

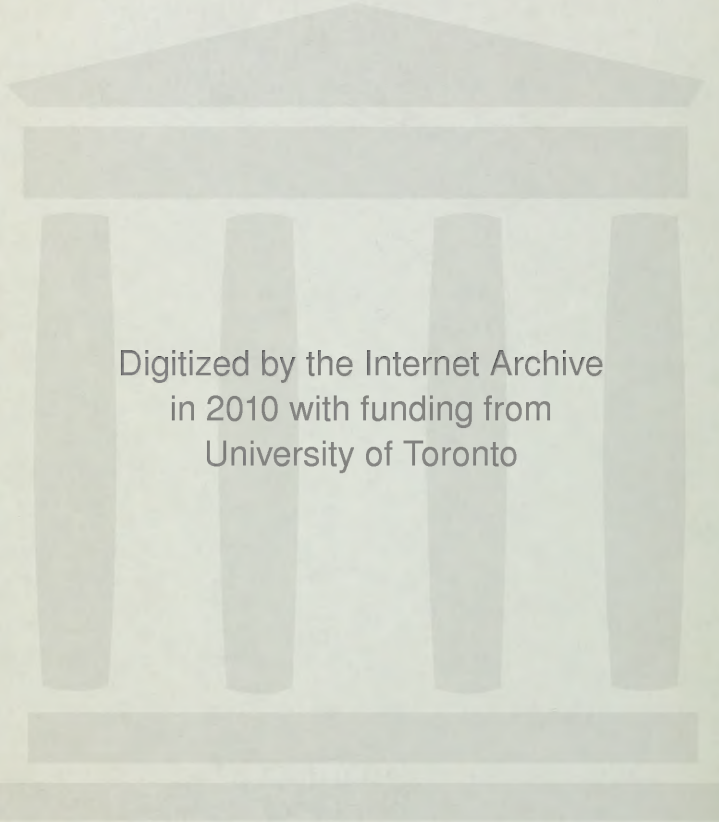


3 1761 03611 3389

Walcott, Gregory Dexter
Research and statistics

LB
2386
W3





Digitized by the Internet Archive
in 2010 with funding from
University of Toronto

journal. He says: "The conditions of war have hindered the appearance of the September number, so that it comes with the October number. The next will appear on the first of November." The *Hochschul Nachrichten* says: "Our journal has let itself be long awaited, and yet in a way no one has been waiting for it, for it appears in perilous times."

The quotations give some idea of the conditions under which educational journalists in Europe are working, and the figures give definite account of results so far as the particular periodicals are concerned. They are doubtless a good indication of general conditions. Monroe's *Cyclopedia of Education* under "Educational Journalism" gives the total number of educational journals in the countries in question which may be compared with those from the Teachers College library:

	Germany	English	French
<i>Cyclopedia</i>	98	46	25
Teachers College	30	12	9

It is evident that the library has nearly the same proportion of journals from the three countries.

In the light of these comparisons Germany has reason to be proud of her standard. *The Cyclopedia of Education* (Vol. 2, page 256) says: "Specialized professional publications develop only with the growth of a profession." If this be true we in the United States have much to learn from Germany, as have also her warring neighbors.

D. R. BRIMHALL

RESEARCH AND STATISTICS
STATISTICAL STUDY OF DOCTOR OF
PHILOSOPHY MEN

I

In the spring of 1912 I had occasion to edit a small college publication which dealt with the graduates of Hamline University who were engaged in higher educational work. The number who had taken the Ph.D. degree at the largest universities of the country led me to calculate the ratio of such students to the entire body of men who had graduated from

the institution for a period of years.¹ This, of course, immediately raised the question as to the ratio elsewhere, and the answer for sixteen institutions, together with other matters, is presented in this article.

My choice of the institutions which I studied was determined by the collection of general college catalogues in the library of Columbia University. Of these, too, I selected only those that were published about the year 1910, and with the graduates grouped together according to classes.

The period 1885 to 1904 I selected so as to allow six years between the time of graduation of the last class and the publication of the record, since I had read somewhere that men are out of college on the average about six years before they obtain the doctor's degree.² My own study verified this statement in part, since the arithmetical average of the 1,315 names dealt with is six years, although the modal average is clearly three or four years. The numbers for twelve years are given in Table I. The remaining degrees were distributed irregularly from 12 to 25 years out of college.

TABLE I

Years out of college.....	1	2	3	4	5	6	7
Number of degrees.....	4	79	239	211	173	135	120
Years out of college.....	8	9	10	11	12	Total	
Number of degrees.....	101	68	56	31	24	1,241	

Another matter that I had to consider at the outset was the elimination from each college class of those students who had obtained a first degree at some other institution. Such students were especially numerous at Harvard and Yale. Only in this way could I look upon

¹ Since some of the institutions which I studied later are coeducational and some not, I confined my attention simply to the men graduates. After I had selected the period, 1885-1904, used in this study, I calculated again the ratio for the men graduates of Hamline and found it 1 in 36. The degrees were obtained at Chicago, Columbia, Johns Hopkins and Yale.

² The nearest verification for this statement that I could find before I completed my own study is in Cattell's "The American Men of Science," 1910, page 582.

LB
2386
u3
826046



the groups studied as especially representative of those institutions, and avoid duplications when the same student was listed as a graduate of Wesleyan, we will say, and of Harvard or Yale.

II

Without further preliminaries, then, I will begin to present some of the more important results of my study of the graduates of sixteen colleges and universities, especially in this section in Table II, the ratio of the Ph.D. men to the body of graduates as a whole in each case. While in my study I differentiated among the various first degrees, as A.B., Ph.B., B.L., and so on, I group them all here under the single head of a bachelor's degree.

Even a casual survey of Table II, indicates a rather wide divergence among institutions

1 in 10 to 1 in 44. This divergence, too, is not confined to institutions in the east nor to those in the west, although the widest variation is very evidently in the east where the range is from 1 in 13 to 1 in 44, while in the western institutions the difference is from 1 in 10 to 1 in 19.

An explanation for this discrepancy, which has been suggested to me in various conversations and which might readily occur to almost any one, is that the graduates of many institutions feel rather dissatisfied with the training afforded them by their *alma mater*, and consequently matriculate at the larger institutions to supplement the work already done, while the graduates of such institutions as Yale and Harvard feel that their bachelor degree represents the educational *ne plus ultra* for them, and are entirely satisfied with it.

TABLE II

	First Decade, 1885-1894			Second Decade, 1895-1904			Entire Period, 1885-1904		
	Bachelor Degrees	Ph. D. Degrees	Ratio	Bachelor Degrees	Ph. D. Degrees	Ratio	Bachelor Degrees	Ph. D. Degrees	Ratio
Amherst.....	774	52	1:15	851	23	1:37	1,625	75	1:22
Bowdoin.....	354	13	1:27	563	8	1:70	917	21	1:44
Colby.....	234	9	1:26	234	7	1:33	468	16	1:29
Columbia*	682	62	1:11	932	57	1:16	1,614	119	1:13
Dartmouth....	686	16	1:42	1,026	23	1:44	1,712	39	1:44
De Pauw.....	388	27	1:14	365	12	1:30	753	39	1:19
Harvard.....	2,524	141	1:18	4,632	132	1:35	7,156	273	1:26
Indiana.....	336	49	1:7	696	50	1:14	1,032	99	1:10
Lafayette....	367	26	1:14	433	11	1:39	800	37	1:22
Michigan.....	784	79	1:10	1,240	80	1:15	2,024	159	1:13
Nebraska.....	170	20	1:8	698	31	1:22	868	51	1:17
Rutgers.....	285	13	1:22	395	11	1:36	680	24	1:28
Tufts.....	145	4	1:36	325	10	1:32	470	14	1:33
Wesleyan....	408	32	1:13	512	28	1:18	920	60	1:15
Williams....	618	22	1:28	716	15	1:48	1,334	37	1:36
Yale.....	2,422	118	1:20	4,226	134	1:31	6,648	252	1:26
Totals.....	11,177	683	1:16	17,844	632	1:28	29,021	1,315	1:22

as to the number of graduates who press on for the higher academic degree, ranging from

*In connection with Columbia, I included among the bachelor degrees, granted to the graduates of Columbia College, the degrees of Ph.B., A.B. and B.S., granted to graduates of the School of Architecture, the School of Political Science, the School of Applied Science and Teachers College. Only so did it seem that the comparison between Columbia, on the one hand, and Harvard

or Yale, on the other, would be warranted. The ratio of 1 in 13 is not affected by this. It is the same for Columbia College by itself, or for these other schools taken by themselves. The degrees of C.E., M.E., E.E., and so on, I did not include, since they seemed to be distinctly professional degrees. But even with those degrees included, the ratio would be only 1 in 16. In connection with the other institutions, also, I omitted these professional degrees. They were especially numerous at Lafayette, Tufts and Nebraska.

But this explanation, although undoubtedly there is some truth in it, hardly meets the situation presented by this table. We could hardly say that the graduates of Columbia College and of Michigan University feel the inadequacy of their college training to such an extent that twice as many of them proportionally seek the higher degree as at Harvard or Yale, nor could we maintain that the college training at Dartmouth and at Bowdoin is so far superior to that at Yale and Harvard that but little more than half of the same proportion of graduates seek and gain the doctor's degree. Still further, if it were simply the Harvard A.B. that was regarded as satisfying, why should not those students who go there as graduates of other institutions and at the end of a year take that degree, be satisfied with it as so many Harvard men seem to be? As a matter of fact, however, one man in five at Harvard and one man in eight at Yale of those already holding degrees, who matriculated at those institutions during the period studied, persisted until the doctor's degree was obtained. The explanation for this phenomenon, then, is not upon the surface. Possibly not until many more such studies as this are made shall we be in a position to determine the cause definitely.

At least one suggestion can be made here. There is a greater tendency for students in the east to take a full college course before studying law or medicine than there has been in the west. Consequently, there is a large body of graduates with which to compare the Ph.D. men at such institutions as Yale and Harvard, and the ratio, therefore, runs high. In the west, however, not infrequently, men have ended their strictly academic work after one or two years, or have gone to the east to complete their work, and in consequence the alumni body remains comparatively small. This may account, in part, for the exceptionally low ratio at the University of Indiana, but the source studied does not throw light upon this point. Still further, this could hardly be advanced in the cases of Columbia and Wesleyan with their very low ratios.

Another cause of this divergence, although I am of the opinion that it is a minor one, is the variation in the care exercised by the respective college officials in the collection of such data. But such errors and omissions, apparent to one making this sort of study, could hardly be responsible for such wide differences as are apparent in Table II.

This much, at any rate, seems clearly to be established by Table II., viz., that the arithmetical average ratio of doctors of philosophy, who received their bachelor degrees from these sixteen institutions from 1885 to 1904, to the other graduates of these same institutions during the same period is 1 in 22. If, now, in view of the large number of graduates involved, the rather long period of time, and the different parts of the country in which the institutions are situated, we might be permitted to generalize; and if we might in any sense regard the results of such a study as this as a test of the scholastic efficiency of an institution, then any college of which the graduates in about this proportion of 1 in 22 gain the doctor's degree is at the average of that kind of efficiency.

It may be urged, of course, that a college does not exist for the specific purpose of graduating students who shall spend several more years in intensive work to gain the Ph.D. degree. None the less, an institution would hardly boast very loudly of its efficiency if none of its graduates ever sought and gained that degree. Not a few institutions take pride in the large number of graduates who have gone into the law and into medicine. They measure their efficiency in that way. It would seem to be perfectly proper, therefore, to apply this other test. Many high-school officials criticize colleges severely, but are not altogether displeased when their graduates matriculate for a college course. They would hardly consider their school as fully efficient if no student in a period of twenty or thirty years ever entered college.

The attainment of the doctor's degree is not, indeed, the only scholastic test that may be applied to a college. All graduate work

would need to be considered, such as the master's degree, the doctor of science and doctor of jurisprudence degrees, years of study at leading institutions without gaining a degree, the work in medicine, law, theology and engineering. All this would need to be considered and properly weighted to reach a complete scholastic test. None the less, if one uses this one phase of advanced work developed here, it at least indicates the relative positions of these institutions, and to that extent their scholastic efficiency.

Another rather significant matter, readily apparent from an inspection of Table II., is the considerably higher ratios in the second decade when compared with the first. These are higher in every case, although in a few instances the difference is but slight.

The first thought that comes as an explanation of this difference is the longer period of time which the graduates of the first decade had to obtain their degree, viz., from 1885 down to 1910, while those in the second decade have been restricted naturally to the period from 1895 to 1910. The difference, however, remains when the two periods are made more commensurate, which I accomplished by considering in the first period only those degrees which were obtained down to and including the year 1900. These results are presented in Table III., together with the average number of years required to obtain the degree in each decade. I obtained the arithmetical average in each case, since the number of degrees in some cases was so small that the modal average could not be used.

An inspection of the averages in Table III. would seem to indicate that the conditions for obtaining the doctor's degree, viz., health, financial resources, stipulated requirements, etc., have remained fairly constant throughout the two periods, and because these averages are so much alike, different by a year in only four cases, we can feel rather sure of our conclusions when we compare the ratios with those of the second decade in Table II. Such a comparison indicates at once a decided drop in the proportionate number of students who, after graduation from these particular insti-

TABLE III

	First Decade, 1885-1891			Average Number of Years per Degree	
	Bachelor Degrees	Ph.D. Degrees Obtained Up to 1900	Ratio	First Decade	Second Decade
Amherst.....	774	41	1:19	6	7
Bowdoin.....	354	10	1:35	5	5
Colby.....	234	6	1:39	6	5
Columbia.....	682	57	1:12	4	5
Dartmouth.....	686	13	1:53	6	6
De Pauw.....	388	24	1:16	6	6
Harvard.....	2,524	123	1:20	5	5
Indiana.....	336	34	1:10	6	6
Lafayette.....	367	18	1:20	6	6
Michigan.....	784	58	1:13	6	6
Nebraska.....	170	13	1:13	6	6
Rutgers.....	285	10	1:28	5	5
Tufts.....	145	3	1:48	4	5
Wesleyan.....	408	24	1:17	6	6
Williams.....	618	14	1:44	6	6
Yale.....	2,422	103	1:23	5	5
Totals.....	11,177	551	1:20	5.5 ⁴	5.6 ⁴

tutions, sought and obtained the doctor's degree. This may have been due to insufficient financial returns as experienced by predecessors, change in ideal or environment, or other causes not revealed by the sources studied, but there can be no disguising the fact.⁵ In the cases of Colby, Dartmouth and Tufts there is an evident increase in the number of students who sought the higher degree, while Columbia, Indiana, Michigan, Wesleyan and Williams remained fairly constant, although a drop is evident in each.⁶

A further inspection of these two tables

⁴ These two averages are obtained immediately from these columns. The data from which the averages themselves were obtained yield 5.3 and 5.4, respectively. It seemed better, however, to include in the table the obvious averages.

⁵ One cause of this decrease is found in the lessened number of men from these institutions who received a theological training and also obtained the Ph.D. degree. The total number of such men for both decades is 82, of whom 71 belong to the first decade. Only 47 of that number, however, received the degree by 1900.

⁶ If further studies should indicate a similar proportionate decrease in the number of Ph.D.

suggests a real inverse correlation between the number of students graduated and the number who obtained the doctor's degree. At Bowdoin the number of graduates increased about 63 per cent., while the ratio of those who took the doctor's degree dropped one half; at Nebraska the number of graduates quadrupled, but the number who took the doctor's degree only a little more than doubled, according to Table III., while at Harvard and Yale, although the number of graduates almost doubled in each institution, the proportionate increase in the doctors of philosophy was but 7.3 per cent. and 30 per cent., respectively. The reason for such an inverse relation could

be determined only by a much more elaborate study than the present one, but there can be no gainsaying the facts. We might assume an inverse relation between the size of a college class and a hospitable attitude toward things of the mind. The larger the class, the greater the mob spirit and the less inclination toward things scholastic, but, whatever explanation might be offered, the material pre-

men at all the institutions in the country, it would mean an ultimate decrease in the proportion of such men on college faculties. For example, if Harvard had depended upon her own graduates to take the advanced training and had sought to recruit her faculty from them, the situation in the second decade would have been as follows: An increase of about 2,000 in the number of graduates, but of only 9 in the number who took the Ph.D. degree. It is true, of course, that the fitness of the Ph.D. men to instruct the ordinary college undergraduate has often been called in question, but that is another matter.

sent in Tables II. and III. clearly indicates that the great increase in the student body at some of the institutions studied has not meant a proportionate increase in the number of those who seek the more advanced type of intellectual training and obtain the doctor's degree.

An application of the more refined statistical methods to the data in hand confirms what Tables II. and III. suggest. I worked out the coefficients of correlation for each college according to the Pearson method, taking, first, the total number of graduates each year as the subject and the number of Ph.D. men each year, less those in the first decade with degrees after 1900, as the relative, and sec-

TABLE IV

	Amherst	Bowdoin	Colby	Columbia	Dartmouth	De Pans	Harvard	Indiana	Lafayette	Michigan	Nebraska	Rutgers	Tufts	Wesleyan	Williams	Yale
Subjects and relatives, degrees.....	+ .26	+ .04	-.05	+ .31	+ .41	-.08	+ .13	+ .58	-.29	+ .49	+ .34	+ .56	+ .29	+ .22	+ .24	+ .37
Subjects, degrees; relatives, percents	+ .12	-.09	-.14	-.13	-.13	-.12	-.77	-.27	-.43	-.42	-.59	+ .40	+ .03	-.10	-.03	-.44

only, the same subject and the per cent. which the Ph.D. men were of their respective classes as the relative. The entire material is hardly of sufficient interest to be presented here, but the coefficients are given in Table IV.

An inspection of the first row of this table indicates that in all but two cases, viz., Colby and Lafayette, the correlation is positive, and while the coefficients in most cases are low, too low to infer a causal relation in a strict sense, we may assume that the increase in the size of the classes did have a real bearing upon the increase in the actual number who took the doctor's degree. This is borne out by the fact that in all these cases where the coefficient is positive more of the Ph.D. degrees were from classes above the average in number than from those below. In the two negative cases, more Ph.D. degrees were from classes below the average and consequently the suggestion of an inverse correlation is

only, the same subject and the per cent. which the Ph.D. men were of their respective classes as the relative. The entire material is hardly of sufficient interest to be presented here, but the coefficients are given in Table IV.

An inspection of the first row of this table indicates that in all but two cases, viz., Colby and Lafayette, the correlation is positive, and while the coefficients in most cases are low, too low to infer a causal relation in a strict sense, we may assume that the increase in the size of the classes did have a real bearing upon the increase in the actual number who took the doctor's degree. This is borne out by the fact that in all these cases where the coefficient is positive more of the Ph.D. degrees were from classes above the average in number than from those below. In the two negative cases, more Ph.D. degrees were from classes below the average and consequently the suggestion of an inverse correlation is

sustained. This is still more apparent from the second row in Table IV., since all but four of the coefficients are negative and those four are smaller than the corresponding coefficients in the first row. Consequently, the suggestion in Tables II. and III. of an inverse correlation between the size of the class and the number who obtained the doctor's degree, especially in the percentage of Ph.D. men to the total number in each class, is fairly well established.

III

Another interesting phase of this whole matter is the institutions at which these degrees were obtained. In all, sixty-five institutions conferred these 1,315 degrees, assuming that four not named were different institutions, but only sixteen conferred 1,215. These sixteen are as follows: Boston University, Chicago, Clark, Columbia, Cornell, German Universities, Harvard, Johns Hopkins, Lafayette, Michigan, Nebraska, New York University, Pennsylvania, Princeton, Wisconsin and Yale. The remaining 100 degrees were scattered among 49 institutions, no institution having as many as eight to its credit.

Of the degrees obtained at the German universities, there was a marked decrease in the second decade. In all, 152 degrees were conferred upon members of the first ten classes, and only 50 upon members of the second group. If we eliminate from the first period such degrees as were obtained after the year 1900, as was done in connection with Table III., the contrast between the two decades is almost as striking. There were 18 degrees of this sort. Consequently there was a drop from 134 to 50. Only 37 per cent. as many were taken in the second decade as in the first. This tendency, of course, corresponds with the increase in the facilities for advanced work at American universities, and is all the more significant when we consider the increase in the actual number of degrees from 551 in the first decade to 632 in the second, as given in Tables II. and III. The fact, however, that nearly one sixth of these 1,315 degrees were obtained at German universities is in itself not without interest.

The number of German degrees, too, ob-

tained by the graduates of western institutions is rather significant. Indiana, Michigan and Nebraska graduates obtained more of these foreign degrees than the graduates of Harvard did, viz., 58 as against 53, although Harvard graduated nearly twice as many men in this period as those three institutions did combined, while the graduates of Amherst, Columbia, Wesleyan, Williams and Yale obtained 19, 14, 11, 10 and 21, respectively. I might also add that Leipzig was by far the preferred institution, while Berlin and Munich each conferred about half as many of these degrees, and Göttingen just half. The numbers are 48, 23, 22 and 24, respectively.

Of the entire number of degrees, 1,315, the German universities, Harvard, Yale and Columbia conferred together about two thirds, Yale slightly in the lead of Harvard, and Columbia not far behind. These numbers in order are 202, 220, 232 and 179. The nearest competitors of these were Johns Hopkins and Michigan with 62 apiece. Still further, 58 per cent. of the Ph.D. degrees obtained by the Harvard men in this period studied were gained at Harvard, and 80 per cent. of the degrees secured by Yale men were from Yale.

GREGORY D. WALCOTT

HAMLIN UNIVERSITY,
ST. PAUL, MINN.

(To be continued)

SOCIETIES AND MEETINGS

THE ASSOCIATION OF AMERICAN UNIVERSITY PROFESSORS

THERE met in New York City on January 1 and 2, a group of about two hundred college and university professors, who formed an organization intended to accomplish for teachers in our higher institutions of learning the objects attained in kindred professions by the American Medical Association and the American Bar Association. Professor John Dewey, of Columbia University, who had been chairman of the committee on organization, presided at the meeting and after the association had been formed was elected its first president. Professor H. A. Overstreet, of the College of the City of New York, was secretary of the

subtracting one from the minuend; (5) skill in one arithmetical operation does not seem to transfer to another operation, a pupil's ability in adding not being a measure of his ability in subtracting or multiplying; (6) there are no ideational types, in that a pupil thinks in a visual, an auditory, or a motor way in all subjects, as for example in language and arithmetic (Lay's law); (7) the best results in arithmetic are generally shown by the visual (Eckhardt) or visual-motor type (Springer), although children's statements as to the character of their imagery are untrustworthy (Springer); (8) improvement in accuracy of computation seems to produce no improvement in accuracy of arithmetical reasoning, although there is a high positive correlation between the two; (9) efficiency in arithmetic is not a function of the time devoted to the subject, a statement which is liable to be misunderstood, however, and which should very likely be interpreted by Fechner's law; (10) certain number pictures, apparently of equal merit, are in reality of different value in the first grade—a discussion well worth the attention of teachers; (11) oblique lines, as opposed to vertical lines in the first study of numbers, double the number of mistakes; (12) the child enters school with the counting psychosis well established, and it is the part of wisdom to take advantage of it; (13) hygiene counsels against certain dull forms of drill, against the too early use of problems, and against too great expenditure of time on arithmetic.

It is not to be supposed that these are all of the positive conclusions reached by the author; but they are fairly typical. The book, however, should be read for much else than for such specific theses. For example, the discussion (p. 130) of the doctrine of specific discipline is well worth the teacher's careful attention, and a single sentence may properly be quoted at this time: "All but the most extreme adherents of this view, however, accept the modification that certain general results from specific training, very important to education, are noticeable, viz., general concepts of method (generalized ideas of attention, attack,

procedure, inductively derived from properly conducted special studies, which may be transferred into habits generally applicable); and, not less important for young pupils, general attitudes toward their school work which shall determine whether they shall be parrot repeaters or seekers after understanding."

The discussion (p. 147) of the question as to whether arithmetic has a place in the first two or three grades is also well worth the attention of teachers. It is in harmony with the present reaction against the postponing of a subject which appeals to children's interests and needs even in Grade I, a postponement which had a much larger number of advocates a few years ago than it has at present.

On the whole, therefore, Dr. Howell's study may be commended to the attention of both the philosophically minded teacher and the psychological experimenter as the best work which has appeared in its line, indeed as the only general survey of this particular field of psychological experiment in number work that is worthy of serious study.

DAVID EUGENE SMITH

TEACHERS COLLEGE,
COLUMBIA UNIVERSITY

EDUCATIONAL

RESEARCH AND STATISTICS A STATISTICAL STUDY OF DOCTOR OF PHILOSOPHY MEN. II

IV

When I had reached the present point in my study of these men upon whom the Ph.D. degree had been conferred by some of the leading institutions in America and Europe, the question arose as to how many of them, thus equipped, had engaged in academic work. The meagerness of the data in the source books upon which I had depended thus far, the difference in length of service, and the difference in the importance of a position as between east and west, large institution and small one, have made an exact determination of this question practically impossible. I have, however, used my best judgment on each case, aided somewhat by "Who's Who in America" and Cattell's "American Men of Science," and

TABLE V

	Total No. of Ph. D. Degrees 1885-1904	Those Holding a College or University Position for a Term of Years							
		Total No.	Per Cent.	Same as Col. 3 Less those in Decade I with Degree After 1900	Per Cent.		With Degree from the 16 Institutions Mentioned in Section III.		
					First Decade Group, Degree Obtained 1885-1900	Second Decade Group, Degree Obtained 1885-1910	Total No.	Per Cent. of Such	Per Cent. of Col. 3 from These
1	2	3	4	5	6	7	8	9	10
Amherst.....	75	63	84	57	61	38	62	87	98
Bowdoin.....	21	15	71	14	57	43	15	71	100
Colby.....	16	12	75	10	30	70	11	78	92
Columbia.....	119	71	50	70	40	60	67	59	94
Dartmouth.....	39	33	84	30	33	66	28	85	85
De Pauw.....	39	24	61	24	62	37	21	70	87
Harvard.....	273	168	61	159	53	47	162	63	96
Indiana.....	99	71	71	62	38	61	66	76	93
Lafayette.....	37	16	43	15	60	40	16	55	100
Michigan.....	159	120	75	106	62	57	113	75	94
Nebraska.....	51	33	64	31	29	71	32	71	97
Rutgers.....	24	15	62	13	46	54	15	71	100
Tufts.....	14	9	64	9	22	77	5	50	55
Wesleyan.....	60	40	66	36	41	58	39	71	97
Williams.....	37	29	78	24	41	58	27	84	93
Yale.....	252	180	71	170	43	57	178	72	99
Totals.....	1,315	899	Av. 68	830	Av. 45	Av. 54	857	Av. 70	Av. 95

feel that should any one else study these same names from the same sources, his results would not vary materially from my own. Table V. gives these matters somewhat in detail.

The first interesting point presented by this table is that 68 per cent. of all who graduated from these sixteen institutions which I have studied and then obtained the doctor's degree, have been or are engaged in college or university work. Practically then, 7 out of 10 of the men who attained this degree engaged for a season, at least, in the work of the higher education. If we look at column 9 of this same table, we find that this is the exact proportion in the case of those who took their doctorate at the sixteen institutions mentioned in Section III., which furnished about 12 out of every 13 of these degrees. This means, then, that there was a better chance for a man to obtain an academic appointment, provided he wanted one, if he obtained his advanced training at one of these presumably better institutions. This becomes all the more apparent, if we consider simply those who took the German degrees. Of these, 73 per cent. have

been or are engaged in college or university work.

This result, again, with reference to an academic appointment, is even more striking when we consider column 10 of Table V. Column 4 gives the percentage of those engaged in higher educational work to the entire number of those who obtained the doctor's degree, while column 9 indicates the percentage of those engaged in such higher educational work to the entire number who obtained this advanced degree at the sixteen institutions mentioned in Section III. In every case but one the percentage here is either the same or higher than in column 4. The exception, Tufts, is due to the number of degrees obtained at Tufts, although not sufficient to include that institution among those mentioned in Section III. When, now, we examine column 10, it is apparent that almost the entire number in column 3, as indicated by these percentages, obtained their degrees at the sixteen institutions mentioned in Section III. Evidence could hardly be stronger that, if a man wants an academic appointment, so far as a Ph.D. degree may facilitate

that end, he should use discrimination in the choice of an institution for advanced work. Not that these 16 institutions are the best *par excellence*. I am not attempting to settle that point. There is, however, a selection at work here. Institutions which make appointments select. The prospective appointee would also, if wise, select his institution for advanced work with care.

Of course, other influences have been at work. Not all who took the doctor's degree cared to teach in college or university. Not a few have engaged in special research work, and in commercial enterprises. The large number of chemists not connected apparently with educational institutions would seem to point in this direction. It is doubtful, however, if 95 per cent. of the 899 engaged in higher educational work would be from the sixteen institutions mentioned in Section III, unless a real selective principle were at work.

If we turn, now, to columns 5 to 7, it is evident that there has been a tendency toward an increase in academic appointments from among Ph.D. men, when we compare the two decades. This is all the more significant when we remember the decided drop in ratio as between the first and second decades indicated in Table II. We might, however, think that the percentage of increase is but the natural result of a constant demand upon a decreasing supply, since the total number of Ph.D. degrees in the second decade is less by 51 than in the first decade. When, however, we eliminate from the first decade all degrees obtained later than the year 1900, as indicated in column 5, we have 830 engaged in college and university work instead of 899, a difference of 69. This number, 830, is divided into 377 for the first decade and 453 for the second, consequently there was an increase in the second decade of 76 such academic appointments, or 20 per cent. Now, Table III. indicates that the number of degrees in the first decade, when those secured later than 1900 are eliminated, was 551, and that consequently there was an increase of 79, or 14 per cent., in the second decade over the first. Consequently, the apparent percentage increase in column 7

over column 6 in Table V. is a real increase in academic appointments from among the Ph.D. men who obtained their first degree from the sixteen institutions studied.

A further inspection of columns 6 and 7 in Table V. indicates that the increase in appointments has not been true of the graduates of all the institutions. In the case of five of these there has been a shrinkage. The very great increase in the case of Tufts is due to the fact that there were but two graduates of that institution with the doctor's degree belonging to the first decade and engaged in college work.

v

In Table VI. are the results of a comparison of these Ph.D. men with "Who's Who in America" and Cattell's "American Men of Science." I supplemented the latest edition of "Who's Who in America," 1912-1913, by the earlier editions, and also used the 1906 edition of the "Men of Science," although the additional information was slight. These two works are, of course, not entirely independent tests of prominence, since Professor Cattell, as he indicates in his preface, made use of "Who's Who in America," nor are they absolute tests, which we probably could not obtain. When the same tests, however, are applied to all these Ph.D. men alike the results are not without significance.

The first rather striking result presented in this last table is that a little less than one third of the entire number of doctors from these sixteen institutions are mentioned in "Who's Who in America," and just one third are mentioned in the "Men of Science," while 51 per cent. are mentioned by both, omitting duplicates. The percentages run rather evenly, although the very high figures for Indiana, Wesleyan, and especially Nebraska in column 5 are rather significant. The high percentage for Colby in column 3 is striking, although probably due to the small number involved. Column 9 indicates that 14 per cent. of the entire 1,315 are mentioned by both these tests and, presumably, they constitute a rather select group. The most striking result is the 31 per cent. for

TABLE VI

	Those Mentioned in								Those Among the First 1,000 Scientists		
	Who's Who in America		American Men of Science		Both, Omitting Duplicates		Both, the Duplicates		No.	Per Cent. to Whole No. of Degrees	Per Cent. to Those in Col. 4
	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.			
1	2	3	4	5	6	7	8	9	10	11	12
Amherst.....	28	37	25	33	39	52	14	19	7	9	28
Bowdoin.....	6	29	7	33	11	52	2	9	2	12	40
Colby.....	7	44	5	31	10	62	2	12	2	12	40
Columbia.....	42	35	40	34	66	55	16	13	11	9	27
Dartmouth.....	11	28	12	31	21	54	2	5	3	8	25
De Pauw.....	15	38	10	26	19	49	6	15	4	10	40
Harvard.....	89	33	77	28	133	49	33	12	31	11	40
Indiana.....	32	32	44	44	59	59	17	17	12	12	27
Lafayette.....	8	22	11	29	14	38	5	13	1	3	9
Michigan.....	50	31	51	32	79	50	22	14	12	7	23
Nebraska.....	20	39	25	49	29	57	16	31	11	21	44
Rutgers.....	6	25	8	33	11	46	3	12	3	12	37
Tufts.....	4	28	6	43	8	57	2	14
Wesleyan.....	17	28	24	40	31	52	10	17	11	18	46
Williams.....	9	24	14	38	17	46	6	16	4	11	28
Yale.....	70	28	77	30	119	47	28	11	24	9	31
Totals.....	414	Av. 31	436	Av. 33	666	Av. 51	184	Av. 14	136	Av. 10	Av. 31

Nebraska. Column 11 indicates that 10 per cent. of the entire number are among the first thousand scientists in the country, according to Professor Cattell's careful selection, and column 12 indicates that a little less than one third of those mentioned in "Men of Science" are in that select group of one thousand. The most striking results in column 11 are the 18 and 21 per cent. for Wesleyan and Nebraska, respectively, and in column 12 the 46 and 44 per cents. for these same institutions.

From this part of the study, we can readily see that those who take the Ph.D. degree are more likely to attain prominence, as measured by "Who's Who in America," than the ordinary college graduates. The 1910-11 edition of this work states that out of the 17,546 biographical sketches presented, 8,529 are of college graduates, or about 50 per cent. Since the percentages for the earlier editions were about the same, we may assume that about 50 per cent. of those mentioned in the 1912-13 edition are also college graduates.⁷ Now, if we should assume

⁷The percentage mentioned in this work is about 54, but this is based on only 15,518 names,

that about one third, or, to be exact, 31 per cent., of the living graduates of these sixteen institutions of Table II. were mentioned in this latest edition of "Who's Who in America," they would constitute about the entire number of college graduates who received mention, which is highly improbable in view of the many graduates from these same institutions in earlier and later periods, and the large number of graduates from other institutions, to say nothing of the Ph.D. men from these and many other colleges and universities.

Earlier in the paper, it was suggested that the proportion of one graduate in twenty-two, pressing on to the doctor's degree, might be taken as a rough test of the efficiency of the undergraduate work and value of the environment at any college or university with an undergraduate department. The results presented in Tables V. and VI. apparently contradict such a view. The percentages run rather evenly in the matter of an academic since about 2,000 of the subjects of sketches did not furnish the necessary educational data. The percentages for the earlier editions ranged from 52 to 54 per cent.

appointment and mention in "Who's Who in America" and in "Men of Science," no matter where the bachelor's degree was taken. Some of the special variations have been noted. Now, this fact would seem to point to rather uniform requirements, so that any man who gains the doctor's degree, no matter where his early training was secured, has about seven chances in ten of getting a college or university appointment, or one chance in three of being mentioned in "Who's Who in America" or in the "Men of Science." This, too, apparently, whether the ratio of doctors of philosophy to graduates be 1 in 10 or 1 in 44, as discussed in connection with Table II. But we may, it would seem, properly put the matter as follows: If an institution with the ratio of 1 in 44 had a very high percentage of its doctors getting mention in these two works used as tests and had an exceptionally large number included in the first thousand scientists, and an institution with a low ratio, as 1 in 10 or 1 in 13, were just the opposite, then we might conclude that the institution which sent out but a few men who attained the doctor's degree was the more efficient, and the mere numbers who went out from other institutions and gained the degree, but seldom attracted attention, would be a reproach to those institutions.

But my study does not show this. It shows rather that they grade fairly evenly, with exceptions here and there. Consequently, we are justified in maintaining that, if the Ph.D. group be at all desirable, and it would seem to be, in view of the increased demand in the second decade so far as these sixteen institutions are concerned, then the institution that sends out a comparatively large number of young men who obtain the doctor's degree is to that extent the more efficient.

We must, of course, always take native ability into consideration. It is not simply the institution. But the institution from which a comparatively large number go on to the higher degree would seem to be furnishing the proper intellectual stimulus and environment, so that the native ability is not allowed to remain fallow or to stultify itself, but is encouraged to develop to the fullest extent either there or elsewhere.

VI

One further matter of special interest in connection with this study is the mortality ratio. Table VII presents this for the total number of graduates at each of the sixteen institutions of Table II., for the graduates less those who gained the doctor's degree, and for the doctors themselves.

TABLE VII

Classes 1885-1904, Mortality Records Up to 1910	Amherst	Howdoin	Colby	Columbia	Dartmouth	De Pauw	Harvard	Indiana	Lafayette	Michigan	Nebraska*	Rutgers	Tufts	Wesleyan	Williams	Yale	Totals
Total bachelor degrees	1,625	917	468	1,614	1,712	753	7,156	1,032	800	2,024	868	680	470	920	1,334	6,648	29,021
Total No. deaths	111	62	25	137	115	55	458	54	63	107	55	39	23	59	75	486	1,924
Per cent.	6.8	6.8	5.3	8.5	6.7	7.3	6.4	5.2	7.9	5.3	6.3	5.7	4.9	6.4	5.6	7.3	Av. 6.6
Bachelors less Ph.D. men	1,550	896	452	1,495	1,673	714	6,883	933	763	1,865	817	656	456	860	1,297	6,396	27,706
Deaths less those of Ph.D. men	111	61	25	129	114	54	448	51	61	100	53	37	22	58	73	481	1,878
Per cent.	7.2	6.8	5.5	8.6	6.8	7.6	6.5	5.5	8	5.4	6.5	5.6	4.8	6.7	5.6	7.5	Av. 6.8
Total Ph.D. men	75	21	16	119	39	39	273	99	37	159	51	24	14	60	37	252	1,315
Total No. deaths of Ph.D. men	1	1	1	8	1	1	10	3	2	7	2	2	1	1	2	5	46
Per cent.	4.7	4.7	6.2	6.7	2.6	2.6	3.7	3	5.4	4.4	3.9	8.3	7.1	1.6	5.4	2	Av. 3.5

* There were 57 graduates whose addresses were not given. If any of these were dead, the percentages would have been changed somewhat, but not very materially.

From this table it is immediately apparent that the death rate among men who have taken the doctor's degree is strikingly less than that for college graduates as a whole, so far as

these institutions are concerned. In fact, it is about one half. This is hardly what one at first thought would infer. It is true that such men constitute a selected group, but the confined, sedentary life that a large proportion of them lead, indicated in part by their college and university appointments, would, one might think, offset that. Table VII., however, indicates clearly that the hardness, correlated with the obtaining of the degree, persists in after life when these Ph.D. men are compared with the ordinary graduates.

There seems, also, to be no great difference between the two decades, although there are slight individual variations among the institutions studied. The figures are so small that little dependence can be placed upon them. This much, however, may be said. There were twelve of the first decade, who took their degree prior to 1900, who died before or at that date. There were also twenty-four of the first decade who have died since 1900. That leaves ten of the second decade who have died between 1895 and 1910. The situation, therefore, is practically the same up to the date reached by the records used.

VII

In closing this study, I do not wish to be understood as regarding the conclusions advanced here as other than tentative, although some seem to be fairly well established. The facts as stated, especially in the tables, will stand a rather severe acid test. By this I do not mean that there are no errors. One could hardly deal with so many names from such various sources and escape error altogether. Such errors, however, I feel are near a minimum and, if detected, would not change materially the conclusions as presented. But many more such studies would need to be made before one could feel a very high degree of subjective assurance in regard to some of the positions here advanced. Or, to put it more generally, one could not apply these conclusions to colleges in general without many additional studies. If such studies should be made by others, as I have made this, or by the various institutions themselves, and ultimately all the results be collected and compared, much

light, I believe, would be thrown upon the problem of the efficiency of a college. A fairly sure test could be developed in this way which could very readily be applied to any institution. Especially would this be so if, as already suggested, all graduate work, including professional work, were scrutinized and properly weighted so as to contribute to the final result.

None the less, while I fully appreciate the tentative character of my conclusions, I feel that future studies will not change some of them to any great extent. They are, to recapitulate, as follows: the modal and arithmetical averages of the time required to take the Ph.D. degree, will stand, I think, and could be used at once in connection with any institution, in so far as it might have a bearing upon educational discussions. The ratio, too, of 1 in 22 as the average number of college graduates who obtain the Ph.D. degree will not, I think, be very seriously modified. I feel that it is more likely to be lowered than raised, if the same period, 1885-1904, be studied at other institutions, since the largest graduating classes, those of Harvard and Yale, have already been dealt with. The inverse relation between the size of the class and the number of Ph.D. degrees obtained later, I believe, will be found true in not a few other institutions. So, too, the tendency toward fewer German degrees in the second decade will very likely show itself at other institutions, which is a matter that has already been noted in other studies. The ratio 7 in 10 for college and university appointments, 1 in 3 for mention in "Who's Who in America" and "American Men of Science," and 1 in 2 for both books combined, will, I think, be maintained, although prediction in such matters is very precarious. The mortality figures, too, I believe, would be matched, if other institutions were studied in the same way. But whether any, or all, or none, of these conclusions should be sustained, I am of the opinion that similar studies in connection with practically all the other institutions in the country are eminently desirable.

GREGORY D. WALCOTT

HAMLINE UNIVERSITY

Ek 7.2.63

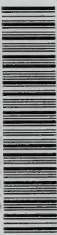
LB
2386
W3

Walcott, Gregory Dexter
Research and statistics

**PLEASE DO NOT REMOVE
SLIPS FROM THIS POCKET**

**UNIVERSITY OF TORONTO
LIBRARY**

UTL AT DOWNSVIEW



D RANGE BAY SHLF POS ITEM C
39 11 15 21 07 010 2