27, and continued through Friday afternoon. The program included fifty-nine papers, of which two reported studies on light relation, seven studies on temperature relations, ten teaching and extension work, eleven vegetable studies, nine breeding work and twenty studies in pomology.

THE SOCIETY OF AMERICAN FORESTERS

President, E. A. Sherman.

Secretary, W. N. Sparhawk; U. S. Forest Service, Washington, D. C.

(Report by W. N. Sparhawk)

The meetings of the Society of American Foresters on December 29 and 30 were the most successful ever held, both as regards attendance and interest and discussion of papers. The total attendance included more than 130 members and guests. Perhaps the most significant fact brought out at the meetings, as well as at those of the joint sessions with the New England Forestry Congress, was that in the northeastern states, at least, the time is now ripe for the application of technical forestry on a wide scale. Not only is systematic timber-growing desirable from the standpoint of general public welfare, but conditions have reached the point where it is a paying proposition for private individuals and corporations.

Resolutions were adopted urging the early establishment of forest experiment stations in

New England and the Lake states; continued acquisition by the Federal government of forest lands, under the Weeks Law; increased State and Federal appropriations for forest fire protection; and the following:

Whereas, After a long career of distinguished service, Dr. Hopkins has resigned as chief of the Division of Forest Insects in the United States Bureau of Entomology, and

Whereas, The depredations of forest insects constitute a vital factor in the problems confronting the forester, be it

Resolved, That the Society of American Foresters recommends the appointment of an entomologist who, in addition to thorough technical training, possesses a rich practical experience in economic forest entomology and a close familiarity with the problems and methods of forest management.

The following officers were elected: *President,* Professor Ralph S. Hosmer, Cornell University, Ithaca, N. Y.; *Vice-president,* Professor Herman H. Chapman, Yale University, New Haven, Conn.; *Secretary,* William N. Sparhawk, U. S. Forest Service, Washington, D. C.; *Treasurer,* Fred W. Besley, State Forester, Baltimore, Md.; *Member of Executive Council (for five years, 1923-27),* Robert Y. Stuart, Forest Commissioner, Harrisburg, Pa.

THE SOCIETY FOR THE PROMOTION OF AGRICULTURAL SCIENCE

President, R. W. Thatcher.

Secretary-Treasurer, P. E. Brown, Iowa State College, Ames, Iowa.

(Report by P. E. Brown)

This society held a brief business session on Thursday afternoon and, after some discussion, voted to merge the society with Section O of the association, the details of the merging to be arranged by the officers of the society who fill corresponding offices in the Section.

GENETICISTS INTERESTED IN AGRICULTURE

Secretary, Edward N. Wentworth, Armour's Bureau of Agricultural Research and Economics, Chicago, Ill.

(Report by E. N. Wentworth)

Geneticists interested in agriculture met Wednesday morning preceding the meeting of the Genetics Sections of the American Society of Zoologists and the Botanical Society of America. The general topic of discussion was "The place of genetics in the agricultural experiment stations." Dr. John W. Gowen, of the University of Maine discussed "The future possibilities for fundamental research in the experiment stations." He called attention to the growing difficulties of financing the stations based on the lowered purchasing price of the dollar, the consequent limitation of funds for research purposes and the increasing pressure from the outside for research giving promise of immediate results in the hope of offsetting the agricultural stringency. Dr. E. W. Lindstrom, of the Iowa State College discussed "The relation of the genetics department to the applied departments." He called attention to the difficulty of making genetic problems fit into the research program of the applied departments and at the same time stressed the fact that requests could not be made for a broad duplication of equipment for animal and plant breeding in order that the genetic research might proceed without interruption. His final decision was that the geneticists must be equipped for applied research in some one field and cooperate by advice and research assistance in other fields. The geneticists interested in agriculture form a temporary organization only, holding meetings at times when live topics of discussion exist, and dealing particularly with problems of organization and procedure in the agricultural colleges. The secretary *ad interim* for 1923 is Dr. E. W. Lindstrom, Iowa State College, Ames, Iowa.

THE POTATO ASSOCIATION OF AMERICA

President, J. G. Milward.

Secretary, William Stuart, U. S. Department of Agriculture, Washington, D. C.

(Report by William Stuart)

The annual meeting of the Potato Association of America, which was held at the Massachusetts Insitute of Technology, December 27-29, 1922, proved to be one of the most interesting meetings thus far held by this association.

One of the worth-while features of this meeting was that of the joint session held by the association with that of the Phytopathological Society for the purpose of a free discussion of seed potato certification standards. Owing to lack of time the chairman of this conference

found it impossible to cover the whole subject involved in seed certification work, thereby making it necessary to postpone its completion until the following afternoon. While no definite action was taken regarding the adoption of uniform inspection rules, it is believed that the ultimate good resulting from this conference will serve to very materially aid in the conduct of this work.

The attendance, while not large at any given session, except the one devoted to a joint conference with the pathologists, was largely made up of persons intensely interested in the improvement of the potato industry. The papers presented and the discussion they evoked were brief, snappy and very much to the point.

The following resolutions were presented by the Resolutions Committee and unanimously adopted by the members present:

Whereas, We feel that the specific functions of this association as stipulated in the constitution can be more efficiently and more fully carried out by closer connection and cooperation with all potato organizations of the United States and Canada; be it therefore

Resolved, That we invite all such organizations to take out memberships for its officers or executive boards and wherever practicable to send at least one delegate to our annual meeting; and be it further

Resolved, That such delegates bring to the meeting their local and regional problems in order that they may be brought to the attention of the specialists best fitted to deal with them. Be it further

Resolved, That this association desires to express its appreciation of the courtesies extended to it by the Massachusetts Institute of Technology and that a copy of this resolution be transmitted to the proper authorities.

At the conclusion of the afternoon session, Friday, Decembebr 29, the following officers were elected for the ensuing year: *President,* Dr. W. H. Martin, Experiment Station, New Brunswick, N. J.; *Vice-president,* G. C. Cunningham, Agricultural Department, Fredericton, N. B.; *Secreary-treasurer,* W. Stuart, U. S. Department of Agriculture, Washington, D. C.; *Assistant Secretary-treasurer,* W. M. Peacock, U. S. Department of Agriculture, Washington, D. C.

The Executive Committee consists of the president, vice-president, secretary-treasurer, the retiring president, J. G. Milward, Experiment Station, Madison, Wisconsin, and H. R. Talmage, Riverhead (L. I.), N. Y.

SECTION Q—EDUCATION

Vice-president and Chairman, Bird T. Baldwin.

Retiring Vice-president, Guy M. Whipple.

Secretary, A. S. Barr, 1924 Hazelwood, Detroit, Mich.

(No report received. The permanent secretary has been obliged to supply what follows.)

Five sessions of Section Q were held, in the Fogg Art Museum of Harvard University, on Wednesday, Thursday and Friday forenoons, and on Wednesday and Thursday afternoons. The first session was addressed by J. C. Manry, University of Iowa, A. I. Gates, Columbia University, and W. F. Dearborn, Harvard University. Informational education and international affairs were discussed.

The second session, held jointly with the honor society, *Phi Delta Kappa,* gave special attention to needed research in elementary, secondary and college education, with papers by William S. Gray, University of Chicago, George S. Counts, Yale University, and Leonard Koos, University of Minnesota. S. A. Courtis and Charles L. Spain, both of the Detroit public schools, spoke on the selection of judges for judgment scales and the platoon organization, respectively.

At the third session were presented papers on rating, by Charles H. Bean, Louisiana State University, and F. A. Kingsbury, University of Chicago. Frank N. Freeman, University of Chicago, spoke on the value of motion pictures in the teaching of writing, with interesting illustrations showing groups of children in good and poor positions for handwriting. Groups to whom these films had been shown advanced much more rapidly in this respect than did other children who had not seen the films. Willis L. Uhl, University of Wisconsin, reported on a recent attempt to develop an improved set of standards for the selection of material for reading and literaure in elementary and high schools. Over 7,000 reading selections were judged by over 3,000 teachers. The main objectives are: mastery of the mechanics of reading, comprehension of what is read, and development of literary culture.

At the fourth session was given the retiring address of Guy M. Whipple, of the University of Michigan, retiring vice-president of the American Association for the Advancement of Science for Section Q. This was followed by a business session, at which Dean Henry W. Holmes, of Harvard University, was nominated to the council for chairman of the Section and vice-president of the American Association for the Advancement of Science for 1923. A. S. Barr was nominated to the council for secretary of the section for the remainder of the term, which ends at the close of the Washington meeting, December, 1924. The newly elected members of the Section Committee for Section Q are: Wm. S. Gray (retiring 1926), School of Education, University of Chicago, and Guy M. Whipple (retiring 1925), School of Education, University of Michigan.

The fifth session dealt largely with tests of intelligence, character, etc., with papers by J. M. Brewer, Harvard University; O. R. Chambers, Ohio State University; and others.

SECTION X—SCIENTIFIC SOCIETIES RELATED TO THE AMERICAN ASSOCIATION IN GENERAL

Society of Sigma XI.

President, Henry B. Ward.

Secretary, Edward Ellery; Union College, Schenectady, N. Y.

(*Report by Edward Ellery.*)

The annual American convention of Sigma XI was held in connection with the meetings of the Association for the Advancement of Science, December 27. The business session convened at 2:30, the president, Professor H. B. Ward, of the University of Illinois, presiding. Thirty-two of the thirty-nine chapters were represented by delegates, this being the largest number of delegates ever registered at a convention of the society. The chief items of business were petitions for chapters from the University of Oregon and Swarthmore College and the consideration of a new constitution. Both petitions for charters were granted. The new constitution, as proposed at the convention of a year ago, was adopted with minor changes and provides for a simpler classification of members and a closer union of alumni members with the active organization.

The annual dinner was held in the Walker Memorial with 170 in attendance. President Ward acted as toastmaster and introduced President Moore of the association, President Farrand of Cornell University, Professor Stafford of the University of Oregon, Professor Marriott of Swarthmore and Professor Webster of Clark University.

The first annual Sigma Xi public lecture given in a joint meting with the association was delivered by President Farrand of Cornell University in the main building of the Institute of Technology. Dr. Farrand chose for his topic "The nation and its health." He was enthusiastically received by a large audience.

Professor F. K. Richtmyer, of Cornell University, was re-elected a member of the executive committee.

Phi Kappa Phi

President General, J. S. Stevens.

Secretary General, L. H. Pamnel, Ames, Iowa.

An informal business meeting formed the only session of this society.

Sigma Delta Epsilon

President, Christianna Smith.

Secretary, Evelyn Fernald, Ithaca, N. Y.

Sigma Delta Epsilon, Graduate Women's Scientific Fraternity, held its first National Convention at the Boston meetings. Amendments to the constitution were recommended by the convention, and membership qualifications and expansion were discussed. A luncheon was held for those interested at The Hotel Essex on December 28, at which Mrs. Anna Botsford Comstock and Miss Christianna Smith spoke on the need of organization among women and what had been accomplished by the two chapters at Cornell University and the University of Wisconsin.

The following national officers were elected at the convention: *President,* Miss Christianna Smith, Dept. of Histology and Embryology, Cornell Univ., Ithaca, N. Y.; *First Vice-president,* Dr. Elizabeth Smith, Dept. of Zoology, Univ. of Wisconsin, Madison, Wis.; *Second Vice-president,* Miss C. Audrey Richards, U. S. Dept. of Forest Pathology, Madison, Wis.; *Secretary,* Miss Evelyn I. Fernald, Dept. of Botany, Cornell Univ., Ithaca, N. Y.; *Treasurer,* Miss Helen Johann, U. S. Dept. of Plant Pathology, Madison, Wis.