

Journal of the
AMERICAN STATISTICAL
ASSOCIATION

Proceedings of the
Centenary Celebration

1839 • 1939

PAST PRESIDENTS

Hon. Richard Fletcher1839-1843	Mr. William S. Rossiter*.....1922
Dr. George C. Shattuck, M.D.*1846-1851	Prof. Warren M. Persons*.....1923
Dr. Edward Jarvis, M.D.*1852-1882	Dr. Louis I. Dublin.....1924
Gen. Francis A. Walker*.....1883-1896	Prof. R. E. Chaddock.....1925
Col. Carroll D. Wright*.....1897-1909	Col. Leonard P. Ayres.....1926
Mr. S. N. D. North*.....1910	Dr. Edmund E. Day.....1927
Dr. Frederick L. Hoffman.....1911	Mr. Carl Snyder.....1928
Prof. Walter F. Willcox.....1912	Prof. Edwin B. Wilson.....1929
Dr. John Koren*.....1913-1914	Col. Malcolm C. Rorty*.....1930
Dr. E. Dana Durand.....1915	Prof. William F. Ogburn.....1931
Mr. Charles P. Neill.....1916	Prof. Irving Fisher.....1932
Prof. Allyn A. Young*.....1917	Dr. Stuart A. Rice.....1933
Prof. Wesley C. Mitchell.....1918	Prof. Frederick C. Mills.....1934
Dr. Joseph A. Hill*.....1919	Prof. Willford I. King.....1935
Mr. George E. Roberts.....1920	Dr. Joseph S. Davis.....1936
Prof. Carroll W. Doten.....1921	Dr. W. Randolph Burgess.....1937
	Dr. R. H. Coats.....1938
	Prof. Raymond Pearl.....1939

* Deceased.

OFFICERS FOR THE YEAR 1939

President

RAYMOND PEARL
*The Johns Hopkins University
Baltimore, Maryland*

Directors

MORRIS A. COPELAND
*Central Statistical Board
Washington, D.C.*

HALBERT L. DUNN
*Bureau of the Census
Washington, D.C.*

GEORGE O. MAY
*Price, Waterhouse & Co.
New York City*

JOSEPH S. DAVIS
*Food Research Institute
Stanford University, Calif.*

F. LESLIE HAYFORD
*General Motors Corporation
New York City*

WALTER W. STEWART
*Institute for Advanced Study
Princeton, New Jersey*

Vice-Presidents

O. C. STINE
*Bureau of Agricultural Economics
Washington, D. C.*

J. FREDERIC DEWHURST
*The Twentieth Century Fund
New York City*

ALFRED J. LOTKA
*Metropolitan Life Insurance Company
New York City*

ROBERT W. BURGESS
*Western Electric Company
New York City*

EWAN CLAGUE
*Social Security Board
Washington, D.C.*

WILLIAM J. CARSON
*University of Pennsylvania
Philadelphia, Pennsylvania*

JOSEPH BERKSON
*Mayo Clinic
Rochester, Minnesota*

VERGIL D. REED
*Bureau of the Census
Washington, D.C.*

Secretary-Treasurer and Editor

FREDERICK F. STEPHAN
*210 Normandy Bldg.,
1628 K Street, N.W.
Washington, D.C.*

Program Committee for the Centenary Celebration

E. DANA DURAND, *Chairman*
EDMUND S. COGSWELL
JOHN DICKINSON
HALBERT L. DUNN

STUART A. RICE
WOODLIEF THOMAS
RAYMOND PEARL, *ex officio*
FREDERICK F. STEPHAN, *ex officio*

Committee on Arrangements for the Anniversary Meeting (The officers and counselors of the Boston Chapter)

EDMUND S. COGSWELL, *Chairman*
ROSWELL F. PHELPS, *Secretary*
E. L. QUIRIN, *Treasurer*

THEODORE H. BROWN
HOWARD C. BALDWIN
CHARLES A. BLISS

OFFICERS AND EDITORS FOR THE YEAR 1940

President

F. LESLIE HAYFORD
*General Motors Corporation
New York City*

Directors

W. LEONARD CRUM
*Harvard University
Cambridge, Massachusetts*

GEORGE O. MAY
*Price, Waterhouse & Co.
New York City*

WALTER W. STEWART
*Institute for Advanced Study
Princeton, New Jersey*

HALBERT L. DUNN
*Bureau of the Census
Washington, D. C.*

RAYMOND PEARL
*The Johns Hopkins University
Baltimore, Maryland*

WILLARD L. THORP
*Dun & Bradstreet, Inc.
New York City*

Vice-Presidents

HOWARD WHIPPLE GREEN
*Cleveland Health Council
Cleveland, Ohio*
*Collection and Classification of Data, and
Administration of Statistical Agencies*

RALPH J. WATKINS
*National Resources Planning Board
Washington, D. C.*
*Facts and Methods Bearing upon Economics
and Economic Theory*

GEORGE W. SNEDECOR
*Iowa State College
Ames, Iowa*
*Statistical and Actuarial Methods and Technique,
and the Teaching of Statistics*

WILLIAM A. BERRIDGE
*Metropolitan Life Insurance Company
New York City*
*Facts and Methods Pertaining
Primarily to Business*

NEVA R. DEARDORFF
*Welfare Council of New York City
New York City*
*Facts and Methods Pertaining to Sociology, Social
Welfare Problems, and Labor Statistics*

DONALD S. THOMPSON
*Federal Deposit Insurance Corporation
Washington, D. C.*
*Facts and Methods Pertaining
to Financial Institutions*

ALFRED J. LOTKA
*Metropolitan Life Insurance Company
New York City*
*Facts and Methods Related to Biometry, Vital
Statistics, Psychology, and Education*

THEODORE N. BECKMAN
*Ohio State University
Columbus, Ohio*
*Facts and Methods Pertaining to
Marketing*

Secretary-Treasurer and Editor

FREDERICK F. STEPHAN
*210 Normandy Building
1626 K Street, N.W.
Washington, D. C.*

Review Editor

GLENN E. McLAUGHLIN
*210 Normandy Building
1626 K Street, N.W.
Washington, D. C.*

Associate Editors

ROBERT W. BURGESS
*Western Electric Company
New York City*

FRANK A. ROSS
*Syracuse University
Syracuse, New York*

GLENN E. McLAUGHLIN
*Hunter College
New York City*

WALTER F. WILLCOX
*Cornell University
Ithaca, New York*

THEODORE O. YNTEMA
*University of Chicago
Chicago, Illinois*

Biometrics Section

Chairman

HUGO MUENCH, JR.
*Rockefeller Foundation
New York City*

Secretary

JOSEPH BERKSON
*Mayo Clinic
Rochester, Minnesota*

JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION

MARCH, 1940 · This part \$1.00 per copy · Vol. 35 · No. 209, Pt. 2

CONTENTS

The Centenary of the American Statistical Association		
	FREDERICK F. STEPHAN	213
Program of the Centenary Anniversary Meeting		216
PROCEEDINGS OF THE ANNIVERSARY DINNER MEETING		
Remarks of the Presiding Officer	RAYMOND PEARL	217
Remarks of the President of the Boston Chapter		
	EDMUND S. COGSWELL	219
Greetings of the Brazilian Geographical and Statistical Institute		
	ILDEFONSO FALCÃO	220
Lemuel Shattuck, Statist, Founder of the American Statistical Association	WALTER F. WILLCOX	224
The Halfway Point	DAVIS R. DEWEY	236
Program of the Centenary Celebration at the Annual Meeting		241
CENTENARY CELEBRATION ADDRESSES AT THE ANNUAL MEETING		
Census - Past and Future	HALBERT L. DUNN, M.D.	242
Statistical Trends	WILLIAM F. OGBURN	252
The Next 100 Years of the American Statistical Association		
	JOSEPH S. DAVIS	261
Greetings of the Allied Social Science Associations	JACOB VINER	273
Greetings of the Royal Statistical Society and the Canadian Political Science Association	R. H. COATS	275
The Aging of Populations	RAYMOND PEARL	277
HISTORICAL EXHIBITS		
Minutes of the First Six Meetings		298
Circular Issued by the Home Secretary		303
By Laws		305
Membership List, 1840		305
Charter		308

JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION

Number 209, Pt. 2

MARCH, 1940

Volume 35

THE CENTENARY OF THE AMERICAN STATISTICAL ASSOCIATION

A group of five men met in Boston on November 27, 1839, and decided to organize a statistical society. They did not have in mind the establishment of a purely local institution for, although the primitive facilities for transportation and communication available at that time prevented the development of a national organization of the kind that we now know, they drew into the membership of the society during its first year men from all the New England states, New York, and Philadelphia, and elected in addition corresponding members from New York, Pennsylvania, Ohio, Illinois, District of Columbia, Virginia, South Carolina, Kentucky, Missouri, and Arkansas. The membership reached into the southern states and westward to the frontier. The center of activities, however, was Boston, and for more than fifty years all the meetings were held in that city. In its development as a national body the American Statistical Association has grown and spread like the Nation of which it is a part. Its meetings are no longer confined to one city or one region. On the date of the 100th anniversary it was appropriate that the Association should return to the city of its birth to inaugurate its Centenary Celebration.

As early as 1933 the Association undertook to prepare an invitation to the International Statistical Institute for a meeting in the United States in 1939 in conjunction with the celebration of the Association's Centenary. Later the invitation of the United States Government was extended to the Institute by President Roosevelt in accordance with a joint resolution of Congress. It was contemplated originally that a meeting of the Institute would be held in the fall of 1939, but the premature adjournment of its Prague meeting during the Czechoslovakian crisis in September, 1938, delayed the formal acceptance of the invitation and made it desirable to shift the time of the meeting to the spring of 1940. The officers of the Association thereupon planned to arrange the Centenary Celebration in a series of three meetings: the first in Boston on the anniversary date, the second in Philadelphia a month later as part of the annual meeting, and the third in Washington in conjunction with the meeting of the International Statistical Institute.

The shadow of war fell across these plans shortly after they were formed. The officers of the International Statistical Institute postponed indefinitely the American meeting. With very deep regret the officers of the American Statistical Association set aside the plans and preparations that had been made for the third meeting in the Centenary Celebration series.

The following societies, institutions, and statistical bureaus were represented at the Centenary Celebration meetings or sent messages of felicitation. Many of them and a number of other scientific and statistical organizations expected to be represented at the meeting with the International Statistical Institute which was planned to be held in May 1940.

Actuarial Society of America	The Brookings Institution
American Academy of Arts and Sciences	Cambridge Philosophical Society
American Academy of Political and Social Science	Canadian Political Science Association
American Accounting Association	Carnegie Institution of Washington
American Association for the Advancement of Science	Cowles Commission for Research in Economics
American Association for Labor Legislation	Danish Statistical Department
American Association of University Teachers of Insurance	Dominion Bureau of Statistics
American Business Law Association	Econometric Society
American Council of Learned Societies	Faculty of Actuaries in Scotland
American Economic Association	Financial and Economic Committees of the League of Nations.
American Farm Economic Association	Finland Statistical Society
American Historical Association	Hungarian Statistical Society
American Institute of Accountants	Institute of Mathematical Statistics
American Marketing Association	International Statistical Institute
American Mathematical Society	Italian Society for Demography and Statistics
American Philosophical Society	Manchester Statistical Society
American Public Health Association	Mexican Geographical and Statistical Society
American Sociological Society	Milbank Memorial Fund
Argentina Statistical Society	National Academy of Sciences
Belgium Society of Statistics	National Bureau of Economic Research
Brazilian Geographical and Statistical Institute	National Industrial Conference Board, Inc.
British Association for the Advancement of Science	National Research Council
	National Research Council of Canada

National Statistical Bureau of Peru	Rural Sociological Society
National Statistical Office of Colombia	Scripps Foundation
Netherlands Statistical Circle	Smithsonian Institution
Pan American Union	Social Science Research Council
Royal Economic Society	Swedish Statistical Society
The Royal Society	Tax Policy League
Royal Statistical Society	Twentieth Century Fund

In this volume are gathered the papers that were presented at the Boston and Philadelphia meetings. With them are included some materials of historical interest pertaining to the founding of the Association and its early membership.

FREDERICK F. STEPHAN, *Secretary*

PROGRAM OF THE CENTENARY
ANNIVERSARY MEETING

BOSTON, NOVEMBER 27, 1939

LUNCHEON OF OFFICERS OF THE BOSTON CHAPTER
AND VISITING MEMBERS

EXCURSION TO POINTS OF INTEREST IN AND NEAR BOSTON

SUBSCRIPTION DINNER

Walker Memorial Building, Massachusetts Institute of Technology

Presiding Officer: Raymond Pearl, President, American Statistical Association

Greetings of the Commonwealth of Massachusetts

The Honorable Horace T. Cahill, Lieutenant Governor of Massachusetts

Response for the American Statistical Association

Raymond Pearl, The Johns Hopkins University

Response for the Boston Chapter

Edmund S. Cogswell, Department of Banking and Insurance, Commonwealth of Massachusetts

Greetings of the Brazilian Geographical and Statistical Institute

Ildelfonso Falcão, Consul of Brazil

Lemuel Shattuck, Statist, Founder of the American Statistical Association

Walter F. Willcox, Professor Emeritus, Cornell University

The Halfway Point

Davis R. Dewey, Professor Emeritus, Massachusetts Institute of Technology

The Association Today

Halbert L. Dunn, M.D., Bureau of the Census

PROCEEDINGS OF THE ANNIVERSARY
DINNER MEETING

PRESIDENT RAYMOND PEARL, presiding

Your Excellency; President Cogswell; Fellow-Members of the American Statistical Association; and Guests:

We are met here tonight to inaugurate the celebration of the 100th year of the continuous life and activity of the American Statistical Association. A month hence the second episode in this celebration will take place in Philadelphia.

But inasmuch as the Association held its first meeting one hundred years ago tonight just across the river in Boston it is altogether fitting that the beginning of our season of rejoicing should take place here, and that the ceremonies appropriate to the occasion should be opened by a representative of the Commonwealth of Massachusetts.

It gives me great pleasure, therefore, to present as the first speaker of the evening His Excellency, The Honorable Horace T. Cahill, Lieutenant Governor of Massachusetts.

[At this point the Honorable Horace T. Cahill delivered an extemporaneous address conveying the greetings of the Commonwealth of Massachusetts.]

On behalf of the American Statistical Association I wish first to thank you, Sir, for the most gracious and cordial greetings you have extended to us. We appreciate them deeply.

When one contemplates the acres, or tons, if you like better to think of them that way, of dry figures that have emerged as a consequence of the generative activities—direct or indirect—of the American Statistical Association, during the hundred years that it has been at its business, it seems almost miraculous that anyone should have kindly feelings towards a body responsible collectively for so many headaches. For your statistician is really a low fellow, with certain traits that are uncomfortably akin to those of the drug addict. He sniffs figures as other unfortunate persons do cocaine. A table or a graph is liable to set him off on as wild and raucous a career as that induced in a Mexican peon by peyoti. Further a statistician can be, and often is, a bit of a nuisance. Friendly persons who prefer to view debts and deficits in a spirit of broad humanitarianism are sometimes annoyed by narrower minds that insist on actually *counting* the cost of being a good fellow on other people's money.

Whenever I consider the ways of life and conduct, the attitudes, the precepts and standards, and the whole philosophy inculcated by 300

years of ancestry in or near these parts, I am overwhelmed by the profound conviction that there was that particular kind of cosmic appropriateness that follows only upon the inevitability portrayed in the Greek tragedies, in the fact of the American Statistical Association having been found in Boston. Nowhere else in the Western Hemisphere but New England, and nowhere in New England but Massachusetts, and nowhere in Massachusetts but Boston, *could* a statistical association have got successfully under way, and been from its very start imbued with those sturdy virtues that ensured continued survival; such as preferring to count, rather than to guess, or to believe, or to hope.

Naturally all these circumstances to which I have alluded have tended to build up traditions within the Association itself. For example, our efficient and beloved Secretary, Mr. Stephan, tells me that one of the most cherished of these traditions, one which has never yet been departed from in the whole history of the Association, is that on each hundredth anniversary the President shall be a Dartmouth man. For the first President, Judge Fletcher, was in fact Dartmouth bred.

In preparing for this occasion it has seemed worth while to get some sort of picture of what was going on generally in Boston back at the time when our Association was founded. Intensive research on the matter brought to light a fact of great interest, and probably hitherto unknown to our membership, or if known, certainly unremarked. It appears that in the year 1839 only one other event occurred in Boston at all commensurate in importance with the founding of the American Statistical Association. That was the founding of the Massachusetts School for Idiotic and Feeble-minded Children! Whatever organic connection there may have been between these two events it has seemed wisest, upon the whole, not to explore too deeply.

Since other speakers this evening will inform and entertain you in respect of the history of the American Statistical Association; and of its growth in numbers, usefulness, and influence; and of its present flourishing condition; and since, above all, it is not fitting for a toastmaster to encroach upon the time assigned to his betters, I shall turn now to the next feature of our program, with renewed thanks to you, Sir, for your welcome, and with the assurance that you may confidently look forward to the presence of the American Statistical Association here again one hundred years hence, if not sooner. For nothing can be surer than that the Association will always come back, whenever it has a significant anniversary, to the kindly womb in which it was

engendered and nourished, just as it did for the 75th anniversary, and is now doing for the 100th.

It is a great pleasure as well as honor, to present as the next speaker Mr. Edmund S. Cogswell, First Deputy Commissioner of Banking and Insurance of the Commonwealth of Massachusetts, and President of the Boston Chapter of the American Statistical Association.

REMARKS OF THE PRESIDENT OF THE BOSTON CHAPTER

The members of the Boston Chapter of the Association are much pleased that the first gathering in our Centenary Celebration is being held in Boston, the city in which the organization had its birth, exactly 100 years ago on November 27, 1839. We appreciate the presence of His Honor, Lieutenant-Governor Horace T. Cahill, and other distinguished guests, who are meeting with us on this memorable occasion, to take part in the celebration.

The year 1939 has been a notable centenary year in the old Bay State. The town of Rowley celebrated the Tercentenary of its founding in August. The Lieutenant-Governor, in his greeting, mentioned the fame of the educational institutions of our Commonwealth, and it seems fitting to call attention to the founding of the first state normal school in America in 1839 at Lexington in our state.

Our Association, which has done so much in its first one hundred years for statistics and the development of statistical methods and research, had its beginning in Boston in 1839, and its headquarters were here for many years. Another speaker will tell of the life of the Association while its residence was in Boston.

In New England, Thanksgiving is a time of reunion and rejoicing. It is an appropriate season of the year for a family reunion. The founders of our Association planned well the date of founding on November 27, 1839, because in 1939 there are two days on which Thanksgiving is celebrated, the fourth Thursday (November 23, 1939) designated by President Roosevelt, and the last Thursday (November 30, 1939) first designated by Abraham Lincoln, our President during the Civil War, and the day on which Thanksgiving has been regularly observed since his time, and is being observed this year in many states. All members thus have had the opportunity of being present at this Centenary Celebration without being obliged to be away from their families and firesides on the day that Thanksgiving is legally observed in their home states.

We members of the Boston Chapter are like the sons and daughters of a large family who have remained at the old homestead while the

other members of the family have gone forth out into the world to seek their fortunes. We have maintained the old homestead and we take great pleasure in welcoming back to it, at this Thanksgiving season, all members of the Association and guests who have come to be present at, and to take part in our One-hundredth Anniversary Celebration of the founding of our Association.

We are happy to have in our company tonight a representative of our esteemed kindred organization in Brazil, the Brazilian Geographical and Statistical Institute. In honor of our anniversary, he has caused the Brazilian flag to be flown today from the flagstaff of the Brazilian Consulate on Washington Street, not far from the birthplace of the Association. Now we are to have the pleasure of receiving greetings from the Consul of Brazil, Mr. Ildefonso Falcão.

MR. PRESIDENT—GENTLEMEN:

Through the incumbency, which greatly honors me, of the Brazilian Geographical and Statistical Institute, of Rio de Janeiro, I arise to warmly greet the American Statistical Association in the person of its illustrious President, Professor Raymond Pearl, on this day that is one of rejoicing and commemorates the victorious first centenary of its foundation in Boston. As may be observed, even though modestly in so notable an assembly of professors and experts of this science positive in progression that is Statistics, Brazil, through its specialized organ of the highest authority, sends its fraternal word of greeting and applause for the work that your Society has already accomplished to enlarge its prestige within and without the United States of America.

Please believe, Gentlemen, that it is not for purely protocolar courtesy that my country, so close to yours by an affinity of sentiments which has never suffered a break in its continuity, takes part in this celebration of so high a significance for a cultural ambient such as that of this powerful Nation which only the other day I called "the backbone of the contemporary world"—but rather, and above all, by reason of a sincere desire to demonstrate that it accompanies as remarkable examples all the immense series of magnificent deeds that have determined the splendor of the American civilization, of which we are all proud.

America, contrary to the old civilizations that from time to time sink down, as now, in the stupid barbarity of war, to the melancholy of all ingenuous pacifists—early became firm and triumphed. Not only that. It surpassed the others to predominate and—what is so

beautiful for you—not by the brutality of material force that crushes without convincing, but rather by the spirit it builds and the uninterrupted progress in the sense of the well being of its people and those who came to cooperate with the best of their goodwill.

In that stupendous labor the American Statistical Association has collaborated for a century. And this because no modern nation can forego the precious assistance of sure statistical methods, such as those of the United States—"leader" country in that science which is, in fact, the heedful barometer, ready to announce and even foretell the atmosphere of activity, under all aspects, of the organized nations. Statistics is order, within constructive action, and wise advertence. How often its numerical demonstrations modify the course of work whose success had never been doubted! All of us now gathered here in festivity, teachers and pupils, are mere figures in statistical reckoning. Not only because of the imperativeness of the demographic principles of Malthus, but also because we must appear here and there, depending upon the role that we play within the community. For masters of the skill of those of this country, whose statistical figures, regardless of how much they may follow fast upon each other, due to the swiftness of progress in all the expressions of material and intellectual work, can never become confused, in an honesty perfectly equivalent to a tradition, Statistics have the credentials of a primacial science. It is a sort of compass for those who do not wish to lose their way—an instrument of precision that has never learned to err in what it ought to show, optimistically or pessimistically, within the coldness of its figures. Schlösser defined it with such sagacity that one day he wrote: "History is Statistics in motion; Statistics is History at rest." And that is the truth—you know it better than I.

Brazil, in its advancing civilization, has for long understood this. Its statistical institutes, not only those of an exclusively economic-commercial or educational character, but also those of the multifarious activities of the kind that, by me, greet today the American Statistical Association, follow the rhythm of the development of the Nation. So it is that—and I take advantage of this moment to inform you—in the coming year of 1940, the Brazilian Geographical and Statistical Institute, by order of the Government, will start taking the general census of Brazil. The figures arrived at, will surely interest the United States, especially at a time when we more closely approach each other by a friendship that time persistently increases.

Mr. President, Gentlemen: Allow me, in conclusion, for the Brazilian Geographical and Statistical Association, of Rio de Janeiro, which I

represent, and for all those who serve the science of Statistics in my country, to rejoice over the long period so gloriously traversed by the American Statistical Association, and to wish it others of the same wisdom, vigour, and brilliance, throughout the years that are transforming into an extraordinary universal event the civilizing preponderance of this great America of Washington and Lincoln, Madison and Monroe.

We are singularly fortunate in having here with us tonight three of the Elder Statesmen of the American Statistical Association, Mr. Dewey, Mr. Willcox, and Mr. Falkner, all of whom have played important roles in its history. The one of them whom I am about to introduce now is universally recognized, here and abroad, as the *doyen* of American statisticians. Both in the science of demography, that basic branch of statistics, and as a historian of statistics, he stands an acknowledged leader. Honors have deservedly been showered upon him. He is an Honorary Fellow of the Royal Statistical Society of England; and of the Statistical Society of Hungary; he has for many years been a Vice-President of the International Statistical Institute. He is a Past President of this Association, as well as of the American Economic Association. His sound and deep wisdom has influenced and in no small degree guided, the statistical work of this country for nearly two generations.

Tonight he is going to tell us about the founder of the American Statistical Association, Dr. Lemuel Shattuck, Statist.

It is with profound pleasure that I present my old and dear friend, Professor Walter F. Willcox.

[Professor Willcox' address is given on pages 224 to 235.]

The connection between the American Statistical Association and the Massachusetts Institute of Technology is a long, close, and honorable one. For many years of what might perhaps be called the middle period of the Association's history, M.I.T. furnished it not only with a *siege social* for its meetings and for the keeping of its archives, but also with its principal officers—in the persons of such commanding figures in the statistical world as Francis Amasa Walker and Carroll W. Doten, for example.

One of the greatest items in this long indebtedness of the American Statistical Association to M.I.T. is for the life-long interest and services of our next speaker, who is today not merely an Elder Statesman of the Association, but in point of fact the Eldest. His memory spans more of our history than that of any other living person, and I am

sure that you all rejoice with me that he has consented to honor us with his presence tonight, and to entertain us with some of his reminiscences about significant events in the Association's history.

It is an honor and a privilege to present to you Dr. Davis R. Dewey, Professor Emeritus of the Massachusetts Institute of Technology, and Past President of the American Statistical Association.

[Professor Dewey's address is given on pages 236 to 240.]

We have been favored this evening with a rich offering of wit and wisdom about the history of the American Statistical Association. It is important that before we adjourn we should hear something of its present state and condition. To do this there could not possibly be a better choice than the one to whom it has been assigned. Chief Statistician for Vital Statistics of the Bureau of the Census, Member of the International Statistical Institute, and the liveliest, keenest, and hardest working Director the American Statistical Association probably ever had, Dr. Halbert L. Dunn, will now speak on *The Association Today*.

[Dr. Dunn spoke extemporaneously reviewing the recent growth of the Association and sketching its opportunities for services as a scientific and professional organization.]

In closing these proceedings I wish to express, on behalf of Directors, officers, and members of the American Statistical Association, our deep appreciation and gratitude to the Boston Chapter for arranging this hundredth anniversary meeting, with its historical exhibit, excursion, and dinner, which we have all enjoyed so much, and which I now declare adjourned, to be reconvened 100 years hence.

LEMUEL SHATTUCK, STATIST, FOUNDER OF THE AMERICAN STATISTICAL ASSOCIATION

BY WALTER F. WILLCOX
Professor Emeritus, Cornell University

THE MOST influential English and American workers in our field, William Farr and Lemuel Shattuck, together with perhaps the most influential American writer of prose and verse, Shattuck's fellow townsman and friend, Waldo Emerson, chose the older and shorter word, *statist* and eschewed the modern tongue-twisting statistician. Should not we lesser laborers in the same vineyard then revive their practice? Because I think we should, my title this evening is in part, "Lemuel Shattuck, Statist."

The year, 1839, when Shattuck reached the age of 46 and founded our society, marked the main turning point in his career. He then retired from business as a printer and bookseller and devoted his 20 remaining years to the service of city, State and nation. Most of his major efforts started and all reached their fruition after that date. Almost his first important move was to gather about him a small group of friends to aid in starting the society whose centenary we celebrate and whose influence gave him a leverage for other tasks. But before describing that event let me outline his earlier life.¹

Lemuel Shattuck, the fifth among six children, was born at Ashby, Massachusetts, about 30 miles from Concord, the county seat, the bicentenary history of which was to be his first literary effort. A few months later his parents moved to his mother's family home in New Ipswich, New Hampshire, about five miles away, and there Lemuel lived until reaching his majority. In childhood and youth he had seldom more than 6 weeks of schooling in any one year and his formal education ended with two quarters in the local academy. These meager opportunities were supplemented, however, by homework with the other children, three brothers and two sisters. Early in life he formed the

¹ Sources. The only important sources of information about Shattuck's early life are manuscripts in the library of the Massachusetts Historical Society of which he became a member in 1830. These include a sketch of his life until he reached the age of 19 (written when he was 60), a Diary covering the next 3 years, and a Journal continuing the narrative until he was 24. Parts of the Journal have been printed in the *Michigan History Magazine*, "Lemuel Shattuck and the University of Michigan," 18 (1934), 225-252.

Shattuck's account of his later life is printed in his *Memorials of the Descendants of William Shattuck*, pp. 302-312. Other sketches have been published in *New England Historical and Genealogical Register*, 14 (April, 1860), 97-99; *Proceedings of the Massachusetts Historical Society*, by Charles Hudson (June, 1880), 6, pp. 155-165; *Memorial Biographies of the New England Historic Genealogical Society*, by John Ward Dean, 3 (1883), 290-321; *Memoirs of the Social Circle in Concord*, by George Keyes, 2d Series (1888), *Pioneers of Public Health*, by M. E. M. Walker, 1930, pp. 59-70; and *Dictionary of American Biography*, by W. F. Willcox, 17 (1935), 33 f.

habit of spending free moments during the day or time taken from sleep over substantial books or in self-directed study. When he was grown and before he started for the West he worked on a farm, in a shop, or as a teacher.

An influence which molded his youth may be guessed from the fact that his mother died when he was 4 years old, his father when he was 22, one sister when he was 23, and the other when he was 28, all of consumption. Only 6 years after the last of these blows fell upon him an article in an English review proved that if the 18th century life table used by the English Insurance Companies was trustworthy the average length of human life had increased and thus gave a rational ground for hoping that it might be further lengthened.² Shattuck fell in with this article not long after it appeared. We may conjecture that the loss of four members of his family by a disease which even then was beginning to be thought preventable gave point to its argument and turned Shattuck's thoughts to sanitary problems as a major and in the end a dominating interest in his life.

The opening sentence of his diary—"This day 19 years ago I was born into this world a sinner possess of that principle which is opposed to God and his government; totally depraved in all my actions, desires and affections" is characteristic not only of Shattuck himself but also of the period before the frost had begun to loosen its grip on the soil of New England. The sentence gives a clue to much of his later life but needs to be supplemented by recalling that he died a Unitarian, in that also reflecting a trend of the times.

The sentence I have quoted was written just as the war of 1812 began. When it ended Shattuck joined the army of migrants westward, going first as a teacher to Troy and Albany where he was inducted into the latest educational fad, the Lancastrian System of Education. Later he ventured into the real wilderness under contract to teach this Sys-

² Edwin Chadwick, "Life Assurances—Diminution of Sickness and Mortality," *Westminster Review*, 9 (1828), 384-421.

If the Northampton Life Table on which the English Insurance experts relied and the table prepared from the experience of these Insurance Companies themselves were as trustworthy and as representative of the general population of England as Chadwick thought they were, the expectation of life in that country had increased since the middle of the 18th century as follows:

Age	<i>Expectation of life in years according to</i>		
	<i>Northampton Table</i>	<i>Equitable Experience</i>	<i>Increase</i>
20	33.4	41.1	7.7
30	28.3	34.0	5.7
40	23.1	27.4	4.3
50	18.0	20.7	2.7
60	13.2	15.0	1.8

No doubt Shattuck accepted these results as proving that the length of life in England was increasing and his own reached a few years later as proving that the length of life in Boston was decreasing. If so, they suggest an important motive for much of Shattuck's future work.

tem in the primary department of an embryo institution in Detroit, the "Catholepistemiad or University of Michigania." It was based on a grant of \$380 from the territorial legislature and burdened with a fantastic and jaw-breaking Greek nomenclature. Shattuck arrived after a week of stage coaching from Albany to Buffalo during which the breakable equipment for the new job which he had brought in his trunk was nearly ruined by the jolting. This experience was followed by more than a week of pitching and tossing in a sailboat out from Buffalo to Detroit a journey which he later described as "amid the most terrific gales of wind, showers of rain, flashes of lightning and peals of thunder I ever witnessed." Before they arrived passengers and crew had to live almost entirely on dry ship bread.

In view of the fact that Shattuck's "manner and conversation were very precise and pompous" and of the Concord tradition that children frequenting the store kept by him and his brother would wait, if the latter was out, in order to be served by him, we may suppose that Lemuel was not eminently successful with children. In his 4-year venture at Detroit his health was impaired and his thin purse lightened because even the modest salary of \$800 was not fully paid until long after his return. Upon getting back to New England he drifted into the other great current of migration, that to the rapidly growing seaboard cities and after 10 years in Concord moved first to Cambridge, five times as large, and soon after to Boston, where he remained until his death, 25 years later. Although Boston was only one-quarter the size of New York and three-quarters the size of its other rivals, Baltimore and Philadelphia, it plumed itself upon being, with the support of Harvard, the intellectual capital of the Western Hemisphere and a modern Athens, with the *North American Review* rivaling the *Edinburgh*. Many Bostonians believed that New England and its capital city had borne the brunt of the recent wars against England, somewhat as Attica and Athens had those of the wars against Persia. In each city the inhabitants, flushed with their victories, felt themselves ready for any task.

Shattuck's fellow citizens prided themselves too, on the cordial reception accorded in Europe to such Bostonians as George Ticknor, Edward Everett, George Bancroft, and Joseph Cogswell, for whom the diplomatic triumphs of the Adamses and the literary triumphs of Irving had prepared the way. These New England scholars, stimulated by Madame de Stael's brilliant interpretation of Germany had outrun British literati in turning to that country for light and leading. Fortified with letters of introduction from Jefferson, Adams and others, they

were received by Europeans everywhere with a warmth of which the remarks of Madame de Staël to one "You are the advance guard of the human race," and of the Pope to another, "In a few years the New World will dictate to the Old" are an epitome. No wonder their heads were turned.

Shattuck as a bookseller and publisher, even on a modest scale, found himself at last in touch with the intellectual life of the world and soon built up a correspondence with many persons of like tastes with himself on both sides of the Atlantic. Being very systematic, if not pedantic, he constantly sought to systematize and so improve town, city, or State affairs. While on the Concord school committee, he had reorganized the public school system, prepared and printed school regulations, introduced school registers to be kept by teachers and filed as a part of their report, secured the passage of an ordinance requiring an annual report in writing from the school committee to the town meeting, and had written the first such school reports ever presented in Massachusetts.³ Other towns soon demanded the like and a few years later the legislature required them of school committees throughout the State.

During the years after Napoleon had been swept off to St. Helena by the rising tide of nationalism in Europe interest in history grew rapidly on both sides of the Atlantic and in America found its earliest expression in hundreds of local histories pouring from the rural presses. Concord, like many other towns, bestirred itself over an approaching bicentenary. It had started 15 years after Plymouth in the heart of the wilderness and was the first town at a distance from the main early highway, the sea. Its position later as county seat and as a temporary refuge of the legislature, and of Harvard College together with its prominence during the opening days of the Revolution, gave its citizens, especially Shattuck, a deep realization of its importance. Not long after his return he began a series of newspaper notes about its history, the warm reception of which encouraged him to extend them into his first literary effort, a history of Concord, which long served as a model.

In the *Prospectus* he wrote:

Few places have so many interesting incidents associated with their history. From its local situation Concord has been the centre of many important operations in the county of Middlesex, and of some of the most interesting in the Commonwealth. Being the first inland town settled

³ Three such reports in Shattuck's handwriting are now in the files of the Concord Board of Education.

above tide-waters, it endured great hardships in the commencement of its history. The progress of the settlement, the exertions to civilize the Indians, the warlike operations in the town as a military post during Philip's war, the distinguished part it took in the Revolution, and in other peculiar eras in the history of Massachusetts, are imperfectly, if at all known; but fortunately many important facts have been preserved in manuscript.

Three-fifths of the book, excluding its appendices and chapters devoted to the four surrounding towns set off from the original Concord, are a general history including two initial chapters about the peaceful and friendly relations between Indians and whites foreshadowed in the name. Then follow special chapters on natural history, church history, and a notable one on statistical history, which gave Shattuck greater trouble and seemed to him more important than any other. It shows his early interest in education, in registration, and in exact numerical statements. Thus he wrote "Few subjects are more interesting than accurate bills of mortality. They are the most authentic evidence of the influence of climate and local circumstances on health and human life."

At the time of the bicentenary Shattuck's book had not been published, but the orator of the day, Emerson, had seen it in proof and in his address commended warmly the author's "zeal and patience."⁴

This tribute was overshadowed, no doubt, in Shattuck's mind by that of a critic in the *North American Review*, the country's foremost journal of opinion, who wrote: "Nothing but inveterate industry and unshrinking perseverance, nothing but the professional enthusiasm by which they are sustained could have enabled our annalist to undertake or to undergo the years and years of dismal drudgery of which his book bears evidence upon every page . . . *The History of Concord* is the fruit of laborious research; the most so, in its class, which American literature has produced."

This cordial reception of his maiden effort kindled and directed Shattuck's ambition. In preparing it he had learned that throughout the State births, marriages, and deaths were incompletely registered. Two years after it appeared and 9 after the publication of the English article about the prolongation of life Shattuck became a member of the Boston Common Council and there proposed that a committee be appointed to consider the subject of registration. The move was unsuccessful, but his effort doubtless prepared the way for similar and

⁴ In answer to Shattuck's claim that he should have been given even more credit Emerson wrote that much of his material had been taken not from Shattuck's pages but from his sources. See Ralph L. Rusk *Letters of Ralph Waldo Emerson*, 1 (1939), 455.

persistent attempts a few years later as a member of the State legislature, which were crowned at last with success.

Thus upon his retirement in 1839 he had already shown in Concord and Boston a keen and intelligent interest in improving and interpreting the statistics of births, marriages, and deaths, and in educational statistics and was in correspondence with leading European statisticians. Six years later when he took a census of Boston, he shaped it after the best foreign models, and his *Plan for a Sanitary Survey of Massachusetts* published in 1850 revealed a remarkable familiarity with the best contemporary demographic and sanitary work in Europe.

This sketch of Shattuck's life has reached the time when our Association was founded. In the preceding years a mushroom growth of statistical societies had sprouted in cities on both sides of the Atlantic but most of them soon withered. We may distinguish a French and a British group. The former included societies organized between 1827 and 1837 in 6 French cities; the latter societies organized between 1825 and 1838 in 11 British cities.⁵ During the same period 3 statistical societies sprang up in the western hemisphere, the Mexican National Institute for Geography and Statistics with its germ in Madrid, the New York Statistical Society, and the American Statistical Association, of which only the last developed a vigorous life. Whether the stillborn New York Statistical Society, which took out and later amended a charter, started under the influence of César Moreau and the French Society of World Statistics, which itself lived less than 20 years, or whether it was due to the example of the London Statistical Society does not appear.⁶

Our own Association originated beyond a doubt in the example of the British group of societies, particularly the Statistical Society of London. But seemingly the founders thought it unwise to stress that fact. In the statement of its field and aim, published immediately after its organization, although the opening and closing sentences are quoted from the *Journal* of the Statistical Society of London, the reader would not learn it from the printed page. The first sentence is not put in quotes and the last is introduced by the phrase, "In the language of a kindred institution." The memory of two recent wars against England, reenforced by the swelling stream of bitterly anti-British immigrants from Ireland may account for this reticence. The Council of the Statistical Society of London reported with appreciation in its

⁵ W. F. Willcox, "Note on the Chronology of Statistical Societies," this *JOURNAL*, 29 (1934), 418-420.

⁶ Compare *Silliman's Journal*, 31 (1837), 186-188 and 32 (1837), 202-204 with *Stat. Soc. of London, Jour.*, 5 (1842), 89.

Journal that its constitution had served as a model for that of the American Statistical Association. Although nearly all statistical societies of that period including the parent Society had been named for a city, those who wrote our Constitution wavered between a nationalism hinted by the word, *American*, in its name and a parochialism shown by requiring that the annual meeting should be held in Boston.

We may assume that the five men who attended the preliminary meeting were not equally responsible for bringing the babe to birth.

A brief review of what the other four had done will help us to fix upon the real leader.

William Cogswell graduated from Dartmouth, and then passed 2 years in teaching at an academy, meanwhile beginning to prepare for the ministry, as Shattuck would have done had health and means permitted. After a pastorate at Dedham, Cogswell resigned to become General Agent of the American Education Society, which aimed to raise funds for a better educated ministry. His duties carried him throughout the Atlantic Coast States, pleading with churches and wealthy persons to give money to the cause. Some journals of the day said that his position gave him more influence than any other man in New England. This office he had held in 1839 for 10 years. Two years later when he retired with health impaired by his labors, he had raised two-thirds of a million dollars and had aided 2,500 young men to prepare for the ministry. Both he and Shattuck were charter members of the New England Historic Genealogical Society.

Richard Fletcher was a lawyer. He had represented Boston for a term in the House of Representatives at Washington, where he found contact unendurable "with men whose profanity and immorality shocked him beyond measure" so he refused to run again. He had also triumphed greatly in both Charles River Bridge cases before the Massachusetts Supreme Court against Daniel Webster and Lemuel Shaw and in the face of the adverse opinion of nearly all the leaders of the Boston bar. This was the great anti-trust case of a century ago, in which the Massachusetts Courts and later the United States Supreme Court denied the claim of Harvard University to an exclusive right to maintain a toll bridge between Charlestown and Boston. Fletcher's successes had made him a leader, perhaps the leader, of the Boston bar. He had been more in the public eye than any of the others and was the obvious man to head the new society.

John Dix Fisher was a physician. He had supplemented his undergraduate course at Brown and his medical work at Harvard by two years in Europe and then became a pioneer in medical reform. His special interest in the care of the blind had been the driving force in

establishing 10 years before the Perkins Institution and Massachusetts School for the Blind. Fisher also had found in Samuel G. Howe the man to head the new institution.

Oliver Peabody, besides being a lawyer and a clergyman, had written poetry of a sort, had been the first American editor of Shakespeare and had helped his brother-in-law, Alexander Everett, in editing the *North American Review*.

Shattuck's career has already been sketched. Among the other four were graduates of Brown, Dartmouth, and Harvard, spokesmen for law, medicine, theology, literature and education, men who had rendered important service to city, State and nation. But though Cogswell's editorship of several volumes of the *American Quarterly Register* had involved a little dilettante work in statistics, none of the four had shown a sustained and compelling interest in that subject. Shattuck alone was a real statist; he alone attended all of the early meetings and as secretary at the start he pulled the laboring oar. He was already in correspondence with Lister, the first Registrar General of England, and with Rawson W. Rawson, Honorary Secretary of the London Statistical Society and first President nearly half a century later of the International Statistical Institute. Before the infant organization was two months old Shattuck had sent Quetelet a batch of statistical books and received a return consignment along with full answers to several questions Shattuck had addressed to him.

We may surmise that the other four men were hand-picked by Shattuck, sharing in his deeply religious attitude towards life; in his profound devotion to the public welfare and to social reforms, in his eagerness to test the efficacy of a new tool with which to work towards those ends. Shattuck's special interest in teaching and preaching may have bound him closest to Cogswell; at any rate it was in Cogswell's office that the early meetings were held; Cogswell made the motion that the society be organized; he was chairman of the committee which drafted the constitution and by-laws and nominated the first officers. After a second meeting, at which a constitution was adopted, the third fixed the original membership or the founding fathers. Those joining at that time included Henry Lee, a leader of the Boston group of traders overseas and of those who fought against any increase of import duties; Joseph B. Felt, who had just spent three years in arranging early papers in the State archives; John P. Bigelow, Secretary of the Commonwealth; Horace Mann, who had served for 10 years in both branches of the State legislature and then for 2 years as Secretary of the newly established State Board of Education; Samuel G. Howe, modern knight-errant, who had begun his long career as director of a school for

the blind, mental and spiritual father of Laura Bridgmen, later to become an abolitionist and backer of John Brown; and Jesse Chickering, one of the few statisticians of that generation. The officers included Ebenezer Alden, genealogist and historian of American medicine; B. B. Edwards, professor at Andover Theological Seminary and author of the society's original Address to the public; and Joseph E. Worcester geographer and lexicographer.

These founders thus worthily represented the historical, professional, and literary leadership in the Boston of 100 years ago. As we shall see, Shattuck at once began to use the organization to reinforce his arguments for improved statistical work in Boston, in Massachusetts, and later in the country.

Little more than a year after our Society was organized the Massachusetts legislature received two memorials, one from the American Academy of Arts and Sciences, the other from the Massachusetts Medical Society, but both due to Shattuck's initiative, urging the enactment of a law for the effective registration of births, marriages, and deaths. As these memorials were received late in the session they were referred to a joint committee which recommended that the subject be postponed for a year but declared that an efficient system of public registration would be of great benefit to the State and expressed the hope that a law would soon be passed to cover the whole ground. Meantime Shattuck had published an article on the vital statistics of Boston, showing as he thought, that the average length of life in the city had diminished in the preceding 20 years. Whether the records of the living and of deaths by age were trustworthy enough to support this conclusion may perhaps be doubted. However that may be, the study shows an acquaintance unusual for a century ago with sound demographic methods and the best foreign authorities; at the time there were no American authorities.

A year later the legislative committee reported a bill for improving registration, but before it was passed unfortunately it was emasculated. The main gain secured through this abortive attempt was that the new law directed the Secretary of the Commonwealth to report annually to the Legislature on registration statistics and thus initiated the valuable series of Massachusetts Registration Reports. The first of these contains, apart from its tables, 60 pages about registration, most of it taken from documents handed to the Secretary by Shattuck. The second includes a letter from the same source making suggestions for which the Secretary had asked. Shattuck showed that since the Revolution registration had been neglected and that the Act of the preceding year had not remedied the situation. Its main defects were

that no person was designated to give the information to the recording office, that no adequate compensation was provided for compliance and no adequate penalty for non-compliance, and that the form of record was left to the town or city clerk. So Shattuck submitted an alternative plan framed after a study of the systems in force in England and France.

In the following year a revised registration law provided that each town clerk or city clerk should send in each year a certified copy of the births, deaths and marriages reported to him. He was to get his information about births from the local school committee, that about marriages from the person performing the ceremony, and that about deaths from the sexton or other person having charge of the cemetery. A fee of 5 cents was provided for each birth or death reported to the clerk and one of 8 cents for each one reported by him to the Secretary of the Commonwealth, but there was no fine provided for failure to report to him. This law brought results little better than those of its predecessor.

Next year Shattuck renewed the attack by sending to the Secretary of the Commonwealth a long letter interpreting the results of registration thus far. As this led to no improvement, he followed it early in 1843 with a memorial to the State Legislature urging that the laws be improved and embodying an annotated draft of a law. Later in the same year, luckily, he himself was elected to the Legislature and became chairman of a joint committee "to consider the expediency of modifying the existing laws relating to the registration of births, marriages, and deaths." The committee's report recited the advantages of civil registration, described the development of the Massachusetts system, pointed out the imperfections of the existing laws and the changes needed to secure complete registration, and ended with a draft of a bill. Before the session closed the bill was passed and the campaign which had begun 11 years before ended at last in victory. In the 10 years following the enactment of the first of these laws New York, New Jersey, Connecticut, New Hampshire, Kentucky, and Pennsylvania passed similar measures and other States followed but more slowly until by 1933 every State had fallen into line, and the country had developed a unique and effective system of registration statistics based upon voluntary cooperation between the constituent States and the Federal Government. For our present country-wide registration system Shattuck deserves more credit than any other man.

Before this campaign ended he turned his attention to the other pier on which the arch of demography rests by moving to improve census practice in Massachusetts. Serious errors had been detected by Jarvis in the 1840 figures for Massachusetts and by Shattuck in the 1840

figures for Boston. Using this evidence of weakness as an effective lever Shattuck induced the Boston City Council, of which he had recently been a member, to set up a joint committee "with full powers to procure a census of the city of Boston with such other statistics as they may deem proper." This committee engaged Shattuck for the task, and eight months later he presented the results in the form of a *Census of Boston for the Year 1845*, the pioneer among modern American censuses. Of this census he wrote later, "He thus introduced for the first time in this country a new plan for the enumeration—that of taking the name and description of every person enumerated." This is a modest statement of his improvements. Giving a line on the schedule to each person instead of to each family made the person the census unit, facilitated recording the name, age, birthplace, marital condition, and occupation of each person, and allowed the preparation of many new and important census tables. Shattuck also introduced collateral material from official sources and bound the whole together through a critical interpretation of the results. Because of this outstanding success he was called to Washington for advice when the Federal census of 1850 was at hand. There he drafted five of its six schedules and wrote the enumerators' instructions; in fact the United States census of 1850 was the Boston census of 1845 writ large. The one outstanding failure of the Federal enumeration lay in seeking for birth rates and death rates not through registration but through asking each family to report any birth or death which had occurred in it during the preceding census year, a procedure against which Shattuck had vigorously protested. In 1900 after half a century of futile attempts, the Washington Census Office abandoned the effort and reverted to Shattuck's plan of encouraging registration. The most important improvements during 150 years of Federal censuses resulted from the adoption in 1850 of Shattuck's ideas.

His last and probably his greatest social service was as chairman of a commission to suggest a plan for a sanitary survey of Massachusetts. Its *Report*, written entirely by him, proved to be a milestone in the improvement of American public health.

For years before 1837 public education in Massachusetts had been getting worse because it was left almost entirely to local authorities. The trend changed when a State Board of Education was created and administered for 12 revolutionary years by Shattuck's friend, Horace Mann. Registration and public health were still, as education had been at an earlier date, almost entirely in the hands of the locality and grossly neglected. Shattuck proposed to set up a State Board of Health

which, like the State Board of Education, should lead in the effort for improvement. For 20 years his report lay almost unnoticed but in 1869, after the political and military struggle over slavery and secession had ended, Massachusetts reverted to his ideas and established the earliest American State Board of Health. Its first head, Dr. Henry I. Bowditch, tells us that he and the Board looked back to Shattuck's report for inspiration and guidance and long afterwards he said of it: "The ideas contained therein germinated slowly but surely. . . . Shattuck . . . as a layman, did more towards bringing Massachusetts to its present status than all the efforts made by the Massachusetts Medical Society in its corporate capacity or by members." Of this same report, George C. Whipple wrote two generations after it appeared: "One is amazed, first, at the farsightedness of Shattuck, and, second, at the way in which his ideal slowly fulfilled itself; there is hardly one of his 50 recommendations which has not in one way or another been carried out in Massachusetts, and there is hardly a public health measure put into practice which was not anticipated by Shattuck, save only those relating to bacteriology—a science then unborn."

The evidence thus outlined seems to warrant these conclusions:

Shattuck was the leader in founding the American Statistical Association.

He was the main agent in carrying to a successful conclusion the prolonged campaign for that effective system of registering births, marriages, and deaths in Massachusetts, which has now expanded to include every State in the Union.

Through his influence and that of his Boston census of 1845 upon the Federal census of 1850, the census practice of the United States was modernized.

Through his Plan for a Sanitary Survey of Massachusetts to be executed by a projected State Board of Health, he contributed more than any man of his generation, professional or lay, to the improvement of American public health and preventive medicine. Such a State Board of Health, was established in Massachusetts 20 years after his report recommended it and then imitated in State after State.

Through the 50 recommendations embodied in that Plan he anticipated nearly all the public health measures not based on bacteriology which were introduced in the following two generations.

Because of these achievements he stands out as the most influential American statist.

THE HALFWAY POINT

BY DAVIS R. DEWEY

Professor Emeritus, Massachusetts Institute of Technology

IN HIS correspondence inviting me to participate in this meeting, the secretary of the American Statistical Association, Mr. Stephan, very thoughtfully reminded me that I joined the Association fifty-two years ago and that my membership was the longest of any now living. Fifty-two years is a long space. Apparently I am an antique. The craze of a decade ago for antiques has somewhat abated, and I therefore seek your indulgence for the present exhibit.

As I stand before you I find it difficult to reconcile the present with the past. Statistics as I knew it a half century ago was a humble worker in the society of arts and sciences which was trying to explain the happenings of this complicated world.

Statistics at that time was a monogamist, wedded to another humble toiler—Arithmetic. Since then Statistics has grown in many ways. The simple family life has been greatly changed. Statistics has become a polygamist; he has taken unto the bosom of his family Miss Algebra, Miss Descriptive Geometry, Miss Analytical Geometry, Miss Integral Calculus, Miss Differential Calculus, and I am told that he will soon wed Miss Einstein Theory of Relativity. I still miss them all.

As I view the activity of this busy family group, I sometimes wonder whether Statistics is the master of his household. At times his wife, Descriptive Geometry, and at other times another wife, Calculus, has the upper hand. And so, notwithstanding my ancient membership, I find it difficult to understand the language of this polyglot family. As I turn the pages of a statistical article or longer treatise, I find them besprinkled with rabbit tracks; and often the only statistical series which I understand are the figures on the upper left-hand and right-hand corners.

Now do not think that I am casting slurs on the modern trend of statistics. I am simply trying to explain the character of statistics in those early days when I joined the Association. Rabbit tracks are very helpful to the hunter, and many statisticians nowadays are hunters. In my day statisticians were sightseers. They loved to look out on a broad expanse of figures, and the more figures that could be packed onto a page, the greater was their exhilaration. They were satisfied in seeing the valleys and peaks which the columns of figures disclosed. Today the hunting statisticians are armed with new kinds of ammunition; some of it is small shot of a new-fangled shape, least squares; and the sights of their rifles are carefully adjusted by correlation.

My task is to summarize briefly some of the historical incidents of the Association a half-century ago. I came to the Institute of Technology in 1886 three years before the quinquennial anniversary of the founding of the Association. General Walker, president of the Institute, was at that time president of the Association. He was elected to that office in 1883, succeeding Dr. Edward Jarvis, who had been president for 31 years. Col. Carroll D. Wright, head of the Bureau of Labor Statistics, was secretary of the Association in 1886. The Association was thus officered by two of the most eminent interpreters of statistical data which this country has known.

On my arrival at the Institute I soon found that President Walker had an ulterior purpose in inviting me to join the teaching staff of the Institute. He was deeply interested in expanding the influence of the Statistical Association and intimated that I would be asked to serve as its secretary. I knew nothing about the Association, but the wish of the president of the Institute was a mandatory order to a young instructor.

But first it was only fitting that I should show my qualifications to be regarded as a statistician. I now read from the official minutes of the secretary, Col. Wright, for the meeting of October 22, 1886, one month after my arrival at Boston, as follows:

The President introduced Dr. Davis R. Dewey, a gentleman connected with the Institute of Technology, who read a most valuable and instructive paper on average prices. Dr. Dewey very clearly analyzed the methods adopted by Mr. Mulhall, Dr. Giffen, and Mr. Jevons, for arriving at average prices for a series of years, and clearly pointed out the difficulties in the way of the methods of reducing average prices to a definite law.

I do not recall what I wrote in that paper, but I think I showed my hostility to the statistical concept, average. I have always mistrusted that concept. My preference has been for the median; and I was overjoyed when I saw on the program that I was to speak on "The Halfway Point."

Seven members were present at this memorable meeting, and on motion of one of the members "a vote of thanks was extended to Dr. Dewey for his instructive address."

Mr. President, I wish also to thank the officers of our Association for thus affording me an opportunity to testify as to my personal qualifications for the high office of recording secretary of the American Statistical Association.

The Association apparently agreed with the encomium expressed

above; for at the next meeting, held January 21, 1887, I was duly elected. At that meeting six members and two guests were present.

As you are well aware, the Association at that time, in spite of its name, was a local, provincial society. I have before me the minutes of the Association which Mr. Stephan kindly loaned me in order to refresh my memory. These minutes extend back to 1872. Apparently not more than ten members were ever present at one meeting. The Association met quarterly. The total membership was less than 75.

The annual dues were only \$2.00. They remained at that figure for many years. Dr. Jarvis, president for so many years, must have been a thrifty New Englander. When the library was turned over to me as secretary, there were boxes of Dr. Jarvis' notes and memoranda dealing for the most part with vital statistics. A large part of these memoranda were written on the reverse side of used envelopes. These envelopes had been carefully slit open, flaps and all, and thus served the purpose of stationery. By such economies, the Association had accumulated invested funds of about \$3,000. As a good part of this was invested in Boston & Albany Railroad stock, paying 8 per cent dividends, this income, together with members' dues, furnished a modest backlog for financial expenditure which was in prospect.

As recording secretary I had three special duties to perform:

1. Act as librarian;
2. Initiate publication of a journal;
3. Increase the membership.

It is not necessary to say much about the library, for that is now a discarded interest of the Association. When I began my duties, however, I found that this was regarded as a precious possession. In the minutes for 1875 its value was reported as \$4,000, representing a total of 2,506 volumes and pamphlets. No permanent abiding place, however, had been found for this collection, and upon my election the library was packed in boxes in a down-town office. President Walker offered space at the Institute and one of the members donated \$1,000 for shelving and transportation. I was expected to enlarge this collection, particularly in extending the files of public documents. As no charge was made for these, the treasury did not suffer. Although I gleaned hundreds if not thousands of volumes from statistical bureaus in all parts of the world, to the best of my recollection no one ever consulted them. In the course of a few years, the library outgrew the hospitality of the Institute, and, much to my satisfaction, was decently interred in the Boston Public Library.

In March, 1888, the first issue of the *Publications of the American Statistical Association*, new series, appeared. It is appropriate, I think, that the title of this first paper should be incorporated in my remarks. It was "Statistics of Water Power Employed in Manufacturing in the United States," 44 pages in length, by Professor George F. Swain of the Institute. This was a substantial contribution, for Professor Swain had been a special agent of the United States Census.

The second issue, owing to our meager finances, did not appear until September, designated as a double number. Two papers were published in that issue. In the December issue, we began a department labelled as Miscellany. Paging of the first volume ran continuous through the following year, 1889; and in December of this latter year we were able to print an article of over 120 pages on "Finance Statistics of the American Commonwealths," by Professor Seligman. This was one of the earliest fruits of Professor Seligman's scholarship, in a field in which he quickly achieved a commanding influence. The two-year volumes, ranging from 350 to 600 pages, continued throughout my secretaryship, which ended in 1906. During the latter part of my editorship, I was assisted by a committee of publication and if there be merit in the journal, much of its is due to the assistance of this committee.

In preparing these remarks, I have glanced over the volumes issued during this period; many of them are worthy of consideration by present-day students. I must confess, however, that none of them contained rabbit tracks. I do not think our printing shop was equipped for any such novelty.

I have just referred to our printing shop. It was only a shop, and not an establishment, managed by a printer of rare accomplishments, with one assistant. Much of the success of the *Publications* was due to this W. J. Schofield, who never asked about money until he had to pay his assistant. The Association was deeply indebted to him for his generous coöperation.

With our slender financial resources, it may well be asked how it was possible to support the *Publications*. The Association had no subsidy from any benevolent foundation. No salaries were paid and clerical labor could be had for 30 cents or less per hour. We had to depend on our own efforts, and the principal effort was toward increasing the membership of the Association. In this we had considerable success; the name of Francis A. Walker, as president of the Association, printed on our stationery, was invaluable. He was not only president of the American Statistical Association, but the first president of the American Economic Association, which had just been organized. He had a

wide acquaintance not only in the field of education, but in public life. He went farther than to lend his name. On two occasions I found on my desk checks for \$100 each, signed with his name.

From the minutes for October, 1889, I read:

The president called attention to the fact that the membership was now about 160 and spoke of the desirability of increasing the number to 300.

In 1892 we had 298 members, and three years later, 501. In 1898 there were 533 members and 67 subscribers, mostly libraries. In the meantime, in 1897, General Walker died and Col. Wright was elected as his successor.

Theoretically the revenue of the Association should have been over \$1,500, but, as you know, members do not always pay their dues. In 1896 the total receipts were \$1,159 and expenditures were \$1,153, leaving a handsome balance of \$6.00. Our economies were not always so favorable—in 1899 we had a deficit of \$4.20!

My service as secretary ended in 1906 and Professor Carroll W. Dotten succeeded. He awakened new interests and in 1916, the last year covered by these minutes, the membership reached 699. The Association had become in reality a national Association. No longer were the meetings confined to Boston. In 1908 the first meeting outside of Boston was held at Atlantic City, with about 40 members present.

To those of you who are rabbit hunters, the foregoing details may appear over-tedious; to those, however, who were engaged in arousing new interest in extending the statistical landscape, the enterprise was most congenial. From the humble beginnings just described, the Association has progressed far beyond the hopes of the enthusiasts of a half-century ago. I can only add the hope that the Association will still further expand its influence, for only on the solid foundation of statistical data and sound interpretation can we build a lasting social economy.

In closing, may I, in fulfilling the request of the president of the American Economic Association, Dr. Viner, bring the congratulations and good wishes of that Association. The American Economic Association is one of the oldest kin of the American Statistical Association, engaged in social enlightenment and with affection it recognizes the substantial accomplishments of its older brother.

PROGRAM OF THE CENTENARY CELEBRATION
AT THE ANNUAL MEETING

PHILADELPHIA, DECEMBER 29, 1939

AFTERNOON SESSION

Chairman: E. Dana Durand, U. S. Tariff Commission

Census—Past and Future

Halbert L. Dunn, M.D., U. S. Bureau of the Census

Recent Statistical Trends

William F. Ogburn, University of Chicago

The Next 100 Years of the American Statistical Association

Joseph S. Davis, Food Research Institute, Stanford University

SUBSCRIPTION DINNER

Presiding Officer: F. Leslie Hayford, President-elect, American Statistical Association

Greetings of the Allied Social Science Associations

Jacob Viner, University of Chicago, President of the American Economic Association

Greetings of the Royal Statistical Society and the Canadian Political Science Association

R. H. Coats, Dominion Bureau of Statistics

Announcement of the List of Societies That Have Appointed Representatives for the Centenary Celebration and Sent Messages of Greeting

Frederick F. Stephan, Secretary of the American Statistical Association

Presidential Address: The Aging of Populations

Raymond Pearl, The Johns Hopkins University

CENSUS—PAST AND FUTURE

BY HALBERT L. DUNN, M.D.

Chief Statistician, Division of Vital Statistics, Bureau of the Census

AT THE BIRTH of this nation about a century and a half ago, the foremost thought in the mind of its people was the maintenance of personal freedom for which the citizen had struggled and for which he had been willing to die. In recent years, however, a number of factors have tended to undermine this freedom. The more important of these are: Concentration in relatively few hands of the agencies which disseminate information to the public, advancement in the knowledge of how to control human behavior by the use of psychology, and the extremely rapid growth of totalitarian ideology.

How many persons appreciate the importance of the census method and its resultant statistical information in the maintenance of the democratic principles to which the country is dedicated? Few, indeed! Because the products of census are almost as abundant and freely available as the sands of the seashore. They are accepted as a matter of course by the consuming public, and the extent of their contribution to the social thought of the country is seldom examined.

The constitutional provision for a decennial census of the United States initiated a new era in the use of social statistics. This was none the less true because the provision for the decennial census resulted from a protracted struggle for control between the large and the small states. It is difficult to see how the states could have been brought together without some compromise, since, under the Articles of Confederation in force at that time, the smaller states insisted on retaining essential equality while the more prosperous ones demanded representation in the councils of the newborn nation proportionate to their population and wealth. We are all familiar with the compromise adopted providing for a legislature of two chambers, in one of which the claims of the smaller states were recognized, and in the other those of the larger. This solution could not have been achieved as a practical matter unless the population of the country could be counted periodically and impartially. The American census was the result.

Prior to this time, the censuses of other nations were usually treated as secrets of state. It seems strange that the reason for our census becoming such a strong adjunct to our democratic form of government could well be classified as a political accident. Yet practical considerations demanded that the job be an impartial one, the results of which all could trust. No better insurance could be found than to insist on

publicity of its results. It was this fact that has firmly aligned our census, thus far, behind the cause of freedom.

Before examining more closely the census in this country and its effects—past, present, and future—on our democracy, a brief historical review is in order to indicate the purposes for which the censuses of other countries in former times were conducted.

It is from Meitzen that we get our best picture of the censuses of ancient history. As far back as 3800 B.C. there existed in Babylonia an elaborate system for revenue control which enabled the rulers to estimate the wealth of the country with considerable accuracy. In 3050 B.C. Egypt enumerated its peoples in connection with problems arising from the building of the pyramids. Other Egyptian censuses dealt with maps of the country, division of the land, and taxation statistics.

In China a series of topographical descriptions of the provinces of Yüking exist as early as 2300 B.C. In Ancient Greece inquiries of a statistical nature were undoubtedly numerous and involved such questions as distribution of property, classification of citizenship, military service, taxation, and civil privileges. Biblical references indicate numerous enumerations of the people of Judea apparently primarily for taxation.

Rome developed the best of the ancient censuses, frequently attaining an exactness of detail not found in any but those of modern times. In particular was this true of the population enumeration, the investigation of property, the surveys of roads, and the assessment of real estate taxes. In the population counts were included such designations as free and slave, domestic position in the family, etc.

The social attitude towards the census of ancient times, in brief, seems to have revolved primarily around fiscal and military questions. The ruling classes were on the whole monarchies. Consequently, the facts collected were of primary value in keeping the ruler in power. The use of the available information for the good of the whole nation, or for studying the characteristics of the population in order to understand how best to guide the nation were concepts but slightly appreciated.

With the downfall of the Roman Empire the census technique was consigned to the scrap heap for hundreds of years. The gradual emergency of social statistics during the middle ages through the mechanism of registers is seen. These registers, of which there are numerous examples, represented accumulations of records concerning taxes, military services, tithes, customs, etc., all of which had much legal and a little statistical value. Although these registers cannot be likened to

censuses in many respects, they did serve one important census function, i.e., the enumeration of individuals coincidentally with the belongings, wealth, and ability to produce goods of various types. Knibbs aptly terms these publications "cosmographics" because they describe the country in a general overall manner—its soil, productive capacity, industries, and the religious customs and economies of its people.

The use of the modern census has grown apace since its start in the middle of the 17th century. The first modern attempt is usually accredited to the Canadian provinces of Quebec and Nova Scotia. Quebec had no fewer than 15 censuses between 1665 and 1754.

In Europe the German states led the way by a first census in the year 1742; Sweden followed in 1748; Denmark in 1769; and Spain in 1787. Great Britain toyed with the idea for thirty years before following these nations and finally indulged in its first census in the year 1801.

From these beginnings, the institution of the census rapidly gained a permanent place in the organization of modern states; Turkey was the last to join the procession in Europe by its census of 1927.

The modern census is primarily devoted to social purposes rather than to the military and taxation objectives of ancient times. It is essential for a modern state to know more than just the number of people within its borders. Additional information such as the local distribution of population, specified as to age, sex, race, and civil status are now minimum requirements for the census of every government.

Knowledge about the people, the size and structure of the family, the economic position of its head, the nature of employment of its members, the financial burdens, scale of living, educational status, sickness, etc., now forms the basis of enlightened legislation.

As Knibbs points out so well, this was a normal development from the medieval growth of nations. At the end of the 15th century, a general desire for order and security made it necessary for monarchs to create experienced bureaucracies for purposes of administration. The nobility preferred good management to the devastating feuds existing in the earlier period of feudalism. Under such circumstances there was no alternative except to obtain a wide knowledge of the affairs of the country before the state could make any serious attempt to develop its resources. Moreover, this was not a phenomenon which applied to one nation, but represented a more or less general situation through the European nations. Foreign relations developed between nations, which depended upon understandings based on facts. Diplomacy, which superseded war as a means of adjustment, depended upon judgment—judgment based upon something better than general impressions. In

particular, accurate information was needed as to financial, military, political, and population resources. Thus, the ground was made ready for the establishment of well-organized statistical bureaus which could bring every device known to science to bear on the problems of measurement and analysis of economic and social changes within the nations. Systematic enumeration replaced general impression, in the destinies of nations, and came to be fashioned upon a quantitative basis.

In the early days of the modern census, the importance of statistical information was not fully recognized. Little effort was made at first to bring the results of censuses under political control, even in non-democratic nations not wedded so definitely to the cause of freedom as the United States.

Hence, unlike the enumerations of ancient times, the modern type of census was able from the start to reflect the new problems of society. In recent years these problems have revolved largely around population. As pointed out by Thompson and Whelpton, there is a very strong feeling in the western world that the virile state must have a rapidly increasing population. Yet practically every nation of Europe is rapidly approaching a stationary population, and some face a decline in the numbers of their peoples. The impression is growing rather generally that steps must be taken to assure the future growth in population of nations if they are to be healthy; that the declining birth rate must be stopped, no matter at what cost to the individual citizen.

To be sure, this feeling that there ought to be continued population growth may be a fallacy. As one of my colleagues has suggested, the development of modern science has given rise to an upsurge in the growth of world population such that the present state of affairs may perhaps be called an epidemic of population from which the world must recover before it can be normal. Be that as it may, the population policies of those nations which have particularly concerned themselves with this problem so far have been directed along two lines of effort—those which aim to increase the birth rate, and those designed to improve the human stock.

The nations which have attempted to raise the birth rate as a solution of their population problems have usually granted subventions to encourage large families. This process has been tried out extensively in France. The results are questionable. Other countries traveling the same path are: Austria, Belgium, Bulgaria, Denmark, Estonia, Germany, Greece, Hungary, Italy, the Netherlands, New Zealand, Spain, Sweden, Switzerland, and Yugoslavia.

The primary consideration which seems to have influenced several of these nations, particularly Italy and Germany, has been their need for soldiers and workers. In Italy, financial incentives were supplemented by laws forbidding abortion and the dissemination of information on birth control. Likewise, in Germany the government has discouraged contraception, though it recognizes the usefulness of contraceptive devices in the control of venereal diseases. Apparently, Germany has succeeded to a certain degree in stimulating the birth rate, though it is difficult to know how much of the result has been due to the financial incentive and how much to the revival of faith on the part of the German people in the future of their nation.

In those states which are controlled by totalitarian ideology, presumptive evidence suggests that censuses are used to forward the political policies of the state. Consequently scientists throughout the world have come to question the validity of certain parts of the census data in the nations of Germany, Italy, Japan, and Russia.

For a century and a half general statistical information concerning the United States has been available to the public. Many times it may have been misquoted or misused, yet the sources of information have remained open. Our task today is to re-examine this element in our democracy in so far as the statistical sources of information are concerned. The link between control of the state and the output of fact-finding bodies is an intimate one. What encroachments are being made by the forces of propaganda, by the suppression of information, and by other limiting factors threatening freedom of thought?

In the beginning of the United States census, no effort was made by the Congress to control census activities. It was considered that a census was essential in order to secure an enumeration which everybody could trust. In no other way could the states be united voluntarily into a nation. We owe to Mr. Madison the inclusion in this first census of certain measures of a social nature which otherwise would not have been considered. The original bill called for nothing more than "an actual enumeration of the inhabitants of the United States in conformity with the Constitution." Mr. Madison observed that here was an opportunity to obtain much useful information for those who would thereafter be called upon to legislate for their country, and that if this bill were extended so as to embrace certain other objectives besides the bare enumeration of the inhabitants, it would enable the legislators to adapt public measures to the particular circumstances of local communities. He then proposed that in order to know the various interests of the United States it was necessary to have a description of the

several classes into which the community was divided. The first schedule of Madison consisted of an enumeration of six items: the names of heads of families; the number of free white males of 16 years and upwards, including heads of families; the number of free white males under 16 years of age; the number of free white females, including heads of families; the number of all other free persons; and the number of slaves.

From this modest beginning new facts have been added to each subsequent census. In recent years the pressure to add new facts to the schedule has increased with the relentless onslaught of a tropical hurricane. Each organization sees *its* needs as most important. Few stop to think of the additional cost of a single question to be answered "yes" or "no" when asked a hundred and thirty million times, or whether there might be some other way to obtain an approximate answer to serve the purpose in a less laborious and costly manner. Sometimes these pressures take a threatening form; in such cases they must be weighed with extra care.

The strategy of the Bureau in the preparation of the schedules for the sixteenth decennial census has been both wise and effective. Eager to cooperate but limited as to the total number of items which could be feasibly included on the schedule, the Bureau invited representatives from all interested groups to participate in a series of meetings dealing with the content of the schedules. In this, as in previous censuses, the American Statistical Association participated broadly through its members on the Census staff and its representation on committees aiding the Bureau. Appointment of liaison men in each governmental statistical agency ensured clearance of controversial questions. The views of all were freely aired. The needs of one group were pitted against those of another, and a rank order in the importance of the various demands was agreed upon which could receive general support from all groups. This democratic procedure has proved to be a real protection. It has precluded hasty decisions by the Bureau as to important inclusions or exclusions. From many sources have come statements such as: "We are reasonably well satisfied even though we did not get everything we desired. We had our day in court, and we recognize now as never before the legitimate claims of other groups whose needs compete with ours."

A second defense of the Bureau against loading the census schedule too heavily is the introduction of a supplementary schedule which carries additional questions to be asked five per cent of the people. If this sampling method proves effective, it might well mean complete

revision ultimately in the technique of taking future censuses. If the answers obtained on the five per cent sample are sufficiently accurate approximations to be reasonably dependable, it may be possible to extend considerably the scope of subject matter of future censuses without materially adding to the cost. This depends of course on whether the five per cent sample proves to be truly representative of the whole. Only trial by fire will prove the case.

Without doubt, some way must be found to incorporate a wider range of information in the national census of the future. The problems of a changing population and economy require it. No one can predict at this time the types of statistical facts an understanding of which may be vital for the commonwealth several decades hence. Business and government alike face rapidly changing conditions. A solution of complex problems depends more and more upon the knowledge of facts. These facts must be free from biases which sometimes occur when regulatory agencies are in the saddle.

The problems now facing the country as a result of its changing population and economic structure are described in a recent publication by the National Resources Committee. This report sets forth the economic implications of the present trend in population, which is characterized principally by a falling birth rate and an older age distribution. With the possible exception of war, the social significance of these two factors probably overshadows all others in importance to the nation. The effects will be measured in empty school rooms, wide shifts in the economic pattern, and profound psychological alterations in the public mind. Already we see the beginnings of the effect of age in the drive of the older age groups toward economic security. This force is almost sure to gather momentum with the passing of the years as the percentage of old people increases.

The report of the National Resources Committee also points to wide variation between regions of the country in respect to population, industry, and agriculture, to the increasing demarcation in class lines due to regional peculiarities in the social and economic groups, and to the tidal movements to and fro in internal migration of a people shuttling back and forth across the country in search of jobs.

The role played by the biological factors in this ever-changing kaleidoscope is as yet but vaguely appreciated. The study of racial differences is hemmed in by political and social prejudices; birth control is for the most part a forbidden topic of conversation, because of moral scruples and religious beliefs. Public Health is just beginning to shake off the fetters which bind it. It has been but three short years since the

Surgeon General was cut off the air when he tried to talk about syphilis! Progress can be made only when truths are faced and discussed.

Many things must come to the surface of the public consciousness for questioning in these next few years. Perhaps it will be necessary to study the structure of democracy itself if we wish to perpetuate it. After all the things which really count are happiness and satisfaction, *not* political or economic forms. We must not tie our faith to witch phrases such as: "Sound money," "One hundred per cent Americanism," "States Rights!" The real benefit which democracy gives us is the right to question just such phrases! To think with freedom! To question fully! What is "Sound money" if one does not have any of it? What is meant by "One hundred per cent Americanism?" Your own pet ideas about the country? "State Rights" for what? For tax evaders? For trade barriers at state boundary lines? For a greater share of the Federal pork barrel by the home town boys?

I have the right to question; you have the right to question. We can question anything or everything. That right is what must be preserved!

To be sure, it is sometimes better to question in a diplomatic way. If not, a man might have to dodge quickly to protect his dignity, or lose his job and see his family go hungry.

But the *right to question* is yours and mine! We are citizens of a free country. When questions about society are raised, census comes into its own. When the rain of questions falls upon those who must answer—on business man, politician, and educator—and it becomes necessary to supply factual answers by statistical studies or enumerations, the census proves itself a tower of strength in the democratic state. Only a federal census is in a position to cover questions on a national scale and at the same time retain comparability and regularity essential for best results.

No one can tell the shape or form the demands on the census of the future will take, or when and where they will arise. The supplementary schedules about to be tried in the 1940 census are but feeble first steps. Every possibility of providing information by means of sampling must be explored in the intercensal periods. Perhaps fewer questions need be asked each person if these are so interlinked as to determine their margins of error and their representativeness. Perhaps more frequent censuses should be taken that are not so elaborate. Perhaps a permanent supervisory field force should be established which would be stationed in local areas and which, by using piece-price payments and local part-time workers, could take on new jobs within a few weeks

notice. Perhaps a registration mechanism for internal migration should be developed such as that enjoyed by Sweden.

Not only must the census of the future meet the expanding needs of of the future with adequate scope, but it must also make its findings available for use more quickly, because many of the things measured will vary rapidly with time.

The population of the country has learned to eat, sleep, and live on wheels. A sampling estimate of population available within 3 to 6 months and correct within a range of 10 to 20 per cent might be more useful than an exact enumeration of the same community made available two years later. Many communities shift by more than 10 to 20 per cent within two years. Such an estimate made currently is sometimes more accurate than an exact count which is two years old. Moreover it is more timely since something can still be done about things. Statistical controls can be introduced into the drafting of legislation. Private business can plan its program intelligently.

Timeliness must be a part of the census of the future. And to achieve timeliness necessitates new methodology. Perhaps it means above all the overthrow of the idol of absolute accuracy and the substitution therefor of measures of variation within which the user will be able to depend upon the reliability of the data.

One other element is essential to the census of the future besides scope and timeliness—availability! Availability is something more than publication in musty volumes of a small fraction of the data collected and tabulated during a census. Census data should be readily and abundantly available. They should be put up in attractive “small packages” by subject matter. Simple interpretations and graphic representation are needed to illustrate principal findings. A central current index of all government data is essential to widespread and general use. This should be published periodically.

Moreover, the great mass of unpublished data should be made available in some way—probably by the development of microfilm photographic techniques. This would permit the statistical investigator in university and business to work with census data more freely. The extension and use of these data for small areas and for special problems would become possible.

Scope, timeliness, and availability. These three contributions by the census method, linked to the citizen's right and *willingness to question*, will prove a bulwark of strength to our democracy throughout the next century.

By scope is meant a wide assortment of questions using whatever

techniques are necessary to make this possible. By timeliness is meant that census data must be available for actual use in the field of action by the participants in the battle. By availability is meant convenient handiness in a form that can be easily used by the ordinary person.

As for willingness to question, this is the foundation upon which freedom of thought is built. The struggle to achieve this attitude is largely an internal one within the mind of the individual. If a person wishes to be really free in his thinking, his first reaction to a new and conflicting idea should be "perhaps it is true!"

Willingness to test one's own beliefs is a more advanced step. This involves looking at new questions from a variety of viewpoints, checking new conclusions against the sum total of other beliefs. It is during this checking process, particularly where social questions are involved, that accurate and timely facts are needed.

The struggle for freedom has reached a new phase. The public mind of the ordinary citizen is the battle ground. The psychological weapons used by the propagandist are: The appeal to cherished prejudices or to ambitions, the use of emotional language, the power of suggestion by misleading metaphors and analogies, the suppression of salient facts or information, the misuse of quantitative statements such as "all for some," "some for all," or the quotation of nonreliable figures as reliable.

The reason why propaganda works so well is that it is natural for people to accept beliefs with but flimsy supporting evidence, *provided* no conflicting facts are presented to challenge their acceptance. Particularly is this true with published statements. This is the reason that the right and willingness to question is the main defense against this new type of aggression. This is why the census method, with its proved ability to produce dependable facts, must be streamlined as to scope, timeliness, and availability of results.

If we know the truth, the truth will keep us free.

STATISTICAL TRENDS

BY WILLIAM FIELDING OGBURN
University of Chicago

I

A VERY good starting point for discussing the trends of statistics is the year 1839, the date our association was founded. The year suggests the pre-civil war and proslavery times. The excitement of Andrew Jackson had passed. No great event enlivened the mediocrity of the time. Martin Van Buren was president. Yet in the world of statistics the times were far from being mediocre. It was rather a period of awakening, the morning of statistics, growing out of a long dim twilight that dated back to the seventeenth century.

Let us note some statistical occurrences which took place in 1839. William Farr, the best claimant to the title of founder of vital statistics, was appointed in England as "Compiler of Abstracts," which led the superintendency of the Registrar-General's office. He had already won fame as the author of a book on medical statistics and hygiene. At this time, a census of agriculture in France included questions in the production of corn per hectare and the amount of livestock. In the same year, a committee of the Statistical Society of London, which in 1885 became the Royal Statistical Society, was appointed to report on the best method of taking the census of 1841. Thus a hundred years ago the Statistical Society of London was co-operating with the organization of the census, as the American Statistical Association is doing in the United States now.

The range of statistical interest at the time is shown by a survey completed in 1839 by Villermé, distinguished French statistician, on the health of workers in textile factories and by a piece of research published in 1839 by Benjamin Phillips in the *Journal of the Statistical Society of London* on the mortality from amputation. In the same year a method of improving a life table was presented by Demonferrand in France. Thus we see that research in vital statistics and in social surveys was under way, as well as economic statistics and census work.

There is a theory in sociology that great events do not occur in isolation, but that they come in groups. Shakespeare's writings were only part of a cluster of great poems and dramas written by many other able literary men of the time. It is social forces that produce frequency distributions in achievement. Such forces were playing upon statistics in the years around 1839.

Statistical theory was also very much alive at this time. In 1839,

readers were studying Poisson's *Research on Probability* which had been published two years previously. Cournot was busy at his great treatise on the theory of probability which was published four years later. The mathematical theory of correlation was also being developed in 1839, for the French astronomer Bravais was at work on a study of probability, published seven years later, which yielded a pretty good idea of correlated relationships, though he did not give birth to a coefficient of correlation.

The practical statisticians and the mathematical students of probability did not see much of one another in 1839. They seem to have dwelt in different lands. One man who was a citizen of both countries and spoke the two languages was Adolphe Quetelet, central statistical figure of the time, whose brilliant light was beginning then to shine over the various countries of northwestern Europe. For, the year the American Statistical Association was founded saw the social scientists of Europe reading Quetelet's most famous work, *Sur l'homme et le développement de ses facultés, ou essai de physique sociale*, published three years before. In Quetelet, writer on the mathematics of probability, and practical statistician, we find the product of this cross-fertilization yielding studies on anthropometry, criminology, the behavior of man, social physics, and such particulars as the disproof of freedom of the will by statistics, and the correlation of the writing of poetry with the age of the writers.

The shape of things to come in the statistical universe were taking form and were clearly visible to the discerning eye. The events occurring in the year our association was formed which have just been passed in review reveal the following factors in the development of statistics.

First was the practical work of statistics, promoted and used by the state in its problems and secondly there were the mathematical studies of probability. The science of statistics was born out of the union of these two forces. These two streams of the practical and the theoretical continue down to the present day and they are still widely separated, although there are many more researches based upon the union of the two than was true a hundred years ago.

From the field of practical statistical investigation, at least two main types have been common in the literature of the past hundred years. These are vital statistics and economic statistics. Both fields were a source of activity in 1839. The more active field then was vital statistics, but there were some statistical studies in agricultural economics and in commerce. The two interests found a common ground in sociological problems having to do with the welfare of the poorer classes. In

the decade there were studies on costs of living of workers' families, on insanity, on crime, on strikes and combinations, and on medical experiences.

The organizational size of statistical work was clearly in evidence at the time our society was formed. In fact, it was organizational activity that was most characteristic of the period. Fact-finding was not only fashionable, it was a passion. There were at least ten statistical societies or statistical sections of scientific organizations formed in England alone in the 1830's. The governments were also very active at this time in statistical organizational work. They were making the registration of vital statistics compulsory, though the time was early for a new country like the United States. There was also much busy-ness with schedule making for the census, with educating the people on taking censuses and with extending its scope to agriculture.

One final observation on these early years is to note the essentially practical nature of the origin of statistics. The concern was with tabulating the number of cattle, the value of imports, the number of births and deaths. Statistics was thus at the opposite pole from a great intellectual activity of the time, namely, philosophy of history, which was concerned only remotely with practical matters. The attitudes toward the two subjects still hold on the continent of Europe today. Statistics possesses resemblances to what today is called engineering. This point is well illustrated by the early nomenclature of statistics. In England it was first called political arithmetic in the seventeenth century. The Germans gave it the title "Staatenkunde" from which came the word "statistics," meaning a collection of facts about the state of importance to statesmen. The burst of statistical activity around the 1830's was due to interest in the activities of the state in matters that concerned its welfare.

II

The outline of the science of statistics as seen in 1839 remains much the same today. The field of vital statistics, if restricted to births and deaths, now plays a proportionately restricted role as compared with a hundred years ago, though many dominant figures in the American Statistical Association in recent times have been from this field. For years after the early days of fascism in Italy the populace read in the front pages of their newspapers the tables of births and deaths and population growth with keen interest as we read the stock market quotations on the back pages. If vital statistics be broadened to include the general subject of population, then there has indeed been a great growth. There are several thousand students taking courses each year in the statistics of population in American colleges today. The mem-

bership of the American Statistical Association has grown from 500 in 1900 to 2500 today.

The popularity of population studies dates from Malthus, but the revival of interest has been greatest following the World War 1914-18. Since then the leading nations of the world have been very actively developing population policies, notably Italy, Germany, and Sweden. Formerly it was thought that the forces that made for quantity and quality of the population were in the hands of God or the instincts of man; but in either case they were not to be interfered with by the government. The growth of population policies of modern states, which must be based of course on statistical data, is a further indication that the original meaning of the word statistics is quite applicable to the science today. It is another indication also that the fertilizing influences that make the science of statistics flower come from the practical social questions of the time.

We have been speaking about the trend in vital statistics and population. More rapid has been the growth in economic statistics which in 1839 were concerned with livestock, taxation, custom duties, and the cost of living. The growth has been particularly rapid in recent years, due in part to the fact that statistics has become an important department in many business organizations. A survey is now in progress from Washington to determine the number of statistical laboratories in connection with business organizations in the United States. As evidence of the interest in business statistics in 1939 there were 4875 students of business statistics in 18 of the schools of business in the United States. The extension of statistics into economics is seen from such fields of study as income, business cycles, prices, production, foreign trade, taxation, money, finance, insurance, marketing, agricultural and land economics. In all these fields the data are largely statistical and the conclusions would be of little use if there were no data of a statistical nature used. The questions asked by the Bureau of the Census on economic conditions in agriculture, business, wholesale and retail trade, and construction work outnumber those asked about population, births and deaths, health and population characteristics by twelve to one.

Statistics continue to be the facts useful for the state. Since economic activities are so large and essential a part of modern man's activities, despite the many attempts to deflate economic man, it is natural that the statistics the state collects should be concerned with economics. But the state is expanding its activities. It reaches out also into other issues such as the care of women and children, looking after the old people, health insurance, other forms of social security. The government is much interested in lessening crime, in improving the condition

of the underclothed, the ill-fed and the badly housed, in preventing industrial disputes. Hence, in these social fields it collects vast numbers of statistics. In the field of religion, it collects few, for the church and state are separated. The Constitution of the United States forbids governmental participation in particular religions, hence the statistics on churches and religion in the United States are inadequate. So as the years go by, the state comes to take more interest in sociological problems. Hence the rise of social statistics.

There are in the United States today 88 different agencies of the federal government collecting statistics about economic and social conditions. This amount appears to be a great deal to those who made out the 135 million returns on 4700 different forms in 1938, not a regular decennial census year. But a state cannot administer its affairs without knowledge of the conditions it deals with, any more than engineers can build the Grand Coulé dam without expert knowledge about steel and concrete. The engineer learns about his materials in the laboratory, while the government obtains its knowledge from statistics. In both cases the knowledge needs to be precise, the result of measurement. What if the census costs forty million dollars, it is necessary and worth it to the state, as well as to the uncounted users of census data.

The trends in statistics cannot be understood unless the correlation between statistical activity and governmental functions be recognized. As government in the United States increases its functions, as occurs under both Republicans and Democrats, it *ipso facto* increases its statistical activity. This fact is illustrated clearly by two events in the twentieth century in the United States. Twice have the government's functions undergone a tremendous expansion. One was during the World War in 1917-18 and the other during the depressions of the 1930's. In both crises the numerical growth of statistical work was meteoric. Statisticians were called to Washington in hordes, and some who were not statisticians. The demand far exceeded the supply. From 1930 to 1938 the number of statisticians in government service in Washington are reported to have increased 700 per cent. Data are not available for the war period.

The reason for this growth in statistical work was the vast expansion of governmental functions during these two critical periods. The United States became during 1917 and 1918 a totalitarian state, controlling prices, production, the press, labor, and exercising in general the functions found in the totalitarian states of Europe. These disappeared, however, during the return to normalcy after the war. During the great depression of the 1930's, the number of commissions and authorities created and popularly abbreviated to the letters of the alpha-

bet, such as NRA, AAA, WPA, FERA, CCC, NRC, CWA, PWA, HOLC, TVA, are testimony of the great increase in the functions of the state. That the rise of the totalitarian state means the proliferation of statistics is shown by the impetus to statistical work manifested in Russia, Italy during the 1920's and Germany in the late 1930's.

This discussion of the role of the state in the development of statistics throws light on the old question of how a science grows. Science is an organized body of knowledge. This body of knowledge takes a form with more or less system. The question is how does the structure come to have the form it has. One theory coming in large part from the natural sciences with mathematical emphases is that the growth of a science comes from the activities of the inquiring mind which seeks to find out the interrelationships between the different increments of knowledge as they are added to the existing stock. Thus a science comes to assume an architectural form. Such a conception is that of the growth of a "pure" science, so called. This body of knowledge, such as is mathematics or chemistry, is then applied to the solution of practical problems. However, this division of science into "pure" and "applied" has never been a very successful description of the social sciences. Hence the history of the social sciences has strengthened the counter-theory that the form assumed by a science is shaped by the practical problems of the time. Even geometry had its early origins in surveying and navigation and the impetus to astronomy came from the practical problems concerned with the timing of crops and calendar making. But later developments in mathematics and astronomy were little related to practical questions or even to the general *zeitgeist*. The knowledge that the temperature of the sun is 40,000,000 degrees and that it is 8,000,000,000 years old was not discovered as a result of any practical interest, nor does the information have any practical value. But in the case of the science of statistics, its growth is seen to be peculiarly the outgrowth of the study of the questions of the time, particularly those questions in which the state is interested. Many other social sciences are also tied closely to contemporary issues. Even history has to be rewritten from era to era. The dictatorship role which the contemporary social *milieu* holds over many social sciences is not especially conducive to symmetry of structure of the social sciences. More important is the nature of the knowledge and not its unity or form, which may be merely the demand of an aesthetic function of the mind.

III

Of course statistics was built upon mathematics, just as any invention is a combination of existing cultural elements. But the origin of the constituent elements is different from the origin of the resulting com-

position. The contribution of mathematics to statistics has led to a very great growth of a trend scarcely in evidence in 1839. I refer to statistics as a technique of measurement, to be applied quite generally whether to issues of statecraft or not. Cournot, for instance, used some statistics, but more mathematics, most ingenuously in the measurement of economic phenomena and their interrelationships.

The use of statistics as a tool of scientific measurement is very well illustrated by psychology, where statistics has a wide use in the solution of psychological problems, rather than in collecting information for the state. In the *Psychological Review* and the *American Journal of Psychology* one half the articles today are of a statistical nature. It is interesting to observe, however, that in the *Journal of Educational Psychology*, which deals with schools, an arm of the state, over 90 per cent of the articles are statistical. At the other end of the distribution is the *American Historical Review* with only 10 per cent of its articles having any tables or charts. The *American Anthropologist* is not far removed from history with 14 per cent statistical articles. The *Political Science Review* has slightly less, 12 per cent. The *American Journal of Sociology* carried 28 per cent. In the three economic journals, The *Economic Review*, the *Quarterly Journal of Economics*, and the *Journal of Political Economy*, 45 per cent of the articles included statistical tables and graphs. On the basis of the journal publications using statistics, the sciences are ordered as follows, psychology, economics, sociology, anthropology, political science, and history. That statistics is becoming a method of measurement in all these sciences is evidenced by the fact that during the past third of a century, the proportion of space used for formulæ, tables and charts in these particular journals has increased 115 per cent.

That statistics would find wide use in the social sciences as a scientific method might be inferred from the nature of science, which, as the facts show, progresses with measurement. ". . . when you cannot express it in numbers" said the great physicist Kelvin, "your knowledge is of a meagre and unsatisfactory kind." In the physical sciences measurement is by weights and measures. In the social sciences we measure by counting.

In much science the measurement is one of relationships, be it of hydrogen and oxygen or temperature and volume. The laboratory is an invention to eliminate all influences except the one being measured. In this physical sense there are no laboratories in the social sciences, or very few. On the other hand, a statistical invention, partial correlation, in whose development statisticians in the United States have played a significant part, serves the same purpose as the laboratory does in the physical science. It eliminates the influence of extraneous factors as do

several other statistical devices. Aside from statistics there are few techniques in the social sciences which hold factors constant or eliminate them.

Equations with several variables, however, are as expensive as laboratories, if the costs of collecting the data be included. This fact recalls the fact that the wealthiest nations have the highest statistical development, for only the wealthy can afford statistics. Since the cost of collecting statistics is high, it is natural that this assignment falls to the government. Few individuals or businesses could make a cost-of-living survey that cost \$7,000,000. Furthermore government statistics are collected without bias and are available to conservative and radical alike. I recall a small cost-of-living survey made by labor unions, that showed an increase in prices five times as great as the government showed a few weeks later. That wages were being raised in accordance with the rise in the cost of living may explain the vast discrepancy between the unions' survey and the government's. Let us hope that the statistical agencies of the state, as it becomes more and more an action agency, will continue to remain free from bias of political and social beliefs. Mechanical invention also favored statistical computation. These aids help. For the great assorting machine that goes by the name of the inventor, Hollerith, our own census bureau deserves the credit. Perhaps the Census may be first to use another machine, where the assorting will be done with an electric eye.

Another aid to the diffusion of statistics as a scientific method is the recent improvements in the methods of sampling and of measuring samples. The wider use of small samples tends to free us from the great cost of mass collection and also presents a useful tool to scientific bureaus with smaller budgets than the governmental agencies.

The diffusion of statistics as a scientific method throughout the social sciences means, of course, that statisticians are no longer a little esoteric band of government research workers and mathematicians. Statistics has become a part of economics, sociology, psychology, anthropology, and the other social sciences. Indeed in my address as president of the American Statistical Association some years ago I discussed the possibility of the Association disappearing, swallowed up by the economic, sociological, and other social science associations, or else the absorption at some future date of the American Economic Association, the American Sociological Society, and the other social science societies into the American Statistical Association, which would then be the one grand over-all social science.

This may be. But looking over the more immediate evidence, I see little statistical associations in process of being born in each social science. For instance, among the economists there are the econometrists,

mathematical statisticians, who are organized and have a publication *Econometrica*. Among the anthropologists there is the *Journal of Physical Anthropology*, devoted largely to statistics. A statistical wing of the psychologists publishes the journal *Psychometrika*. Among biologists, *Biometrika* has been in existence a long time as a publication of statistical biologists. More recently in the United States there is the *Bulletin of Mathematical Biophysics*. Among sociologists there is the Population Association with its quarterly *Population Index*. Among historians and political scientists there is so far as I know no statistical publication, nor any statistical organization.

In the early days when statistical literacy was low, those who could read and write this strange new language were set off and apart from the others. They were labeled statisticians. But now most any social scientist can compute a correlation coefficient, and can read and write the statistical language to some extent. Indeed, the arithmetics for the eighth grade in the public schools now have sections on statistics. So a degree of statistical literacy will be universal in the future, since now nearly 100 per cent of the children go to the elementary school and 65 per cent to the high schools. But, now, few are literate in mathematical statistics and these groups in the different social sciences tend to organize statistical wings in these sciences.

This profusion of statistics as a method throughout the sciences is illustrated by the most unusual topics which have been investigated statistically. I mention a few.

The length of words in the writings of Horace and Dante.

The number and kinds of balls a pitcher pitches.

The height of statues in the Louvre.

The number of lines on the tip of the forefinger.

The rate of learning to play the piano.

The diameters of Italian shields in the Middle Ages.

The chances of a guest winning in a gambling house.

The relation of first to second prizes.

The flight of a bee.

On whether it is better to add up a column of figures or add them down.

In conclusion, these brief observations on statistical trends during the history of our association indicate rather clearly that statistics has been promoted greatly by the state and by the study of social phenomena of the present, since the more recent the phenomena the better and fuller the measurement. The structure of the science has been shaped largely by the practical contemporary problems. On the other hand the contribution from mathematics has done much to make it a nearly universal tool of research in all the social sciences, though not in all parts of them.

THE NEXT 100 YEARS OF THE AMERICAN STATISTICAL ASSOCIATION

BY JOSEPH S. DAVIS
Food Research Institute, Stanford University

Little of all we value here
Wakes on the morn of its hundredth year . . .

TIME takes a terrific toll. Among associations, the struggle for survival is even more severe than among individuals. Natural and social forces set no upper limit on the span of an association's existence, yet even incorporation gives no assurance of perpetuity. Inherent weaknesses are unsparingly showed up in the stress of life, and the mortality rate is extremely high. It is a distinction of ours, much the oldest of the national social-science organizations in this country, that it has lived through 100 years—ten decades marked and marred by depressions and wars as well as by several "new eras" of peaceful prosperity. It is a further distinction that it has not merely survived as a legal entity, like sundry corporations that are as old or older; it has continued an active career as an individual body, neither merged with others nor submerged into others.

Had the founders of this association attempted, in 1839, to portray American society of the present day, their mistakes would have been serious if not ludicrous. They could not successfully have projected even the role that statistics, and the American Statistical Association, would this year be playing. Yet if they could be present at this series of meetings, in the vigor they enjoyed in 1839, I venture to think that their amazement and bewilderment would be tempered by a strong sense of kinship; that they would participate in our sessions more actively than do many here in corporeal attendance; and that they would feel more at home among us than they would in the present homes of their individual descendants.

The continuity of spirit that has marked our past century augurs well for the century to come. Like the "wonderful one hoss shay," of which Oliver Wendell Holmes chucklingly wrote, our association waked

. . . on the morn of its hundredth year
Without both feeling and looking queer.

Unlike the Deacon's masterpiece, however, ours has passed its anniversary date without vanishing in a cloud of dust,

All at once, and nothing first,
Just as bubbles do when they burst.

Pausing in our stride, we seek perspective from a long look backward, enlightenment from a review of current trends, and inspiration from a long look ahead. Standing at the mid-point of two centuries, we gird up our collective loins for the tasks ahead—new decades of effective progress and constructive leadership in the art and science to which we have a common devotion.

I

Dr. Dunn and Professor Ogburn have ably dealt with important phases of the past and present, and my own look backward and around us must not be long.

The *milieu* out of which the American Statistical Association sprang was specifically described by Alexis de Tocqueville, writing shortly before our founding date. A young French aristocrat with philosophic leanings, he came to the young United States in the spring of 1831—curiously enough, to investigate penitentiary methods. Here he spent a fruitful year, in extensive travel and acute observation of all phases of American life. Four years after his return to France he published a book on *Democracy in America*, which quickly brought him fame. Almost exactly 100 years ago, he published a second Part of this work in which he included penetrating chapters on “public associations in civil life.” Let me quote a few of de Tocqueville’s sentences:¹

The political associations which exist in the United States are only a single feature in the midst of the immense assemblage of associations in that country. Americans of all ages, all conditions, and all dispositions, constantly form associations. (p. 129)

Feelings and opinions are recruited, the heart is enlarged, and the human mind is developed, only by the reciprocal influence of men upon each other. (p. 132)

As soon as several of the inhabitants of the United States have taken up an opinion or a feeling which they wish to promote in the world, they look out for mutual assistance; and as soon as they have found each other out, they combine. (p. 133)

They have not only commercial and manufacturing companies, in which all take part, but associations of a thousand other kinds,—religious, moral, serious, futile, general or restricted, enormous or diminutive. (p. 129)

Our association was among those properly described by the adjectives “serious, . . . restricted, . . . diminutive.” Had it been “enormous,” “general,” or “futile,” it would probably not have lived through these intervening years. “Serious” it remains, despite the humor that

¹ Here taken from the revision of Henry Reeve’s English translation by an American professor, Francis Bowen, first published in 1862 (7th ed., Boston, 1882), Vol. II.

frequently enlivens our meetings. "Restricted" in its objectives it is still, but its geographical scope and its range in subject matter have greatly widened. "Diminutive" it can no longer be called, yet even at its membership peak we have never yet mustered more than 1 in 50,000 of the population; the more significant ratio to the size of the broad occupational classes from which our members are drawn is much larger, but still very small.

To quote de Tocqueville again:

In order that an association amongst a democratic people should have any power, it must be a numerous body. The persons of whom it is composed are therefore scattered over a wide extent, and each of them is detained in the place of his domicile by the narrowness of his income, or by the small unremitting exertions by which he earns it. Means must then be found to converse every day without seeing each other, and to take steps in common without having met. (p. 136)

The early history of this association shows that it exerted no mean influence even when its membership was exceedingly limited. It sought to overcome this handicap, and that of distance, by developing corresponding memberships; and for many years the reading of correspondence was a regular feature of its meetings. With the growth of the country and the passage of years, the much more numerous members have truly become "scattered over a wide extent," and each year the factors that de Tocqueville mentions set limits to the extent of face-to-face intercourse.

The founders were not professional statisticians. No such profession then existed. It has since emerged, partly through the association's efforts. Yet even today, professional statisticians are few among the many who, more or less expertly, use statistical tools and materials in diverse professions and occupations. We have latterly become increasingly conscious of the need for developing the statistical profession, in training, standards, and recognition. Whatever has been done in this direction, however, we have continued a catholic organization—welcoming into membership all who are seriously concerned with statistics, regardless of their field of interest or level of attainment.

The association has grown in geographical scope. Founded in Boston by a little group of men, its seat long remained there. Only gradually did its active membership extend along the Atlantic seaboard, still more gradually into the hinterland. Before and after its central base was moved to New York, its strength was greatest in this same area, mainly between Boston and Washington. Only 25 years ago was a president first elected from west of the Alleghenies—our present chairman, Dr. Durand. Only since the World War of 1914-18, with notable ex-

pansion in the ranks of statisticians in the narrower sense, has it extended its membership practically throughout the country. Even now there are wide stretches outside the Great American Deserts where statisticians are almost unrecognized and the association is almost or entirely unrepresented.

The association has likewise broadened in scope of subject interests. Originally it was concerned primarily with statistics collected by the government, notably the federal and state governments. It is only in the past quarter-century that statistics has experienced a vast growth in economics, in business, in lesser units of government, and in science. There remains much common ground; but specialization has necessarily increased so greatly that even the experts in different fields speak dialects appreciably different. One of the difficult problems of recent years has been to combine cultivation of the common ground with facilitation of closer contacts among those immediately concerned with particular portions of the field.

To meet these difficulties of "conversing" over great distances, both geographical and intellectual, numerous steps have been taken. From the outset, the secretaryship has been the crucial office; and it is hardly too much to say that the association owes its continued existence, and much of its strength, to the devoted efforts of the few able men who have successively held this post. Practically throughout the association's history, committees have been appointed and reappointed to deal with substantive tasks of importance. The irregular publications of the early years were succeeded, in the second half-century, by regular ones which became in fact a quarterly *Journal* some years before the present name was formally adopted. Forms of organization better suited to a large and far-flung membership were gradually evolved, and helpful traditions established. For years the association's board of directors has compared favorably, in frequency of meetings, in efficiency of operation, and in devotion to its tasks, with any corresponding body within my range of observation. The programs of the now annual meetings have come to be in striking contrast to those of early days, or those of our slightly elder sister, the Royal Statistical Society. Instead of one major paper, the number of major and minor papers is almost legion. Large numbers actively participate. The variety of the menu offered is such that no one can go away hungry, whatever the limitations upon his statistical diet. Local chapters, with more frequent meetings, have been established not only in the great centers of statistical work but in various cities or districts outside. In 1935 this association led in taking the forward step of putting the secretary-editorship on a full-time basis, and in providing more adequately for the association

headquarters, now at the seat of the federal government. Still more recently the *Bulletin* was instituted as an additional, less formal medium of communication.

Since I joined the association 20 years ago, I have been repeatedly impressed by the youthful vigor that has characterized it, despite its advanced age. Election to the roll of Fellows has been our way of giving recognition to those who are welcomed as "statisticians of established reputation"—a recognition that in recent years has been granted perhaps too charily. The elective offices have not been honorary posts. Officers have been chosen neither for reasons of popularity, nor typically for statistical achievements, but for promise of leadership. With rare exceptions they have measured up to the expectations, and service to the association has characteristically developed enduring loyalty. This corporation has never been one "without a soul."

II

From this hasty survey I turn my back on the past and the present to peer into the future, for a long look into the century ahead. Alas, even with spectacles I am hopelessly nearsighted! Even with statistical telescopes my vision remains dim.

At moments like this we recall, with a yearning for fulfilment, the words that Jehovah spake to the Hebrew prophet Joel:

And it shall come to pass afterward, that I will pour out my spirit upon all flesh; and your sons and your daughters shall prophesy, your old men shall dream dreams, your young men shall see visions.²

Perhaps it is something of a handicap that our ranks are strongest in the broad middle ages. Few of us are willing to admit ourselves old enough to resort to dreams, and not many more will admit they are young enough to be visionary. On prophesying we are all painfully weak.

About 100 years ago my grandfather's brother left his job in a Philadelphia iron works for a similar one paying \$2 more per week in Pittsburgh. Having crossed this state by railroad and canal boat, he wrote back to his parents that he had found the journey "both speedy and cheap." Within two months I have crossed the same state, from Pittsburgh to Newark, New Jersey, in two hours, on just one leg of a trans-continental flight that seemed to me speedy if not cheap. Joel Davis in 1839 could not have imagined this, much less forecast it. No more can Joe Davis today forecast the mode, speed, or cost of travel in 2039.

That, however, would be an easy task compared with the one before

² Joel 2: 28; cf. Acts 2: 16-17.

us. To no man is it given accurately to envisage the kind or state of society 100 years hence. Our most experienced forecasters fill with cautions and reservations their predictions even for the year ahead.³ All our practice in trend analysis and projection reveals grave obstacles in the way of making dependable economic or social forecasts for a decade or two, to say nothing of a century. These obstacles not only appear insuperable; they bid fair to remain so. Perhaps we should have called in a prophet or a poet, whose flights of imagination might yield a fascinating picture of the year 2039—however remote from the ultimate truth that picture might eventually prove to be. For such exercises the very practice of our profession unfits us. Between statisticians and social scientists on the one hand, and prophets and poets on the other, I see little or no common ground.

Even the future population of the present area of the United States is among the unpredictable. Despite the famous work of Pearl and Reed, Thompson and Whelpton, and others, I completely distrust the extrapolations of population curves to January 1, 2040. I have myself computed trends that beautifully fitted series of data for 50 to 80 years, but have seen abundant reason for utter disbelief in their projection for a like period. The reasonable assumptions on which population forecasts for 20 to 30 years may be fairly reliable are subject to radical change in much less than 100 years. Such forecasts are all too easily confused with predictions, prophecies—sometimes even by the forecasters themselves as they come to forget that their assumptions are only assumptions, not dependable facts. Here as in other statistical work, painstaking processes of statistical analysis must be supplemented and guarded by rational, over-all superchecking.

I, for one, do not believe that a population of 150 million, which de Tocqueville confidently forecast⁴—or the larger one of 160 to 180 million that some now suggest as our probable peak—will be sufficient to hold possession of the vast resources of our present nation through the

³ Thus Colonel Ayres prefaces his annual outlook in the Cleveland Trust Company *Business Bulletin* of Dec. 15, 1939: "Two controlling factors make it impossible to foresee clearly at this time the probable developments of business in 1940. Both of them are so important that they cannot be disregarded, and both are unpredictable. One of them is the war, which may or may not terminate in 1940, and which may at any time develop new characteristics of the first importance to American business. The other controlling factor is our political campaign, culminating in the presidential election, and that event also is clearly destined to prove crucially significant for the future of our business . . . our foresight is powerless to penetrate the murk of war and the fog of politics . . ."

⁴ "The time will therefore come, when one hundred and fifty millions of men will be living in North America,* equal in condition, all belonging to one family, owing their origin to the same cause, and preserving the same civilization, the same language, the same religion, the same habits, the same manners, and imbued with the same opinions, propagated under the same forms. The rest is uncertain, but this is certain; and it is a fact new to the world, —a fact which the imagination strives in vain to grasp."

*"This would be a population proportionate to that of Europe, taken at a mean rate of 410 inhabitants to the square league." (p. 558)

next 100 years. If we choose to continue on the present path of declining birth-rate and negligible net immigration, we shall probably fall prey to aggressors who will choose differently for us.

The social structure of America today is subject to strains and stresses that threaten it from within and without. Ten years after the close of our last prosperity decade, in the first year of a new great war even crazier than the peace that died at the age of 21, we are necessarily sober, even anxious. We have no guarantee that in the year 2039 the United States of America will be a nation, in the changing sense that it has been for the past 160 years, or that the form of society in its present territory will be as nearly like that of 1939 as ours is like that of 1839. It is entirely safe to assume that the next century, like the past one, will be marked by changes that in retrospect will appear revolutionary. It is also safe to assume that statistics will be increasingly important, and I have reluctantly refrained from exploring the future trends of statistical developments. But other assumptions on which I choose to proceed are by no means equally safe.

As a basis for further discussion, nevertheless, I shall assume:

(1) that what we call western civilization will withstand the catastrophes of aggression, war, and internal revolution, and evolve rather than disintegrate or be submerged;

(2) that, for at least another 100 years, the United States will continue in a significant sense a nation, and one that plays a major role in maintaining and improving western civilization; and

(3) that freedom of association, freedom of thought and expression, will here be preserved.

Under present circumstances, these are bold assumptions. They necessarily involve optimism rather than pessimism. Whether the course of actual events will bear them out will depend, not merely on irresistible forces, but also on what we and our descendants think, feel, and do, and on the priorities that we and they assign among more or less incompatible wants. They imply what our forebears would not have hesitated to call "faith in our destiny." I am inclined rather to call it "creative confidence": confidence in our ability and will as a people to build on the principle of ordered liberty, and to develop social science and "social engineering" fit to match our natural sciences and their engineering applications. I call it "creative" because I believe that such confidence tends to insure that the things believed in will persist or come into existence, whereas the fatalistic acceptance of despairing defeatism tends to bring about the very results most feared.

With this faith or confidence, and on the assumptions I have stated, I find it not hazardous to forecast that the American Statistical Associ-

ation will persist through a second century, even gaining in strength and vigor. My conviction that statistics will grow in importance does not even depend on the assumptions I have made, for statistics will be increasingly essential in any form of civilization that seems to me within the bounds of possibility. In Nazi Germany and Soviet Russia, statistics are no less vital than in progressive and liberal democracies; but it is hard to think of associations such as ours persisting, at least without radical transformation, in a world or broad region dominated by a Hitler or a Stalin. And I hope you will not think me carried away by the exhilaration of this occasion if I affirm that this association has a lofty, indispensable mission to perform.

The long look ahead that I have taken does not, after all, reveal much concrete detail. We cannot envisage the goal of 100 years' activity as a business firm sets a sales quota for a season. Paradoxically, our goals are mainly qualitative rather than quantitative; our achievement consists in a progressive flow of achievements, few of them spectacular in themselves. The question where the association will be in 2039 is in practice far less important than another question: What course shall we choose for the coming years and decades, so that our successors may take even more pride in the progress of a second century than we can now justly take in the progress now registered on the scrolls of history?

III

One of the perennial responsibilities of our association is to employ a variety of means to bring about the improvement of statistical data, methods, interpretation, and exposition. Directly and indirectly, we work at this task through our annual meetings, our chapter meetings, our committees, and the *Journal*. In constructive service of this sort our Advisory Committee on the Census, for example, labors hard and long. It is with this object in view that we have formally given support to the Central Statistical Board,⁵ on which the secretary of the association is at present the only non-governmental member.

In the discharge of these responsibilities, we should not overlook the obligation to point out, in the name of the association, official blunders in the collection, presentation, use, and lack of use of statistics. One early precedent is worth citing.

In November 1844, when the American Statistical Association was only 5 years old, a committee appointed by the association memorialized "the honorable the Senate and House of Representatives in Congress assembled." Through 18 pages of the Senate Document in which

⁵ By action of the Board of Directors, Apr. 30, 1935 and Apr. 3, 1937.

this memorial was published,⁶ the committee pointed out "various and gross errors . . . discovered in the printed edition of the sixth census of the United States . . ." The memorial concludes thus:

In view of these facts, the undersigned, in behalf of said association, conceive that such documents ought not to have the sanction of Congress, nor ought they to be regarded as containing true statements relative to the condition of the people and the resources of the United States. They believe it would have been far better to have had no census at all, than such a one as has been published; and they respectfully request your honorable bodies to take such order thereon, and to adopt such measures for the correction of the same, or, if the same cannot be corrected, of discarding and disowning the same, as the good of the country shall require, and as justice and humanity shall demand.

This and subsequent actions of the association exerted no insignificant influence.

A wise fellow-member of the association wrote me in the spring of 1936:

Our Society, I take it, is not concerned with the merits or demerits of legislative proposals; it should, however, I take it, be concerned to see that the statistical information submitted by Government departments in support of proposed legislation is competently prepared and fairly interpreted to the Executive and the Legislature.

He had glaring instances of the contrary in mind, and I believe his position was and is unassailable.

My own studies have revealed various cases in which high officials in the government have effectually misrepresented actual or prospective results of important measures, before Congressional committees or in numerous and widely distributed public speeches. Such misrepresentation would have been difficult or perhaps impossible, if there had been resort to appropriate economic and statistical analysis. Reports of operations of huge governmental corporations are either omitted entirely, or are depressingly meagre even when reported totals are carried out to pounds and cents. Suppression of significant evidence, and other forms of effectual misrepresentation, rightly draw official condemnation when they occur in private business or in political attacks on the administration. But too often the pot is as black as the kettle. Policies that cost billions are embarked upon, or pursued, without the critical consideration that could and should be given both within the government and by competent students outside. The pressure of "emergency" is rarely an adequate excuse.

⁶ 28th Cong., 2nd Sess., S. Doc. 5. Dr. Robert F. Martin generously furnished me a photostat copy of four pages of the printed document.

Under such circumstances, individual criticism is all too ineffective, whether directed at particular instances or at more general practices. It is not enough that "eternal vigilance is the price of liberty" and of orderly progress. It is important that effective weight be exerted on behalf of sound positions disclosed by individual vigilance.

Here lies a challenging opportunity of which we have latterly taken too little advantage. The difficulties that it presents are by no means insuperable. Let us accept the principle that the association cannot properly concern itself with "the merits or demerits of legislative proposals," except as these directly relate to statistical organization and technique, and that even here we must avoid partisanship. But let us also accept the principle that as an association we properly have a common interest and responsibility, wholly in consonance with the welfare of the nation, in seeing that statistics are used and not abused, and that this interest justifies us in publicly taking certain kinds of positions as an association.

To arrive at such positions is not so easy with a diverse and scattered membership. It will commonly entail suitable investigation by competent standing or special committees, and consideration of their report by the board of directors, before action is taken in the name of the association. In extreme instances, advance canvass of the Fellows or entire membership may conceivably be appropriate. In all cases the association membership should be advised of what is done. We should certainly avoid indiscriminate overindulgence in such procedure, shun "railroading" in any form, and stick to temperate language. Yet we may well develop ways and means of duly exercising this function - potentially one of the most important that our association may have.

Of other opportunities before us I must speak more briefly. Looking ahead, even for two or three decades, I see excellent prospects of expanding usefulness in our chapters, subject-matter sections, publications, committees, and the annual meetings themselves.

The development of local chapters is essential to the association's progressive attainment of its objectives. Semi-autonomous the chapters may well continue, varying from district to district as conditions and personnel vary. The experience of chapters with several years of successful activity can be drawn upon to strengthen the weaker ones and to help found others on a secure footing. In many sections remote from the national headquarters, the support of business, government, and university executives can be enlisted, with the incidental effect of enlarging their own appreciation of statistics and statisticians, actually and potentially. Publication of the best of the chapter papers, and their local distribution, would tend to increase the prestige and influence of

the chapters. Committee activities will in due course be developed locally, on a scale eventually exceeding that of the national association only a few years ago.

Alongside such geographical groupings, however, we need to promote more interest groupings. The Biometrics Section of the association illustrates this possibility. In the coming years I expect to see the organization and evolution of several additional ones, varying in type, scope, and programs. The need arises from the geographical scatter of specialists in particular fields, who need "to converse" over long distances. Too often they are unacquainted one with another, even by name. Specific group programs at the annual meetings, and correspondence between meetings, can be made to overcome these difficulties.

The time is not too far distant, I suspect, when the *Journal* of the association will have sectional supplements, some of them processed rather than printed, and perhaps a supplemental series of chapter papers as well. The *Bulletin* will presumably relieve the *Journal* of some demands on its space, while undergoing internal development as a medium of communication. Eventually, I feel reasonably confident, the association will find means to sponsor a series of monographs on statistical methods and techniques.

The development of our association's committee work is restricted by limitations of distance, time, and funds to which we have as yet given insufficient recognition. But the techniques of committee work are inadequately understood, particularly within a far-flung organization. We still proceed too much in the dark in deciding on whether or not to appoint a committee, in stating its objectives, in selecting its personnel, and in the prosecution of its work. Even our own experience with committees would justify intensive study, with a view to deriving principles and techniques of effective procedure. Such a crystallization is long overdue, and it would have value not only for our association but for many others.

Some eight years ago a special committee of seven able members of the association submitted a report "on a program of research in statistics and on related matters of association policy."⁷ For various reasons, not much has come of it. Reread at intervals, this document still impresses me as overambitious and otherwise inadequately matured. Within the association and outside, conditions have changed since it was written. Yet the problem remains. The association's relation to statistical research deserves to be attacked afresh. The time may soon be ripe for the appointment of another committee to bring forward at least a provisional solution.

⁷ This JOURNAL, March 1932, Supplement, XXVII, 252-59.

Such questions of policy and strategy are among the most important before us. Time and again one is impressed by remarkable progress in techniques except in the field of policy-making. This is true in government, in business, in education, and in such associations as this. All too often, statistical workers are regarded as mere technicians in executing a policy determined almost without reference to their actual or potential contributions. As we learn how to cope with the limitations inherent in a voluntary organization, almost wholly self-financing, we shall have contributions to make in this important direction.

I expect our annual meetings to continue multiple-ring circuses, with only occasional hours reserved for general sessions. Only thus can we hope to serve the needs of our diverse membership. The improvements that I envisage lie chiefly in the field of advance preparation and effective exposition. The time may well come when we shall elect our president, vice-presidents, and secretary—now virtually the program committee—months or a full year earlier; and arrange for circulation of many of the papers well in advance of the meeting itself. And we shall certainly make far more efficient use also of available devices for presenting tabular and graphic materials to audiences of varying size. In this respect our practice has lagged too far behind our knowledge.

The development of the statistical profession will engage our serious interest in the years immediately ahead. But on this specific problem, bristling as it is with sub-problems, I must refrain from enlarging.

In speaking somewhat more concretely I have had to be selective and suggestive. In closing, let me once more quote de Tocqueville:

Amongst the laws which rule human societies, there is one which seems to be more precise and clear than all others. If men are to remain civilised, or to become more so, the art of associating together must grow and improve in the same ratio in which the equality of conditions is increased. (p. 134)

In democratic countries, the science of association is the mother of science; the progress of all the rest depends upon the progress it has made. (p. 134)

These pregnant statements we cannot easily accept without reservations. On "equality of conditions" de Tocqueville had what we might call a "complex." His idea of a "ratio" between incommensurables betrays his limited acquaintance with mathematics and statistics. Even his phrase "science of association" may give us pause. Nevertheless, some pondering leaves one impressed by the significant truths thus succinctly set forth. We shall do well to foster the development of the "science of association" in its special bearings on the functioning of associations such as ours. In our own particular sphere, we must make further progress in the "art of association." Thus may we hope to fulfil our appointed mission in the next 100 years.

GREETINGS OF THE ALLIED SOCIAL SCIENCE ASSOCIATIONS

It is a pleasure and an honor to present to the American Statistical Association, on behalf of the allied social science associations, greetings and congratulations on the attainment of your centennial. While it is arguable that your superiority over the allied associations in age can be explained as simply due to an earlier start, no one can gainsay that you have made excellent use of that earlier start. From the earliest years of your existence, your officers and members have been making, in a perhaps fluctuating but undoubtedly ever-flowing stream, notable contributions to statistical theory and practice, by virtue of which our sister disciplines have been enabled to improve the tools of analysis with which we work and have been endowed with rich masses of well-ordered data to which to apply them. As an Association, you have contributed greatly, in guidance, encouragement, and provision for publication, to the attainment of the high standards of statistical research, teaching, and practice to which this country can lay claim. Those of us who have had administrative experience in connection with allied learned societies feel humble also when we contemplate your growth in numbers, your development of live and active regional societies, your success in financing and operating a central administrative office. As an editor of an allied journal, I congratulate you also on the high standards maintained by your JOURNAL and thank you both for the contributions direct and indirect which it has made to economics and for your development of a subsidiary journal which segregates those more mathematical contributions whose intellectual quality, I am sure, is proportional to their unintelligibility to mathematical ignoramuses like myself. I congratulate you also on your useful *Bulletin*, and on the report which is current and which I hope is true, that you are successfully engaged in a campaign for funds to maintain and extend your manifold beneficial activities. I note with interest that, according to one of the original by-laws of your Association, "The labors of the Association may embrace all subjects." It is apparent that you have gone far toward living up to this magnificent objective. As far as economics in particular is concerned, it might even be suggested that "embrace" is a mild term unless it could be interpreted to include even the hug of the bear. We not only profit, however, from your activities, but are vitally dependent on their continuance for our own continued progress, and we wish you, without any question of jurisdictional rivalries or reservations, unlimited expansion of your activities and your progress.

One of your officers kindly advised me that what was chiefly expected of me this evening was brevity, and not too much even of that. I am moreover impatient myself to listen to the address of your president, Dr. Pearl, whose work has fascinated me ever since I first encountered his demonstration that fruitflies and Englishmen breed and die according to the same statistical law. I will therefore hold you further only sufficiently to repeat once more that the allied associations, on this notable occasion, welcome the opportunity to congratulate you on your past achievements and to wish you a continuance into the indefinite future of your past progress and success.

JACOB VINER

President, American Economic Association

GREETINGS OF THE ROYAL STATISTICAL SOCIETY
AND THE CANADIAN POLITICAL
SCIENCE ASSOCIATION

Professor Viner with a wit and eloquence that fall within the upper decile has spoken for the other social sciences and their unison with us on this occasion. There is another unison not different in kind, the international—peculiarly the dwelling place of Science—on which it is my pleasant duty to sound a note, a grace note if you will to Professor Viner. It carries greetings from two other lands, Great Britain overseas and Canada your northern and good neighbor respectively. To do this becomingly I must doff for a moment that status of “one of us” to which the Chairman specially alluded and for which I must specially thank him. But a Canadian is used to such “moments”: it is part of the joy of being a Canadian *vis à vis* the two great leaders of his dominant tongue that he is at once closer to Great Britain than you are and closer to you than any Briton. In my own case, if you will pardon the complacency for the moral's sake, I can never subdue that feeling of being at the same time ex-President of the American Statistical Association, and as a courtesy to my office an honorary Fellow of the Royal Statistical Society.

It is in my latter capacity and from the venerable body which I have just named that at the wish of the President, Dr. Bowley, himself a household word wherever the language of statistics is spoken, I express what he has already written on behalf of the Council,—its most cordial congratulations upon past and present, and its warmest good wishes for the future. “Let us now praise famous men” is the phrase that occurs to us all at mention of the Royal Statistical and its works, and I will not undertake to paraphrase the written message. Only six years senior, the Royal Statistical links us with Quetelet, the father of official statistics. Its example we know was potent with those pioneers of American statistics, your founders, to whom we so fitly did honour the other day. (It is hard to keep my pronouns straight.) Youthful though it was in 1839 it has been called the mother, or at least the elder sister, of this association, as it was certainly the mother of the International Statistical Institute, which I feel sure is present in spirit tonight and would be audible but for the unfortunate indisposition of Dr. Willcox. The point I would mention is that for a hundred years these two great English-speaking societies have marched side by side in the advancement of understanding and truth in the affairs of men, and always in close official and personal friendliness, though the political waters between (in which statisticians are such

emulous fishermen) were not always smooth. It is from that great tradition that I have the honour to bear a commission of goodwill compact on behalf of the Royal Statistical Society at the beginning of this new century, full we may be sure of new triumphs in our cooperation.

Also, ladies and gentlemen, and in the same vein, I am envoy of a second sister association, the Canadian Political Science Association, which covers all the social sciences for Canada, and sponsors therefore all those virtuositities for which Professor Viner has spoken. It permits me in passing to put a gloss on his allusion (he mentioned it I thought too lightly) to the precocity of statisticians as organizers among the social sciences. In the United States we had an association a third or half a century before any one else thought of such a thing: even in Canada we had a purely statistical body which lit the lamp for all the others. But perhaps you do not know or have forgotten that the Canadian Political Science Association was first conceived in the United States—yes, actually in Boston itself, of good omen. The year was 1912 when a few of us present at the Boston meetings of that year formed the nucleus from which grew the sturdy body whose felicitations I now present. The *sequelae* of course were all in Canada. The Duke of Kent on a certain occasion hastened home to England that the future Queen Victoria might be born on English soil. So we. Thus daughter as well as mother joins in this celebration.

In a gathering of cheer like this a Canadian cannot forget that his country and his sister countries of the British Commonwealth are at war—the nadir of internationalism, the bankruptcy it seems of our scientific method. We do not flinch. Nevertheless I have no doubt but that the application of statistics to our major human problems will one day be seen as the outstanding contribution of the famous nineteenth century to its famous “science,” even to its famous “applied science”; and that even as “the prayer of Ajax was for light” so our distinguished President for 1939 in the key address which we are all eagerly awaiting (and which I have been delaying) will envisage war itself as only a “strange interlude” in a persistent progress towards the light.

Ave and Salve, but not Vale.

R. H. COATS

Dominion Bureau of Statistics

THE AGING OF POPULATIONS¹

BY RAYMOND PEARL
The Johns Hopkins University

I

ONE HUNDRED years ago a small group of men, mostly living in or near Boston, met together on November 27th to manifest their abiding faith about an undeniably queer streak in their individual biological constitutions. They seem to have been an odd lot of fish, differing widely from each other in most respects, but all alike in one. Each of them had what the psychiatrists nowadays call a compulsion neurosis impelling him to tinker with numbers and fiddle with figures. Their souls cried out for tabulations in the same way that the prohibitionist of later times yearned for his daily ration of Peruna. But what was more remarkable than this insatiable craving for dull data—a taste that appears to happy people who can take their statistics or leave them alone, to verge on the pathological—was the simple faith of the founding fathers that, once the word got around that there was a *statistical* association, it would grow and prosper. They somehow knew deep down in their protoplasm, that there must be a lot of other people afflicted with their special kind of numerical itch, who would come running at the chance to hold pleasant converse about the symptoms, the therapeutics, the operations, and the prognosis of their malady.

How right they were! You have only to look about you to see how the pleasantest and most useful of all forms of mild insanity has grown by what it has fed on. And not only has it grown of itself but it has at the same time developed a power of infecting others that could not be better evidenced than by the magnificent array about this table of presidents of the Allied Social Science Associations, whom we delight to have with us on this occasion, and whose presence we esteem as a very great and real honor to the American Statistical Association.

It seems to me that, quite simply and genuinely, without vanity or boasting, our Association has a right to be proud of what it has accomplished in the century of its existence. Its long array of publications holds high rank throughout the world; its meetings have stimulated and informed the beginners at the same time that they have cheered the maturer members through their annual renewals of pleasant social

¹ A condensed version of this paper constituted the presidential address delivered at Philadelphia, following the dinner held there in connection with the celebration of the centenary of the American Statistical Association, December 29, 1939.

contacts and their encouragements and stimulations to keep up the good work; and finally the Association's influence through its membership, and particularly in recent years through its efficient and able Secretary, upon the intellectual and moral standards of American statistics, governmental and private, has been profoundly beneficial. And in all these, and many other respects, there has been steady progress all the time. That progress has not stopped. Nor is there any sign of its stopping. On the contrary the Association embarks upon its second century with renewed vitality and a broadened and deepened program that ensures still further progress and enhanced influence. Biologically, continued normal growth is the sign of continuing youth. The sociologists, I understand, have deep-rooted, not to say violent, objections to regarding anything like the American Statistical Association as an organism. But, be that as it may, the Association, though old in calendar time, has certainly become steadily younger during these past hundred years by every important token of youth; vigor, vitality, originality, receptiveness to new ideas, and organic growth. What states and conditions this progress towards youthful attributes may reach if it keeps on in the same way for another hundred years a biologist finds it not only difficult but a little startling to contemplate. But perhaps our trend line will in time begin to take on the character of an asymptotic approach to a steady state or golden era of perpetual youth, when directors will cease from troubling about budgets and secretaries will achieve a well-earned rest.

It is a curious paradox that while statisticians banded together in an association seem able to keep themselves, in their collective or associated aspect, perpetually youthful, the same can not be said of the principal pabulum on which they nourish themselves. For that nourishment derives from the sizes, movements, and other peculiarities of populations, and populations do indubitably age with the passage of time. In particular the population of the United States, from the manifold gyrations of which the members of this Association have found more grist for their statistical mills than from all other sources combined, has aged in several remarkable ways during the past hundred years. I should like, if you please, to devote the remainder of my remarks to a brief and all too inadequate discussion of the general subject of the aging of populations. It is fraught with important consequences to every one of us, individually and collectively. But before beginning its discussion it may be well to defend briefly the categorical statement that population is the *fons et origo* of all statistical activity. In common with all other intellectual activities of humankind there goes on in the field of statis-

ties all the time a process of splitting into sub-fields or specialties. But however intensive the specialization, and whatever its field so long as it relates to human beings and their activities, it rests at bottom on the statistics of population. Try to think of financial statistics, or marketing statistics, or social statistics, or any other sort you please, completely divorced from, and with absolutely no knowledge whatsoever of, concurrent population statistics, and you see at once that in the absence of a bond with statistics of population the specialty would be instantly sterilized and rendered devoid of any real meaning or significance.

So perhaps it is fitting that in celebrating our hundredth birthday we go "back to Bach," and talk a little about population.

II

The division of the individual life cycle of the human organism into periods, or "ages of man," has been a favorite diversion of poets and philosophers nearly as far back as the record goes. No phenomenon of nature is more obvious than the cyclical character of the individual life processes. Out of previous non-existence the life of each individual begins as such at some point in time. Philosophically it is of no great present import whether the marker of this beginning be taken as the fertilization of the egg or the visible act of birth. Either may serve as a starting point. At some later time subsequent to its beginning each individual life as such comes to an end with death. Between these two events the most primitive folk wisdom could not miss taking account of what man's mammalian forebears indeed were well aware of, namely that the living individual goes through obvious states of development or progression to a prime of life, to be followed by stages of regression or involution. Shakespeare, and for that matter Proclus 2,000 years before him, distinguished seven stages in man's individual life cycle. This septenary way of looking at life has been much favored in literature. Biologically, however, it has no particular justification. The observations of the biologist lead him to the view that the life cycle of any mammal, including man the unique mammal, can logically and precisely be divided into only three stages that have epistemonomic significance. These are its pre-reproductive, reproductive, and post-reproductive phases. These three phases are biologically fundamental. Correlated with each of them are many other aspects of life, readily distinguishable, but generally less fundamentally important. Thus the pre-reproductive phase is *also* the age of man that includes infancy, and the major part of growth. The reproductive phase is *also* the period

of full vigor and its expression in all the manifold ways that the human engine uses to let off steam. The post-reproductive phase is *also* the period of senescence, and of the ripened wisdom that only the experience of living a long time can bring. But mostly these *also* matters are biologically secondary to the basic businesses of life; which are first getting ready to reproduce, then reproducing, and finally just sticking around without any biological justification so far as has yet been discovered, merely because each bearer of a vital torch hates mortally to drop out of the parade—in fact absolutely refuses to so long as there is a sufficient head of steam in the boiler to turn over just once more the worn and weary engine.

While the already mentioned correlates with the basic phases of the life cycle are mostly of secondary significance biologically, one of them is, however, of first rate importance, and particularly so in the case of the human animal. Man's social evolution has combined with his organic evolution to bring it about that the people in the reproductive phase of life have to do the work necessary to get not only their own livings, but also the livings of the infants and youngsters in the pre-reproductive phase, and still further the major part of the livings of the old folks in the post-reproductive phase. In the aggregate this puts a pretty heavy burden of work on the shoulders of a moiety of every human population that we know anything about. Under the circumstances there is a certain cosmic fitness, or perhaps a manifestation of Divine Wisdom, to be observed in the fact that the biological business of reproducing is on the whole of a pleasant and relaxing nature, rather than an added burden upon those who must concurrently do most of the world's work. It seems odd that this thought was not embodied in the Bridgewater Treatises, or other similar expositions of natural theology.

III

A further example of providential foresight is to be found in the evident pains that were taken to make things convenient for statisticians when the age boundaries of the three phases of the human life cycle were set by the Heavenly Committee on Biological Arrangements. For the end of the pre-reproductive phase, and the beginning of the reproductive, which occurs at puberty, happens at the age of about 15 years as an average for mankind as a whole, as nearly as may be determined.² The end of the reproductive phase of the cycle, marked

² See the extensive collection of data on the age at menarche in the writer's *The Natural History of Population*. London and New York (Oxford Univ. Press), 1939. It is there shown (p. 49) that the mean of the means of 142 distributions of age at menarche is $15.17 \pm .05$ yrs., and that the median of these 142 means is $15.15 \pm .06$ yrs.

by the menopause in females, and by so small an amount of subsequent reproducing in the male as to be statistically insignificant in spite of a good deal of senile boasting and occasional individual exceptions to the rule, occurs on the average at a point sufficiently near to a calendar age of 50 years so that no error of any moment will be made by taking it at that as a round figure.³ So then if we classify human population counts into a three-fold age grouping, in which the three classes are, in order, 0-14 years inclusive; 15-49 years inclusive; and 50 years and above, we shall have allocated the population in substantial accord with the fundamental biological divisions of each individual human being's life cycle from birth to death.

The eminent Swedish statistician Sundbärg seems to have been the first to appreciate the significance and some of the biological implications of this age classification of human populations. He noted that in virtually all populations just about 50 per cent of all the people fell in the 15-49 year age class, that is to say, in the reproducer-worker phase of the life cycle. This observation has been confirmed by all subsequent students of the matter. The proportionate numbers in the pre-reproductive or post-reproductive phases (the 0-14 years and 50 years and over age classes) are found to vary more widely, on the whole, from population to population, and in a compensatory way. Thus a population like that of India in 1931 had 39.9 per cent in the pre-reproductive phase with ages below 15 years; 50.4 per cent in the reproductive phase with ages between 15 and 50 years; and only 9.7 per cent in the post-reproductive phase with ages of 50 years and above. In the same year 1931, by way of contrast, the population of France had only a little more than half as high a proportion (22.9 per cent to be exact) of its citizens in the pre-reproductive phase; about the same proportion (51.4 per cent) in the reproductive phase; and almost three times as great a proportion (25.7 per cent) in the post-reproductive phase. It needs no elaborate argument or added documentation to make it clear that from a biological point of view the populations of India and France are widely and deeply differentiated, one from the other.

Table 1 shows the percentage distributions of the populations of some 50 countries at the most recent dates for which data were available in accessible sources, according to the three-fold division of the life cycle. The countries are arranged in the table in descending order of the percentage in the pre-reproductive phase (0-14 years).

³ Again *The Natural History of Population* (p. 52) summarizes the most reliable data on age at menopause, and finds an inter-group mean for this character of $46.38 \pm .23$ years, and an inter-group median of $46.25 \pm .29$ years.

TABLE 1
 PERCENTAGE DISTRIBUTIONS OF VARIOUS POPULATIONS, AT SPECIFIED DATES,
 IN THE PRE-REPRODUCTIVE (0-14 YEARS), REPRODUCTIVE (15-49 YEARS),
 AND THE POST-REPRODUCTIVE (50 YEARS AND OVER) PHASES
 OF THE HUMAN LIFE CYCLE

(Computed and tabulated by the writer from official data.)

Country	Year	Pre-reproductive 0-14 yrs.	Reproductive 15-49 yrs.	Post-reproductive 50+ yrs.
Brazil	1920	42.7	48.3	8.9
Honduras	1930	42.5	48.4	9.2
Cuba	1919	42.3	47.5	10.1
Turkey	1935	41.3	45.5	13.2
India (excluding some provinces)	1931	39.9	50.4	9.7
Algeria	1911	39.7	48.9	11.4
Palestine (excluding Beduins)	1931	39.3	47.8	12.8
Mexico	1930	39.2	50.2	10.6
Egypt (exclusive of Beduins)	1927	38.5	48.9	12.5
Argentina	1914	38.4	52.4	9.2
Chile	1930	37.2	51.2	11.5
Mauritius	1931	37.2	50.4	12.4
U.S.S.R. (including Asiatic territory)	1926	37.2	49.9	13.1
Japan	1930	36.7	48.1	15.2
Bulgaria	1934	35.6	49.2	15.2
Poland (without Upper Silesia and part of Wilno)	1921	35.3	49.6	15.1
Roumania	1930	34.7	51.9	13.4
Yugoslavia	1931	34.6	49.9	15.4
Spain (including Spanish population in Ceuta and other North African provinces)	1920	32.2	49.4	18.4
Tunis (European population only)	1936	32.1	51.7	16.2
Greece	1928	32.1	50.0	17.0
Portugal (including Azores and Madeira)	1930	32.0	49.9	18.1
Canada	1931	31.7	51.6	16.6
British Malaya	1931	31.4	59.2	9.3
Union of South Africa (whites only)	1936	31.2	52.5	16.3
Lithuania (excluding Klujpeda)	1923	30.8	50.0	18.2
Netherlands	1930	30.6	51.2	18.1
Italy	1931	29.7	50.9	19.4
United States of America	1930	29.4	53.4	17.3
Finland	1930	29.2	52.9	18.0
Irish Free State	1926	29.2	48.4	22.4
Northern Ireland	1926	29.0	49.9	21.1
Norway	1930	28.4	51.2	20.3
Hungary (present territory)	1930	27.5	54.1	18.3
Australia	1931	27.5	53.3	19.1
Scotland	1931	26.9	51.3	21.7
Czechoslovakia	1930	26.3	54.4	19.4
Danzig	1929	26.1	55.3	18.5
New Zealand (excluding Maoris)	1936	25.5	52.7	21.8
Denmark	1935	25.3	53.6	21.1
Latvia	1935	24.8	50.5	24.7
Luxembourg	1935	24.6	53.7	21.7
Switzerland	1930	24.5	54.0	21.2
Germany (excluding Saar Territory)	1933	24.2	51.0	21.8
England and Wales	1931	23.8	53.4	22.8
Austria (present territory)	1934	23.6	52.7	23.7
Estonia	1934	23.3	52.5	24.2
Belgium	1930	22.9	54.2	22.9
France	1931	22.9	51.4	25.7
Sweden	1935	22.2	54.4	23.4

Sundbärg proposed to classify populations into "progressive," "stationary" or "stagnant," and "regressive" types, on the basis of their percentage distribution in the three age classes. The progressive type had, by his definition, 40 per cent or more in the pre-reproductive (0-14 years) phase; 50 per cent in the reproducer-worker phase (between 15 and 50 years of age) and 10 per cent or fewer in the post-reproductive phase (50 years and over). For the stagnant type the corresponding percentages were 33-50-17, and for the regressive type 20 (or fewer)—50-30 (or more). The concept and the descriptive terms for the types obviously referred to purely biological or reproductive progression, stagnation, or regression. Surely in no other sense than the biological would any social philosopher be likely to regard the populations of Brazil, Honduras, Cuba, and Turkey, as either the *only* progressive (they alone in Table 1 had 40 per cent or more in the pre-reproductive phase), or the *most* progressive populations in the world today.

But quite apart from Sundbärg's purely formal and somewhat sterile classification it is plain that the status of any population at a given moment, relative to the proportions of its component members falling in the three biological phases of the life cycle, may have an important and direct bearing upon the aggregate or composite behavior of that population, and upon the probable course and outcome of any enterprises upon which it may embark as a whole. Of all the forms of aggregate behavior in which a population may become involved war is surely one of the most significant as well as dreadful. Let us consider for a moment the condition of the populations of the chief protagonists shortly before they embarked in 1914 upon World War I, and similarly before they started early last September upon World War II. The necessary data are lacking to make this suggested picture absolutely precise, complete, or accurate, nor will it be necessary to bore you with an analysis made as elaborate as possible for the sake of the last iota of comprehensiveness. A simpler approach will sufficiently indicate the outlines and broad coloring of the picture. In 1914 within a few days of the outbreak of hostilities, Germany, with only Austria as an ally of any degree of effectiveness, found herself immediately confronted by France, England and Wales, Scotland, Belgium, and Russia. Let us agree to leave Russia out of the picture, except for certain overtones presently to be struck. There are two pragmatic reasons for treating Russia in this cavalier fashion; the first is that anything like trustworthy figures for the age distribution of the Russian population at a reasonably short time before 1914 are not available in any sources

at my command; the second is that the subsequent course of events indicated that Russia played an effective part in the course of war for only a short time. In a similar way we shall not include in the figuring the population resources of the outlying parts of the British Empire, or of those other countries that eventually rallied around the Allies before World War I came to an end. Let us confine attention solely to the immediate military impact of the chief combatants at the very outbreak of the war. The nearest population figures are those of 1910 and 1911. As of those dates Germany and Austria had total population resources, counting both sexes together, of upwards of 64 million persons, of whom approximately 33.5 per cent were youngsters in the pre-reproductive phase of life under 15 years of age; 50.8 per cent were workers aged between 15 and 50 years on whom fell the combined burdens of fighting and of producing the goods to keep both the troops and the civilian population alive and going; and 15.7 per cent were over 50 years of age. If we consider the *male* population only, upwards of 16 million, or 51.3 per cent of them were in the group between 15 and 50 years, with 34.1 per cent in the under 15 group, and only 14.7 per cent in the 50 and over group.

As of the same date the four instantaneous and immediate Allies that are to be considered, Belgium, France, England and Wales, and Scotland had total population resources, counting both sexes, of upwards of 87.5 millions, a clear numerical advantage in total over the enemy of nearly 37 per cent, not counting Russia or later ralliers-around at all. Furthermore approximately 52.2 of this combined population fell in the fighter-worker age phase between 15 and 50, as against the corresponding 50.8 per cent in the population resources controlled by Germany, another clear advantage. This difference of only 1.4 per cent may seem too small to pay attention to, but it was a difference that was more than 200 times its probable error, and represented an absolute advantage in this age phase of nearly 3 million persons. In the under 15 phase of the life cycle the combined allied population had about 28.5 per cent of the total, and in the 50 and over phase about 19.2 per cent. We shall not stop to argue over the comparative advantages or disadvantages of the distribution of these outlier phases, but instead may consider, just for a moment, the combined Allied male population only. Again neglecting Russia, it amounted to upwards of 43 million against about 32 million for Germany and Austria, a relative advantage of 34 per cent. Of its components 52.4 per cent fell in the fighter-worker phase between 15 and 50 years of age, as against 51.3 per cent in the German controlled population resources. Altogether

there can be no question that at the outbreak of World War I the size and structure of the combined population resources of the immediate Allies were definitely more advantageous than those then controlled by the Germans.

What now of the situation at the outbreak of World War II? Again Russia will be omitted from all consideration, because up to the time of writing anything like direct military aid from Russia to Germany in the latter's war with the Allied forces has been chiefly notable for its absence. Poland also is best left out of the military reckoning for another and sadder reason. So we are left with France, England and Wales, and Scotland on one side, and Germany (which in August 1939 included Austria as a part of itself) and Czechoslovakia on the other side. It seems fair to count in the Czechoslovakian man power for the pragmatic reason that *at the outstart* of World War II Germany had received for nearly a year, and was then receiving, direct and important military advantages from her virtually complete control of it.

Before proceeding further with the discussion it must be called to mind that in the quarter of a century that elapsed between the beginning of World Wars I and II, the populations of all the countries involved had increased in absolute size, by normal processes of growth. Furthermore, as will presently be seen, they had changed in their age structure by significant amounts, as a result of the operation of differential birth and death rates in the interval.

So then, taking figures as of roughly 1937 and 1938, it appears that the Allies went to battle last September with total population resources, counting both sexes, of a little more than 87 million persons. But now *more than one-quarter* of them, as against the 19 per cent of 25 years ago, were in the post-reproductive phase of life aged 50 and over. Furthermore, instead of the 52.2 per cent of fighters and workers between 15 and 50 there were only 51.3 per cent in this phase; almost one in a hundred fewer. Finally, instead of 28.5 per cent of youngsters coming along there were only 23.6 per cent.

The population resources controlled by Germany in early September of this year present a different picture. She had a total of approximately 90 million persons to draw on. In this respect the advantage was with her this time, to the tune of only 3.4 per cent to be sure, but in great contrast to an advantage of 37 per cent in the other fellow's favor 25 years ago. The age distribution of this population was different too. Of its component members 53.7 per cent, as against the Allies 51.3 per cent, were in the worker-fighter phase of the life cycle. Again a little difference of 2.4 per cent may not seem to amount to much, but it is

enormously greater than any chance fluctuation of sampling that could be expected, and in fact represents an advantage of more than 3.6 millions of persons in the fighter-worker phase, of whom a little fewer than a half are males. Of the semi-dependent old folks there were but 22.4 per cent in the German set-up against the Allies 25.2 per cent. In respect of the youngsters under 15 Germany was on all fours with the Allies, having 23.8 per cent in this phase as against 23.6 for the Allied populations. It is not worth taking time to discuss separately the male portions of the compared populations, since that analysis yields nothing to alter essentially the picture given by the total.

The statistical computation has been carried quite far enough to make it perfectly plain that, so far as the population aspects of war are concerned, the absolute and relative advantages and disadvantages accruing from that source *have become reversed* in the quarter of a century separating these two great conflicts between essentially the same combatants. Generally falling birth rates on one side, and generally rising birth rates in considerable parts of the populations concerned on the other side have been in the main responsible for this substantial alteration of the picture.

IV

It is now time to give some attention to the question of what the population of the United States has been doing during the hundred years in which the American Statistical Association has at least kept a watchful eye upon it, even though not able to do much more than that, and particularly not quite powerful enough to control its movements. Unfortunately, it is not possible to make penetrating comparisons in respect of age distributions between the population of this country as it was in 1830 and a hundred years later in 1930, as we should like to, because the census of 1830 left a good deal to be desired in the way of information about the ages of the inhabitants. So the best that can be done from the standpoint of this discussion is to compare the total "free white" population in 1840 with the total white population of 1930, for such separate divisions (state or territories) as had official existence in 1840. There were 30 such political subdivisions in 1840. Twenty-eight of these units had in 1840 the same boundaries that they have today for all practical purposes; two out of the 30, namely Wisconsin Territory and Iowa Territory as they were called in 1840, included much larger areas than they do now as states. The boundaries of the former took in a part of what is now Minnesota, and the latter included, besides its present territory large parts of present-day Minnesota, and North and South Dakota.

It is further to be noted, before proceeding further with this discussion, that the standards of accuracy and completeness in census taking were not as high in 1840 as they have since become. But, again except possibly for Wisconsin and Iowa, internal evidence indicates that no serious errors of inference are likely to arise in the use it is proposed to make of the figures here.

The available data for the comparison of the populations of these 30 states (and territories) in 1840 and 1930 present such a great number of glittering facets for discussion as to raise the dyed-in-the-wool statistician to the seventh heaven of delight. But in the brief remainder of time left for this discourse it will be possible to say something about only two of these manifold aspects. The first will relate to the comparative reproductive performances of the white population a hundred years ago and in 1930. For the purposes of this discussion let us consider for a moment the ratio between (*a*) the number of persons in a population falling in the pre-reproductive phase of life (0-14 years), which may be called the *generate* of the population, on the one hand; and (*b*) the number of persons in the same population at the same time (say the year of a census) falling in the reproductive phase of life (15-49 years), which may be called the *gerant* of the population, on the other hand. If the former of these numbers is divided by the latter and the quotient is multiplied by 1,000, the resulting answer will state the number of persons in the pre-reproductive phase of life in that population for each thousand persons in the reproductive phase at the same time. This ratio, which may perhaps be fittingly called the *generative index* of the population, is biologically significant. Its meaning may perhaps be most clearly envisaged if we think for a moment of a population as contained in three great tanks, set one above the other, as shown in Fig. 1.

The topmost tank, set on a high scaffolding, is filled to a certain level with the persons in the *pre-reproductive* phase of life. At its bottom is an age outlet pipe through which trickles a constant flow of fully matured larvae, as it were, who, having achieved puberty, pass down the pipe into the next lower tank, which is filled to a certain level with the *reproducers*. From this second tank there are two pipes. One of these runs upward and over the top of the first tank into which it empties. Through this pipe flows the stream of new births which the reproducers pump up to maintain the level of the first, or pre-reproductive phase tank. A second pipe from the reproducer tank leads off from the bottom down into the third tank in the series, which rests on the ground. Through this pipe flows the stream of those who, having finished their

reproducing, pass on down to the third or *post-reproductive* tank. At the bottom of that final tank there is only one outlet. It is a broad and shrouded spillway, labelled *Death*, and all eventually slip through it to the earth from which they came, and on which the system of tanks rests. Both of the two higher tanks also have death drainways, to be sure, in addition to their other outlets. But these are much smaller ones and let out fewer persons than the regular age outlets.

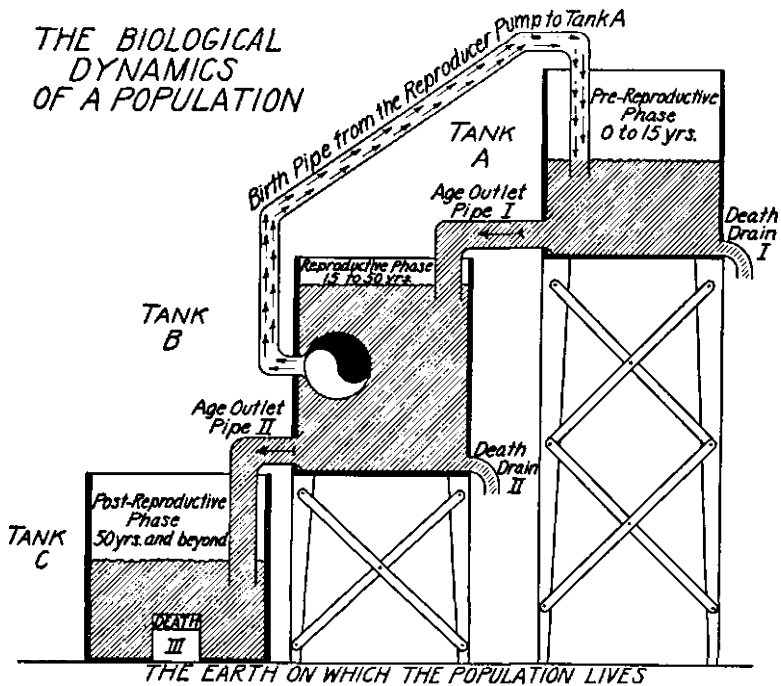


Fig. 1. Diagram to illustrate the more important of the fundamental variables in the biological dynamics of populations. For further explanation see text.

Now what our generative index measures is the height of the *level* of the topmost or pre-reproductive phase tank, that the persons in the second or reproducer tank are able to maintain by their reproductive efforts, with the death drainways in both always open as well as the age outlet pipes.

Table 2 gives, for the white populations of 1840 and 1930, the generative indices state by state, at those two dates, together with the absolute numbers from which the indices are computed (namely the populations in the pre-reproductive and the reproductive phases of

the life cycle). The entries in the table are arranged in descending order of the generative index as it was in 1840.

TABLE 2

WHITE PERSONS IN THE PRE-REPRODUCTIVE (0-14 YEARS OF AGE) AND REPRODUCTIVE (15-49 YEARS OF AGE PHASES OF THE HUMAN LIFE CYCLE, IN 1840 AND 1930, AND THE CORRESPONDING GENERATIVE INDICES OF THESE POPULATIONS, BY STATES (OR TERRITORIES IN 1840 IN TWO CASES)

State (or territory)	Free white population in 1840		White population in 1930		Generative index		Decline in the index 1840- 1930
	Aged 0-14 yrs.	Aged 15-49 yrs.	Aged 0-14 yrs.	Aged 15-49 yrs.	In 1840	In 1930	
Tennessee	321,516	273,689	725,728	1,078,942	1175	673	502
Alabama	170,152	146,621	614,314	864,919	1160	710	450
Georgia	203,446	177,678	627,639	946,369	1145	663	482
Indiana	337,146	300,599	866,780	1,597,127	1122	543	579
Arkansas	38,845	35,099	487,067	688,519	1107	707	400
Mississippi	87,663	82,248	349,358	504,728	1066	602	374
Missouri	158,473	149,259	916,082	1,787,391	1062	513	549
Kentucky	281,461	265,875	828,585	1,165,753	1059	711	348
North Carolina	223,401	218,745	830,291	1,114,397	1021	745	276
Illinois	224,887	222,982	1,897,094	4,051,927	1009	468	541
South Carolina	119,011	118,813	344,490	477,613	1002	721	281
Ohio	697,079	698,111	1,742,651	3,363,286	999	518	481
Virginia	330,161	345,616	583,598	898,857	955	619	306
Pennsylvania	723,681	810,433	2,770,453	4,808,427	893	576	317
Michigan	93,665	105,445	1,357,305	2,520,610	888	538	350
Maine	210,581	238,993	228,143	381,851	881	597	284
Iowa	19,225	21,905	692,454	1,247,833	878	555	323
New Jersey	145,615	171,616	1,038,160	2,125,408	848	488	360
Delaware	24,491	29,178	55,191	107,616	839	513	326
Vermont	114,339	141,357	101,513	173,497	809	585	224
Maryland	129,063	160,794	377,533	718,558	803	525	278
New York	955,860	1,215,407	3,057,576	6,889,490	786	444	342
Florida	11,372	15,152	308,493	540,405	751	571	180
Louisiana	61,292	85,812	440,694	697,111	749	632	117
New Hampshire	103,005	140,117	124,743	226,664	735	550	185
Dist. of Columbia	11,837	16,244	70,142	206,199	729	340	389
Connecticut	104,817	153,797	437,136	845,543	682	517	165
Rhode Island	37,063	55,679	188,856	357,651	666	528	138
Massachusetts	247,840	392,841	1,111,736	2,222,678	631	500	131
Wisconsin	11,232	18,159	841,108	1,525,427	619	551	68
Totals and averages	6,201,219	6,808,264	24,014,913	44,134,796	911	544	367

Among the 30 political subdivisions of the United States that existed in both 1840 and 1930 there were 11 which in 1840 had generative indices with values *greater* than 1,000, meaning that in these 11 states there were more than 1,000 persons in the pre-reproductive phase of life for each 1,000 in the reproductive phase. These states ranged from Tennessee with a generative index in 1840 of 1,175 to South Carolina,

whose generative index in 1840 was 1,002. Between these extremes fell, in descending order of the index, Alabama, Georgia, Indiana, Arkansas, Mississippi, Missouri, Kentucky, North Carolina, and Illinois. These 11 states were certainly doing their reproductive duties to the nation in a big way back in 1840. They were turning out prospective presidents and senators, as well as schoolmarms and share-croppers at a stupendous rate. And may I again remind you that it is *solely* of the free *white* population of that day that we are speaking? The Negro does not enter the picture being drawn at all.

In 1930 there was not a single state in the Union with a population having a generative index as great as 1000. The state whose white population had the highest index in 1930 was North Carolina, and the value of the index was 745. So are the mighty fallen! The states with the next highest generative indices for the white portion of the population in 1930, that were also present and reproducing as well as voting in 1840, arranged in descending order according to the 1930 value of the index, were South Carolina, Kentucky, Alabama, Arkansas, Mississippi, Tennessee, Georgia, Virginia, Louisiana, and finally Maine with an index of 597 in 1930. So then it appears that among the 30 political subdivisions that had a census of the free white population taken in 1840 as either states or territories, 8 out of the 11 that had the highest generative indices in 1840 were among the 11 with the highest indices in 1930. Three that were in the 11 highest in 1840 (namely Indiana, Missouri, and Illinois) were replaced in 1930 by Virginia, Louisiana, and Maine. Truly one is again reminded of the profound wisdom of Malthus when he said that "the passion between the sexes is necessary, and will remain nearly in its present state." When one reflects that the white populations of Tennessee, Alabama, Georgia, Arkansas, Mississippi, Kentucky, and the Carolinas were among the 11 showing the highest generative indices in 1930 just as they were in 1840, it seems plain that "the passion between the sexes" in those populations had indeed experienced little relative alteration in the period.⁴

But perhaps some may be disposed to think that this record of secular perseverance in concupiscence found in the most vigorously reproductive American population groups is perhaps after all only accidental. So let us next have a look at the 10 states that in 1840 showed

⁴ It is to be understood clearly that the above comparisons are based upon the 30 states (or territories) that were represented in the records in both 1840 and 1930. In 1930 the white populations with the highest generative indices, among all 48 states (and the District of Columbia) were, in descending order: North Carolina, West Virginia, South Carolina, Kentucky, Alabama, Utah, Arkansas, New Mexico, Mississippi, Tennessee, and North Dakota. But in 1840 West Virginia, Utah, New Mexico, and North Dakota did not exist as such.

the *lowest* generative indices, and then see how they stood in 1930. In 1840 the political subdivision with the lowest generative index for its free white population was Wisconsin Territory, but it was at that time populated chiefly by pioneering migrants from the east and south, who had not been there long enough to bring about anything like a settled or normal age distribution. Furthermore there is reason to believe that the 1840 census was particularly inadequate in that Territory. On these accounts it will probably be better to fix attention upon Massachusetts, as the state with a stabilized population having the lowest generative index in 1840, with a value of 631; that is to say 631 persons in the pre-reproductive phase of the life cycle to each 1,000 in the reproductive phase. The next lowest was Rhode Island (666), and then in order Connecticut, District of Columbia, New Hampshire, Louisiana, Florida, New York, Maryland, and finally as the tenth in the list Vermont, whose generative index in 1840 was 809. In 1930 the list of 10 states with the lowest generative indices for the white population out of the 30 states that can be compared over the period, starts with the District of Columbia, whose index was only 340. Next was New York (444), followed in order by Illinois, New Jersey, Massachusetts, Missouri, Delaware, Connecticut, Ohio, and ending with Maryland, whose index for the white population was 525. Again it develops that five out of the 10 states (District of Columbia, New York, Massachusetts, Connecticut and Maryland) appear on both the 1840 and 1930 lists. Whatever may have been the causes that led the white population of these five states to be at the bottom of the scale in 1840 in the matter of effective reproduction, and quite regardless of the social, economic, and other changes that took place in the American scene between 1840 and 1930, the striking fact is that these same states turned up again in 1930 at or near the bottom of the list.⁵

Up to this point the discussion has been of the relative ranks of the most vigorously and the least vigorously reproducing white populations in respect to their generative indices in 1840 and 1930. For all of the states without exception there was a decline in the absolute values of the generative indices between these two dates. Perhaps the best indication, in broad outline, of how great this decline was can be given by comparing the combined index for the 30 states (and territories) in 1840 for which data existed, with its value for the same states in 1930.

⁵ Again, as before, it must be emphasized that the above comparison relates only to states represented in the figures in both 1840 and 1930. Taking into account *all 48 states* and the District of Columbia, the 10 with the lowest generative indices in 1930 were, in order, District of Columbia (340), California (376), Nevada (423), New York (444), Oregon (449), Washington (452), Illinois (468), New Jersey (488), Massachusetts (500), and Arizona (508). But in 1840 there were no data for California, Nevada, Oregon, Washington, or Arizona.

In 1840 the total white population of these 30 subdivisions of the United States had 6,808,264 persons in the reproductive phase of the life cycle (15-49 years old), and 6,201,219 persons in the pre-reproductive phase, leading to a generative index of 911. The white populations of the same subdivisions in 1930 had 44,134,796 persons in the reproductive phase of life (or about 6.5 times as many as in 1840). But in the pre-reproductive phase of life there were in the 1930 white population only 24,014,913 persons, or fewer than 4 times as many as in 1840. Vermont actually had *absolutely* more persons in the pre-reproductive phase in her population in 1840 than she had in 1930. The 1930 generative index for these combined white populations was only 544, not quite 60 per cent of the value of 911 displayed in 1840. The greatest decline in the index in the 90-year period was exhibited by the white population of Indiana, where it fell from 1,122 in 1840 to 543 in 1930, or 579 points. The smallest decline was in Wisconsin, from 619 in 1840 to 551 in 1930, or only 68 points. This, however, is not quite fair, because, as has already been noted, in 1840 the territory that was later to become the state of Wisconsin was only sparsely settled with a population having an abnormal age distribution for the time. Actually its generative index did not become stabilized until 1860 at about 897 where it stayed through the 1870 census. Leaving Wisconsin out on this account, the state showing the next smallest decline in the white population index between 1840 and 1930 was Louisiana, where it fell 117 points from 749 to 632.

v

Let us now turn to a brief examination of some of the facts about the comparative proportion of persons in the post-reproductive phase of the life cycle—the oldsters who have slid down into the bottom one of our three tanks. It needs no emphasis or elaboration to make it clear that these persons, who have worked out and finished whatever potential biological justification there ever was for their existence, constitute a social problem of the first magnitude in all present day populations of the western world.

As before attention will be confined to the white population only, and to the 30 political subdivisions of the United States that can be compared in 1840 and 1930. Table 3 gives the percentages of the persons aged 50 years and over, in the white populations of 1840 and 1930.

Among all of the populations shown in Table 3 New Hampshire's showed the highest percentage of old folks in 1840 and also in 1930. That percentage was 14.4 in 1840 and 24.3 in 1930. Furthermore this

latter percentage was the highest shown by any of the 48 states and the District of Columbia in 1930. All six of the New England states in 1840 had between 10 and 14.4 per cent of their white populations in the post-reproductive phase. But no other state did at that time. In

TABLE 3
 PERCENTAGES OF THE WHITE POPULATIONS OF 1840 AND 1930 THAT WERE IN THE POST-REPRODUCTIVE PHASE OF THE HUMAN LIFE CYCLE (AGED 50 YEARS AND ABOVE), BY STATES (OR TERRITORIES IN 1840 IN TWO CASES)

State (or territory)	Percentage aged 50 yrs. and over		Increase in percentage 1840-1930
	In 1840	In 1930	
New Hampshire	14.40	24.28	9.88
Connecticut	14.33	18.60	4.27
Vermont	12.20	23.26	11.06
Rhode Island	12.17	19.25	7.08
Massachusetts	12.12	20.42	8.30
Maine	10.16	23.23	13.07
New Jersey	9.77	17.33	7.56
North Carolina	8.81	12.94	4.13
Virginia	8.78	16.23	7.45
Maryland	8.77	18.91	10.14
New York	8.73	18.07	9.34
Pennsylvania	8.47	17.51	9.04
Dist. of Columbia	8.40	21.67	13.27
Delaware	8.35	20.80	12.45
South Carolina	8.21	12.90	4.69
Kentucky	7.27	16.46	9.19
Ohio	7.12	19.32	12.20
Tennessee	7.09	15.51	8.42
Georgia	6.52	14.27	7.75
Indiana	6.03	20.88	14.85
Michigan	5.88	16.56	10.68
Alabama	5.49	13.00	7.51
Louisiana	5.27	13.65	8.38
Illinois	5.16	18.05	12.89
Mississippi	5.12	14.29	9.17
Florida	5.08	17.94	12.86
Missouri	4.99	20.41	15.42
Wisconsin	4.42	18.74	14.32
Arkansas	4.19	14.46	10.27
Iowa	4.18	20.71	16.53
Weighted averages	8.31	17.85	9.54

1930 nine of the 30 states under comparison found 20 per cent—*one fifth*— or more of their populations in this phase. Furthermore each of the three Pacific coast states, Washington, Oregon, and California, not represented in 1840, also had more than 20 per cent of its population in this phase. The state that showed the greatest increase in the proportion of old folks between 1840 and 1930 was Iowa, which as a pioneering

Territory had only 4.18 per cent of its population in this phase a century ago, according to the somewhat imperfect record, but in 1930 had 20.71 per cent, approximately a five-fold apparent relative increase. On the other hand the state that showed the smallest increase in the percentage between 1840 and 1930 for the white population was North Carolina, which had 8.8 per cent in 1940 and only 12.9 per cent in 1930. South Carolina behaved in practically the same way, increasing from 8.2 per cent to only 12.9. This latter percentage was the lowest for the entire United States in 1930. The weighted average for all 30 states compared was 8.31 per cent in 1840, and more than twice as much (17.85 per cent) in 1930.

A great deal is heard today about the growing burden thrown upon our social structure and way of life to take care of the old. Their numbers, both absolute and relative, have steadily increased during the last century, as we have seen. A primary causal factor in bringing about this increase has been the truly magnificent achievements of public health efforts. With drastic reductions in the ghastly mortality in the pre-reproductive phase of life that prevailed a century ago many more people have been able to live on into the post-reproductive phase. Furthermore no social trend could be more obvious than the increasingly vocal demands of the old folks that they be adequately taken care of when they are in that terminal phase of their earthly career. The tectonics of our kind of democracy obviously favor such demands, and encourage their perennial growth. The wisdom of the founding fathers led them to the view that youngsters under 21 years of age were, on the whole, too foolish to be entrusted with the power of the vote. But not having envisaged the possibility of such weird economic philosophies as those currently associated with "ham and eggs" or "\$200 a month" it apparently never occurred to them that there might conceivably be an age *beyond* which people would also be too foolish to be allowed to vote.

But along with the increase in the proportions of the population in the post-reproductive phase, and indeed partly responsible for it statistically, there has been a decline in the birth rate and a consequent decrease in the proportion of the population in the pre-reproductive phase, from 43.70 per cent in 1840 to 28.95 per cent in 1930, again for the 30 states that can be compared at the two dates specified. So there has been some compensation for the increasing old age burden on those who must do the population's work through a lightening of the relative burden of infancy and youth that must be cared for. At the same time government has again stepped in and insisted, through child labor legislation, that society must assume the total support of children

up to the comparatively advanced age of 18 years. While to be sure the constitutional amendment to this end has not yet been ratified, there seems every reason to believe that the political strategy being used to bring about that result will presently achieve complete success. When it does we shall present to the world the bizarre picture of a great nation affirming in its laws that a human being is a helpless infant incapable of doing gainful work to help towards its support until well past the age of 18 years, and by the might of the law must be prevented from so doing; while at the same time the laws of many of the constituent states of the nation with equal solemnity affirm that this same "infant" may legally marry and produce offspring for several years before reaching the age of 18. Truly, as has so often been observed, we are a remarkable people.

But we must get back to our mutton. It is plain that the old folks, on the one hand, and the youngsters, on the other hand, by their own lusty bellows and the supplementary skullduggery of their "humanitarian" friends are ganging up, as the expressive phrase goes, on the half of the population that does the work, pays the bills and taxes, and in cold fact earns the livings for all. What we want to know is how the burden borne by this always harassed moiety compared *in total* in 1930, counting *both* young and old into the load, to what it was in 1840. The answer is simple, and will perhaps prove a little surprising. In 1840 there were, in the 30 states that can be compared, 7,380,831 persons in the pre-reproductive and post-reproductive phases of life taken together. To take care of them there were 6,808,264 persons in the reproducer-worker phase. So that a century ago each 1,000 workers aged between 15 and 50 years, had 1,084 other persons, younger and older, besides themselves to take care of, and in the main earn the livings for. In 1930, on the other hand, each 1,000 of the 44,134,796 workers in the reproducer-worker phase of life, had only 880 persons besides themselves to take care of, out of the total of 38,826,524 persons in the pre-reproductive and post-reproductive phases of life combined. In short, the total burden has *lessened* by something of the order of a fifth of its initial magnitude in the course of a century.

To the biologist this clear-cut end result that emerges from the complex tangle of social, economic, and political forces, as well as underlying biological variables that are involved in its causation, appears primarily to be a striking example of *adaptation* of the human species *qua* species. As has been discussed elsewhere in detail,⁶ the population of the world increased nearly five-fold in the three centuries between

⁶ Cf. Chap. VI of *The Natural History of Population*, 1939, pp. 249-288.

roughly 1630 and 1930. This extraordinary spurt of population growth in such a relatively small fraction of the vast total span of time during which man has existed as a distinct species on the earth has been primarily a consequence of the easier ways of getting a living that followed the spectacular advances of pure and applied science, giving man a power to turn the forces and resources of nature to his own ends undreamed of before. But an average density of more than 40 persons per square mile of land area of the earth, counting in every single square foot of land, is so great as to lead to discomfort, unrest, and recurring disturbances. Already a century ago there had begun adaptive responses of populations in the attempt to mitigate the discomfort arising from the painful stimuli induced by high population densities. One of the chief of these adaptive responses, and one which has increased enormously as everyone knows, is the practice of contraception. By this device it is easier and pleasanter by far to reduce the burden on those in the reproducer-worker phase of the life cycle by cutting down the numbers in the pre-reproductive phase, than it is to lighten the load by lopping off those in the post-reproductive phase of life. In fact any conceivable technique to reduce the numbers in the post-reproductive phase would be completely repugnant to the moral and ethical ideas of western civilizations, to say nothing of others.

It may be counted as certain that mankind will continue and increase its adaptive efforts to make life easier and pleasanter. That is, in fact, the way of all living things. Man's whole history is the record of a long struggle, partly by the trial and error process, and partly by the exercise of intelligence, to find easier and pleasanter ways of getting a living. The ethnologist's records of the evolutionary progression of culture patterns point this as the prime motive and moral of the story, with a culmination in the industrial-commercial culture pattern that enables enormously larger populations to live in a specified area with far less expenditure of physical effort than under any preceding mode of life.

That relatively easy and pleasant living is a desirable end in itself, surely no one but the most spiritually constipated misanthrope would deny. But the adaptive processes by which this end is achieved always want careful watching. For the results of the science of biology and paleontology indicate clearly that the chief characteristic of biological adaptation is opportunism rather than wisdom. In their adaptive efforts to get out of unpleasant and painful situations living things generally, just like the unfortunate ladies of song and story, tend to take "the easiest way." All too often in the long history of life on the earth

this pathway, so pleasant temporarily, has led only to the extinction of the species at the end. Those adaptations that both natural theologians and biologists agree in regarding as perfect paradigms of wisdom, divine or just biological as the case may be, may perhaps all be really only the naturally selected cases where the opportunism of the moment—"the easiest way"—happened by pure chance alone to be also the wisest course in the long run. The cases where this perfect one-to-one consilience failed to be present are not now observed, for the simple reason that they are no longer here to be observed.

The current use of such devices as contraception (or, for that matter, capitalism or communism) as adaptive procedures to ease the burden on aging populations may well be scrutinized from this point of view. Just possibly what mankind is slowly but steadily doing may turn out in the long run to be the moral equivalent of curing a toothache by the effective but disastrous technique of cutting off the patient's head. There is no good in making life easier if there is not going to be anybody around to live it. The advancement of science, and, indeed of knowledge generally, represents biologically the most colossal and intricate adaptive procedure ever achieved by any organism. But has it brought collective wisdom in its train? The sorry state of the world today, and all history, too, make it crystal clear that the realistic answer must be an emphatic *No*. Nor is there any smallest reason to suppose that statesmen or politicians are going to guide our destinies in the future any more wisely than they have in the past.

Perhaps it may turn out to be the principal opportunity and duty of the American Statistical Association, in the next century of its existence upon which it is now so auspiciously entering, to instil clearly and deeply into the minds and consciences of the mass of our people that their chiefest concern is the composition of the population.

HISTORICAL EXHIBITS

MINUTES OF THE FIRST SIX MEETINGS

A meeting was held at the Rooms of the American Education Society, number 15 Cornhill, Boston, November 27th, 1839, for the purpose of considering the expediency of forming a Statistical Society. The following persons were present, the Hon. Richard Fletcher, Rev. William Cogswell D.D., Oliver W. B. Peabody Esq., Register of Probate, John D. Fisher, M.D., and Lemuel Shattuck Esq.

The meeting was organized by the choice of the Hon. Richard Fletcher as chairman, and of Lemuel Shattuck, Esq. as Secretary.

The objects, for which the meeting was called, were then stated and discussed, and the opinions of the several gentlemen present freely exchanged on the advantages which would result from the formation of such an association and on the expediency of forming one. Then, on motion of the Rev. Dr. Cogswell,—resolved,—that it is expedient to form a Society to be called the American Statistical Society.

On motion of Mr. Shattuck, voted, that a Committee of five be appointed to prepare a Constitution for the government of said Society, to be submitted at an adjourned meeting, and that all the gentlemen present constitute said Committee.

Voted that this meeting be now adjourned to Wednesday evening, December 11th, at 7 o.c. P.M. to meet at this place.

Attest, Lemuel Shattuck, Secy.

Boston, December 11th, 1839

A meeting was held this evening according to adjournment. All the gentlemen present at the last meeting were present at this, except Hon. Richard Fletcher, from whom a letter was received, stating that he was unavoidably absent.

The chair was taken by Oliver W. B. Peabody Esq.

The Rev. Dr. Cogswell from the Committee chosen at the last meeting, reported the following draft of a Constitution.

Constitution of the American Statistical Society:

Article I. The Society shall be denominated the American Statistical Society.

Article II. The objects of the Society shall be to collect, preserve and diffuse Statistical information in the different departments of human knowledge.

Article III. The Society shall be composed of Fellows, Corresponding members, Honorary members and Foreign members.

Article IV. The Fellows shall be chosen by ballot, having been previously nominated by the Board of Directors,—the affirmative votes of four fifths of these Fellows present, being necessary to a choice, and no balloting shall take place unless ten Fellows be present. Corresponding, Honorary and

Constitution, shall be made ~~made~~ by the Board of Directors.

Art IX. No alteration of this Constitution shall be made, except on recommendation of the Board of Directors, and by a vote of three-fourths of the Fellows present at an Annual Meeting.

Richard Fletcher

William Coopersell

Oliver W. Brown

Levent Shattuck

John Fisher

B. W. Edwards

Ebenezer Alden

~~Delaplanche & Lawrence~~

J. D. Worcester

Joseph B. Field

Samuel G. Howe

John C. Bigelow

H. Hill

Jesse Chickering

Warren M. Mason

Geo. C. Shattuck

Thomas C. Webb

William L. Gannett

Henry Colman

Thomas Simonds

Robert C. Southwick

Wm. L. Gannett

Wm. L. Gannett

Benjamin Peirce

Paul Newhall

Signatures of the original members of the American Statistical Association affixed to the Constitution adopted on December 11, 1839.



LEMUEL SHATTUCK
Home Secretary 1839-1844
Librarian 1810-1843
Counselor 1844-1847 and 1854-1858



WILLIAM COGSWELL
Counselor 1839-1843



OLIVER W. P. PEABODY
Counselor 1839-1843

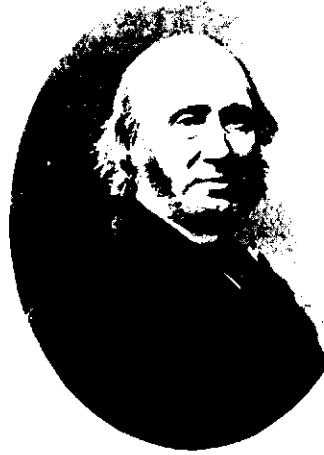


JOHN D. FISHER, M.D.
Counselor 1839-1840

The four men whose pictures are shown above and Hon. Richard Fletcher, whose picture is shown on another page, were present at the meeting on November 27, 1839, at which it was decided to organize the American Statistical Association.



HON. RICHARD FLETCHER
President 1839-1846



GEORGE C. SHATTUCK, M.D.
Vice-President 1840-1846
President 1846-1852



EDWARD JARVIS, M.D.
President 1852-1882



JOSEPH B. FELT
Recording Secretary 1839-1859

The photograph of Richard Fletcher is from the archives of Dartmouth College. The pictures of Lemuel Shattuck, William Cogswell, George C. Shattuck, Edward Jarvis, and Joseph B. Felt are reproduced from the New England Historical and Genealogical Register. The picture of Oliver W. P. Peabody is reproduced from The Outlook, and the picture of John D. Fisher is from the New England Magazine.

Foreign members shall be nominated and elected in the same manner. Each Fellow, on admission to the Society shall pay into the Treasury Five Dollars and annually afterwards Two Dollars, or Thirty Dollars at some one time.

Article V. Fellows only shall be entitled to vote, but Corresponding, Honorary and Foreign members shall have the right to sit and deliberate in all the meetings of the Society.

Article VI. The officers of the Society shall be a President, Vice-Presidents, a Recording Secretary, a Home Secretary and a Foreign Secretary, a Treasurer, a Librarian and nine Counsellors, who, together (with the President and Secretaries) shall form a Board of Directors for the government of the Institution,—five of whom shall constitute a quorum at any meeting regularly convened. There shall, also, be a Publishing Committee of five, to be chosen annually by the Board of Directors at the time they shall appoint.

Article VII. The Society shall meet annually in the City of Boston on the first Wednesday in February, to hear the report of the Board of Directors and of the Treasurer and of the Librarian, to elect officers and to transact other necessary business, and also at such other times as the Board of Directors shall appoint. Ten Fellows shall be necessary to form a quorum for transacting business, but a less number may adjourn a meeting.

Article VIII. By-laws for the more particular government of the Society, not contravening the Constitution, shall be made by the Board of Directors.

Article IX. No alteration of this Constitution shall be made, except on recommendation of the Board of Directors, and by a vote of three fourths of the Fellows present at an annual meeting.

These articles were deliberated on and discussed, and on motion of Mr. Shattuck, it was voted,—that we form ourselves into a Society and adopt this Constitution, and that all who approve and sign this Constitution previously to the organization of the Society by the choice of officers, shall be considered as original members.

Voted, that the meeting be now adjourned to Wednesday evening next at 7 o.c.

Attest.—Lemuel Shattuck
Secy. pro. tem.

Boston, December 18th, 1839

A meeting was held according to adjournment. Present, Hon. R. Fletcher, chairman, Henry Lee Esq., Rev. J. B. Felt, Rev. Dr. Cogswell, O. W. B. Peabody Esq., John P. Bigelow, Secretary of State, Hon. Horace Mann, Dr. John D. Fisher, Dr. Samuel G. Howe, Dr. Jesse Chickering and Lemuel Shattuck Esq. Resolved, that we now proceed to the organization of the Society by the choice of officers.

Voted, that a Committee of three be appointed by the Chair to retire and

nominate a list of officers for the government of the Society and Rev. Dr. Cogswell, Mr. Bigelow, and Dr. Fisher were appointed said Committee. This Committee reported a list of persons for officers in part.

Voted to proceed to the choice of officers.

Dr. Fisher was appointed to collect the votes and the following individuals were chosen to their respective offices.

Hon. Richard Fletcher	President
Henry Lee Esq.	Vice Presidents
Bradford Sumner Esq.	
Rev. Joseph B. Felt	Recording Secretary
Lemuel Shattuck Esq.	Home Secretary
Joseph E. Worcester	Foreign Secretary
Rev. William Cogswell D.D.	Counsellors
Ebenezer Alden M.D.	
Oliver W. B. Peabody Esq.	
John P. Bigelow Esq.	
Hon. Horace Mann	Counsellors
John D. Fisher M.D.	
Prof. Bela B. Edwards	Counsellors
Samuel G. Howe M.D.	
Jesse Chickering M.D.	

The President, Rev. Dr. Cogswell and Henry Lee Esq. severally made statements respecting the important advantages which would result from Statistical investigations.

The Society then adjourned to Wednesday evening, January the 8th at 7 o.c.

Lemuel Shattuck, Secy.
pro. tem.

Boston, January 8th, 1840

A meeting of the Society was held this evening according to adjournment. Members present were the President, Bradford Sumner Esq., Rev. Dr. Cogswell, Dr. Fisher, Dr. Chickering, Mr. Peabody, Dr. Webb, Mr. Shattuck, Mr. Felt and Mr. Simonds.

As Mr. Felt was unable to officiate because of an inflamed eye, Mr. Shattuck was appointed Secretary pro. tem.

Voted, that an application be made to the Legislature for an Act of Incorporation and that said application be signed by all the present members of the Society.

Voted that a Committee of three be appointed to prepare a draft of a petition and, also, of an Act of Incorporation.

Messrs. Fletcher, Sumner, Peabody and Shattuck were appointed said Committee.

Lemuel Shattuck, Secy.
pro. tem.

Boston, February 5th, 1840

The annual meeting of the Association was held at Joy's Building, No. 10, at 7 o.c. p.m. As Mr. Felt was still unable to officiate, Mr. Shattuck was chosen Secretary pro. tem. Members present were the President, Rev. Dr. Cogswell, Professors Treadwell and Nichols, Dr. George C. Shattuck, Dr. Chickering, Mr. Thomas A. Davis, O. W. B. Peabody, Esq., Rev. Joseph B. Felt, Dr. Alden, Mr. Joseph E. Worcester, Dr. Webb, Mr. Simonds and Lemuel Shattuck Esq.

The President remarked on the formation, progress and purpose of the Society, and on the public good it might do, if suitably conducted.

Voted, by recommendation of the Directors, that the name of the Society be altered from that of the American Statistical Society to that of the American Statistical Association. Letter from H. Lee Esq. resigning his office of Vice President was read. Voted to proceed to the choice of officers. Rev. Dr. Cogswell and Mr. Peabody were chosen to propose a list of candidates for officers and to collect votes for the same. The subsequent individuals were chosen to their respective offices.

Hon. Richard Fletcher, President	
Bradford Sumner	
George C. Shattuck	Vice-Presidents
Joseph B. Felt, Recording Secretary	
Lemuel Shattuck, Home Secretary	
Joseph E. Worcester, Foreign Secretary	
Thomas A. Davis, Treasurer	
Lemuel Shattuck, Librarian	
William Cogswell	
Oliver W. B. Peabody	
John P. Bigelow	
Horace Mann	
John D. Fisher	Counsellors
Bela B. Edwards	
Jesse Chickering	
Samuel Dorr	
Daniel Treadwell	
William Cogswell	
Joseph E. Worcester	
Oliver W. B. Peabody	Publishing Committee
Joseph B. Felt	
Lemuel Shattuck	

By recommendation of the Directors individuals were proposed as Fellows, Honorary, Corresponding and Foreign Members. See their names on the printed list of the Association's first pamphlet,—from the name of Prof. Daniel Treadwell to the end of the said list.*

The meeting was then dissolved.

Lemuel Shattuck, Secy.
pro. tem.

* See p. 304.

Boston, April 8, 1840

The quarterly meeting of the Association was held at their room at 1/2 past 3 o.c. Members present were the President, Messrs. Sumner, Cogswell, Dorr, Worcester, Webb, Fisher, Simonds, Shattuck, Davis and Felt. Records of all the preceding meetings were read. The following donations were reported by Mr. Shattuck, namely:

Statistical forms for taking the 6th census of the United States. 5 pamphlets relative to Portland Maine. President's Message December 24th, 1839. 20th Report of the American Home Mis. Soc. 11th and 12th Report American Tract Society by Lemuel Shattuck Esq. Vol. 2 to 11 inclusive of the Quarterly Register of the American Education Society. Christian Philanthropist 2^d and 3^d by Rev. William Cogswell D.D. Statistical Tables of Massachusetts by O. W. B. Peabody Esq. State of the Banks in the U. S. Steam Engines in the U. States. 12 Pamphlets by Lemuel Shattuck Esq. 21st 22 and 23 Report of the A. E. Society. Catalogue of Yale College by Rev. Wm. Cogswell D.D. Set of the forms and questions used by the Statistical Society of London by Lemuel Shattuck Esq. 4 pamphlets by Rev. Wm. Cogswell D.D. Butler's Annual Discourse by the Author. Forms used in France for the Registration of Marriages, Births, and Deaths by Lemuel Shattuck Esq. Congressional Document H.R. No. 12 and 93. Also Senate 111, 124 and 153 by Hon. Caleb Cushing. Pitkins Statistical View by the Author. Visit to the Red Sulphur Springs of Virginia by Rev. John Pierce D.D. Letters were read from the following gentlemen; Gouverneur Emerson M.D., Francis Lieber L.L.D., President Van Buren, Hon. Thos. L. Winthrop, Rev. Grant Powers, Hon. J. K. Paulding, Hon. B. F. Butler, Hon. Charles K. Williams, Francis Cogswell Esq., Prof. Romeo Elton, George Folsom Esq., Prof. B. Silliman, Hon. Henry L. Ellsworth, Hon. Caleb Cushing, Henry Lee Esq., N. J. Bowditch Esq., D. H. Stover M.D., Abel L. Pierson M.D., Emory Washburn Esq., Timothy Pitkins Esq., Gov. Wm. Plummer, Lucien Minor, Esq., B. B. Thatcher Esq., Rev. Z. S. Barstow, Prof. P. Cleaveland, Robley Dunglison Esq., Hon. John Davis, Hon. Levi Woodbury, Rev. John Pierce D.D.

The following gentlemen were elected: Hon. Wm. Jackson Newton, Honorary Member;—M. Quetelet, Dr. Julius, Foreign Members; Mr. Warterston, Mr. Van Zandt, H. C. Carey Esq. of Philadelphia, Sidney E. Morse, Esq. New York, Peter Force Esq. Washington, Corresponding Members; John A. Shaw Esq., Bridgewater, Fellow.

Remarks were made about the reading of Statistical documents and individual members handing in such topics, as they would choose to write on.

Mr. Shattuck read an article on the Statistics of Saxony.

CIRCULAR

SIR:

An institution has been formed in Boston by the name of the AMERICAN STATISTICAL ASSOCIATION, for the purpose of collecting, preserving, and diffusing statistical information, in the different departments of human knowledge. One of the methods which the Association propose to take in accomplishing this object, is to procure, by solicitation or otherwise, books, pamphlets, periodical works and written communications, relating to the subject of Statistics. It is also their intention to promote the science of Statistics, to suggest and prepare the best forms for keeping records, proposing questions, and making investigation; and to aid all those who are interested in this important object, in presenting information in the form most interesting and useful. All donations, either in print or in manuscript, will be deposited in the library of the Society for the use of the members and others, and a description of them carefully entered on the records in connection with the name of each donor. Should you feel disposed to forward to the Society any book, document, report, or statistical table, or to compile one on any subject selected by yourself, or proposed by the Society, you will confer a public benefit and particularly oblige its members. In no country is it more important that facts should be accurately sought, collected, and made known, than in this. It is hoped that you will so far favor our purposes, as to make such contributions as your convenience may permit. The Association will be pleased to receive suggestions and to correspond with any individuals in relation to their objects.

With great respect, your obedient servant,

LEMUEL SHATTUCK,

*Home Secretary of the American
Statistical Association.*

Boston, April 4, 1840.

N.B. All communications may be addressed to the Home Secretary. In forwarding documents to the Association, it is requested that a private conveyance, when it can be had, may be adopted, instead of conveyance by mail.

The Association will gratefully receive Reports, Documents, and other Works, either Domestic or Foreign, relating to the following subjects:—

1. *Topography.*—In relation to Public Lands, States, Counties, Towns, Rivers, Ponds, Lakes, Climate, Meteorology, Geology, Mineralogy, Vegetable and Animal productions.

2. *Population.*—The Census of different periods; the Births, Marriages, and Deaths, specifying the diseases, sex, age, and months of the year, when each death took place; Boards of Health, prevalence of Epidemics, and other diseases.

3. *Education*.—Common Schools, Academies, Colleges, Medical, Law, and Theological Schools, and other Institutions of Learning, Education Societies, Expenses of Public and Private Education.

4. *Associations*.—Lyceums and Library Companies, Reading Rooms, Medical, Musical, and other Societies; Life and Trust Companies; and all other Associations for promoting the several interests of the community.

5. *Public Press*.—Books of every kind, and especially those respecting Statistics, Almanacs, Year Books, Annual Registers, Newspapers, and other Periodical Publications, and Statements, exhibiting the Prices and the Number in circulation.

6. *Government*.—Public Administration of the Government of the United States, of the Individual States, Counties, Cities and Towns; number of Electors, and Votes given for different Candidates.

7. *Public Defence*.—The Army, the Navy, and Fortifications of the United States; and the Militia of the several States.

8. *Economy*.—Price current of Articles of Consumption, Wages, Rents, Distribution of Wealth, and Domestic Management.

9. *Productive Industry*.—Agriculture, Manufactures, Arts, Mines, Fisheries, and other productions of Industry.

10. *Internal Improvements*.—Canals, Railroads, Steam Navigation, Coast-ing Trade, Post Offices and Post Roads.

11. *Trade and Commerce*.—Trade, Shipping, and Navigation; Exports and Imports, Tariff and Duties.

12. *Finance*.—Receipts and Expenditures of the United States, of the several States, of Cities and Towns; their Valuation, and Taxes.

13. *Casualties*.—Losses by Fire, Shipwreck, and other Disasters.

14. *Crime*.—Police, Courts of Justice, and Judicial Administration, Penitentiaries, Jails, Houses of Correction and Reformation, and Prison Discipline.

15. *Pauperism*.—Alms-houses, Houses of Industry, number of Paupers in States, Counties and Towns, Expense of their Maintenance, Causes of Pauperism, and character and condition of paupers.

16. *Benevolence*.—Asylums, and other Institutions for the Blind, Deaf Mutes, the Insane, Orphans, and other persons; of Hospitals, Infirmarys, Dispensaries, and other Institutions for the relief of the Sick; Sunday School, Education, Bible, Missionary, Tract, and other Societies for the improvement of the condition of mankind.

17. *Religion*.—Ecclesiastical Conventions and Associations of all kinds, particular Churches, as to the number of Communicants, Baptisms, Deaths, &c., State of Religion.

18. *Miscellaneous*.—All other topics relating to the state, progress and welfare of society.

19. *Statistical Forms*.—For keeping Records, collecting Information, and preparing Tables, in any branch of Statistical Knowledge.

BY-LAWS OF THE AMERICAN STATISTICAL ASSOCIATION

I. The operations of this Association shall be principally directed to the Statistics of the United States; and they shall be as general and extensive as practicable, and not be confined to any particular part of the country. Foreign Statistics may occasionally be considered. The labors of the Association may embrace all subjects of a Statistical nature.

II. In accomplishing the objects of the Association, statistical information shall be sought by procuring books, pamphlets and periodical works, by original written communications, and by correspondence and personal application. All donations shall be recorded in the book of the Librarian and also of the Recording Secretary, by specifying the articles, time of reception and name of the donor and they shall be acknowledged by the Librarian with thanks to the donor.

III. All books, pamphlets, periodical works, and donations of every kind, shall be the property of the Association, and they shall be preserved in their Library, and so arranged as to be easily accessible.

IV. Efforts to diffuse statistical information shall be made by printing and publishing circulars, reports, a periodical work, or occasional volumes.

. . . VIII. It shall be deemed the duty of every fellow to prepare at least one article a year on some statistical subject, which shall be at the disposal of the Publishing Committee.

[The By-Laws quoted above are part of a group of thirty-one By-Laws adopted by the Directors of the American Statistical Association early in 1840 and recorded in the Minute Book following the Minutes of the Annual Meeting held on February 5, 1840. The other twenty-six By-Laws pertain, for the most part, to details of procedure. *Ed.*]

MEMBERSHIP LIST, 1840

FELLOWS OF THE ASSOCIATION

Hon. Richard Fletcher	Boston
Rev. William Cogswell, D.D.	Boston
Oliver W. B. Peabody, Esq.	Boston
Lemuel Shattuck, Esq.	Boston
John D. Fisher, M.D.	Boston
Prof. Bela B. Edwards	Andover
Ebenezer Alden, M.D.	Randolph
Bradford Sumner, Esq.	Boston
Joseph E. Worcester, Esq.	Cambridge
Rev. Joseph B. Felt	Boston
Samuel G. Howe, M.D.	Boston
John P. Bigelow, Esq.	Boston
Henry Lee, Esq.	Boston
Jesse Chickering, M.D.	Boston

Hon. Horace Mann	Boston
George C. Shattuck, M.D.	Boston
Thomas H. Webb, M.D.	Boston
William Lincoln, Esq.	Worcester
Rev. Henry Colman	Boston
Mr. Artemas Simonds	Boston
Robert Rantoul, Jr. Esq.	Boston
C. Francis Adams, Esq.	Boston
Thomas A. Davis, Esq.	Boston
Prof. Benjamin Peirce	Cambridge
Prof. Daniel Treadwell	Cambridge
Hon. Nathan Hale	Boston
Hon. Samuel Dorr	Boston
Benjamin B. Thacher, Esq.	Boston
Nathaniel I. Bowditch, Esq.	Boston
David H. Storer, M.D.	Boston
William Brigham, Esq.	Boston
Rev. William C. Brown	Boston
Augustus A. Gould, M.D.	Boston
Hon. Stephen C. Phillips	Salem
Abel L. Pierson, M.D.	Salem
Benjamin Merrill, Esq.	Salem
Rev. Charles W. Upham	Salem
Asahel Huntington, Esq.	Salem
Elisha Bartlett, M.D.	Lowell
Luther V. Bell, M.D.	Charlestown
Hon. Caleb Cushing	Newburyport
Prof. Edward Hitchcock	Amherst
Prof. Joseph Alden, D.D.	Williamstown
Josiah Noyes, M.D.	Needham
Emory Washburn, Esq.	Worcester
Hon. William D. Williamson	Bangor, Me.
William Willis, Esq.	Portland, Me.
Francis Cogswell, Esq.	Dover, N. H.
Luke Howe, M.D.	Jaffrey, N. H.
George P. Marsh, Esq.	Burlington, Vt.
Prof. Romeo Elton	Providence, R. I.
Edward Herriek, Esq.	New Haven, Ct.
George Folsom, Esq.	New York
Henry Bond, M.D.	Philadelphia

HONORARY MEMBERS

Hon. Thomas L. Winthrop, LL.D.	Boston
Hon. Nathan Appleton	Boston
Hon. Samuel T. Armstrong	Boston

Hon. John Pickering, LL.D.	Boston
Hon. Abbot Lawrence	Boston
Hon. John Davis, LL.D.	Rochester
Rev. Thomas Robbins, D.D.	Rochester
Rev. Israel W. Putnam	Middleboro
Rev. John Pierce, D.D.	Brookline
Prof. Parker Cleaveland, LL.D.	Brunswick, Me.
Hon. Isaac Hill	Concord, N. H.
Rev. Nathan Lord, D.D.	Hanover, N. H.
Hon. Joel Parker, LL.D.	Keene, N. H.
Hon. William Plummer	Epping, N. H.
Rev. Zedekiah S. Barstow	Keene, N. H.
Hon. Charles K. Williams, LL.D.	Rutland, Vt.
Hon. William R. Staples	Providence, R. I.
Hon. Timothy Pitkin, LL.D.	Utica, N. Y.
Prof. Benjamin Silliman, LL.D.	New Haven, Ct.
Hon. Thomas Day	Hartford, Ct.
Rev. Grant Powers	Goshen, Ct.
Hon. Isaac McConhie	Troy, N. Y.
Rev. Nathan Bangs, D.D.	New York
Rev. Rufus Babcock, D.D.	Poughkeepsie, N. Y.
Hon. Benjamin F. Butler, LL.D.	New York
Rev. Francis L. Hawkes, D.D.	New York
John W. Francis, M.D.	New York
Samuel George Morton, M.D.	Philadelphia, Pa.
Hon. Martin Van Buren, LL.D., Pres. U. S.	Washington, D. C.
Hon. Levi Woodbury, LL.D.	Washington, D. C.
Hon. James K. Paulding	Washington, D. C.
Hon. Albion K. Parris	Washington, D. C.
Henry L. Ellsworth, Esq.	Washington, D. C.
Hon. David L. Swain	Chapel Hill, N. C.
Jacob Swigert, Esq.	Frankfort, Ky.
Hon. Lewis Cass, LL.D., Minister to France	

CORRESPONDING MEMBERS

Hon. John C. Spencer	Albany, N. Y.
Azariah C. Flagg, Esq.	Albany, N. Y.
Samuel Hazard, Esq.	Philadelphia, Pa.
Robley Dunglison, M.D.	Philadelphia, Pa.
Gouverneur Emerson, M.D.	Philadelphia, Pa.
Samuel T. Worcester, Esq.	Norwalk, O.
Rev. Calvin E. Stowe, D.D.	Cincinnati, O.
Rev. John M. Peck	Rock Spring, Ill.
Aaron Vail, Esq.	Washington, D. C.
Lucien Miner, Esq.	Charlottesville, Va.

Edward T. Tayloe, Esq.	Powhatan Hill, Va.
Francis Lieber, LL.D.	Columbia, S. C.
Edward Jarvis, M.D.	Louisville, Ky.
James L. Miner, Esq.	Jefferson City, Mo.
Albert Pike, Esq.	Little Rock, Arkansas

FOREIGN MEMBERS

- Capt. John Washington, Secretary of the Royal Geographical Society, London.
- Caesar Moreau, Secretary of the French Society of Universal Statistics.
- G. R. Porter, Esq., Secretary Statistical Department of Board of Trade, London.
- Von. J. G. Hoffmann, Director of the Statistical Bureau, Berlin.

CHARTER

Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same, as follows:

1. Richard Fletcher, Bradford Sumner, William Cogswell, Samuel Dorr, and Joseph B. Felt, their associates and successors, are hereby made a corporation by the name of the American Statistical Association, for the purpose of collecting, preserving, and diffusing statistical information; with all the powers and privileges, and subject to all the duties, restrictions, and liabilities set forth in the forty-fourth Chapter of the Revised Statutes.
2. Said corporation may hold real estate to an amount not exceeding twenty thousand dollars, and personal estate, the income of which shall not exceed three thousand dollars annually; provided nevertheless that nothing contained in this act shall be construed to authorize the said corporation to traffic in books for the purpose of profit.

February 5, 1841.