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## THE SALARIES OF PROFESSORS IN AMERICAN COLLEGES AND UNIVERSITIES<sup>1</sup>

THE Carnegie Foundation for the Advancement of Teaching, in seeking to carry out its primary object of establishing a retiring allowance system in the colleges, universities, and technical schools of the United States, the Dominion of Canada, and Newfoundland, has found it necessary to conduct various enquiries into the condition of education in these three countries. Among the first of these studies was one which had to do with the salary and tenure of office of the professor and of other officers of instruction. The results of that study are given in the present bulletin and are based upon data supplied by some seven hundred and fifty institutions in the United States and Canada, the figures given in all cases being presented exactly as they were received from the officers of these institutions.

The organization of colleges and universities in the United States is fashioned very much after that of business corporations; the board of trustees corresponding to the board of directors, the chairman of the board to the chairman of the board of directors, the president of the college to the general manager. The president is the connecting link between the administrative body of trustees on the one side and the teaching body on the other.

<sup>1</sup> From Bulletin number two of the Carnegie Foundation for the Advancement of Teaching. This bulletin, entitled "The Financial Status of the Professors in America and in Germany," contains much additional information and discussion.

In Canada the organization is somewhat more democratic, the governing boards in most cases being elected from the alumni and containing generally members of the faculty.

The instructing staff in most institutions, both in the United States and Canada, consists of professors, associate professors, and assistant or adjunct professors. These form the faculty or permanent body of teachers. In addition there are grades of instructors, lecturers, tutors and assistants whose positions are in great or less measure temporary.

Not all of these offices appear in all institutions. Even in some of the larger universities there are only two grades in the faculty, the professor and assistant or adjunct professor. In many smaller colleges the greater part of the teaching staff is included in the faculty with a very limited number of instructors and assistants. The grade of preceptor is unique in Princeton, where its holders are considered of faculty rank.

While this paper will deal, so far as seems necessary to render clear the status of the professor, with all of these grades of the instructing staff, it is upon the holder of the professorial title as embodying the force and tradition of college teaching that the attention will be principally directed.

As was pointed out in the second annual report of the president of the foundation, the words "college" and "university" have no well settled meaning in America, nor is the sphere of higher education by any means carefully defined. As a result the degree-giving institutions in these countries present every variety of educational and administrative complexity. Even the well-informed educator is apt to speak of our colleges and universities as if they formed a homogeneous species conforming more or less clearly to some

typical condition. Not only is this not the fact, but these institutions do not even fall into any definite number of such species. There is no method of classification which, when applied to the thousand American and Canadian degree-conferring institutions, will enable the student to divide them into clear species. Whatever criterion is chosen will result in placing some institutions in company to which they are not entitled to belong.

The number of students, or the "bigness" of the college or university, is probably the most usual method of classification. But in regard to the number of students one finds a range continuous from institutions with fifty students to institutions with five thousand, and if in this continuous series arbitrary lines are drawn, the groups thus made put together institutions whose consideration side by side could serve no useful purpose; for instance, Johns Hopkins University with the University of Southern California, Yale University with the Temple College, and Williams College with Maryville College.

The size of the teaching staff would naturally be considered a more scientific method of classification, but here again there is a continuous gradation from institutions with five to institutions with five hundred teachers, and groups selected on this basis would result in such incongruities as placing Valparaiso University with Leland Stanford Junior University, Union College, Nebraska, with Amherst College, and Howard College at Birmingham, Alabama, with Ripon College.

The maintenance of professional schools might be considered as a significant line of cleavage, but such a means of demarcation, which would put in the supposedly less important group Princeton, Brown, Wesleyan, Vassar, Bryn Mawr, and Trinity (Hartford), and in the higher

group such institutions as Hamline University, Epworth University, Baylor University, Kansas City University, and some forty or fifty other essentially minor institutions can not be considered an illuminating classification.

The presence of a certain number of resident graduate students is a significant feature of an institution for higher education, and might be used with advantage in a classification if graduate students in the various institutions had to comply with similar requirements before being enrolled. It is true that the graduate student must have received a college degree, but a collegiate degree in the United States means anything from a bachelor of arts or a bachelor of science of such an institution as the Ohio Northern University, Ada, Ohio, up to the bachelor of arts and bachelor of science of such universities as Columbia, and the University of Chicago. Until the collegiate degrees begin to have a definite meaning, it will be futile to base any classification upon the graduate schools, which essentially rest upon these degrees.

The annual income is one of the better ways of grouping American colleges and universities, because a "dollar" is somewhat the same all over the United States; whereas a "student" may mean a person in the "school of oratory" or a candidate for the degree of doctor of philosophy. The word "teacher" may mean a full professor working exclusively for his college or a musician in Chicago who is the "non-resident director" of the schools of music of a chain of small colleges throughout Illinois and the adjacent states, the same individual being counted thus in a score or more of college catalogues. The test of annual income, however, fails to divide institutions into any sharp groups. The institutions range almost continuously from so-called colleges receiving an annual in-

come of eight hundred and fifty dollars up to universities with a yearly budget of a million and a half dollars. It is true that between six hundred and fifty thousand dollars a year income and eight hundred and fifty thousand dollars a year income occurs a break, but there does not seem any solid reason why the ten universities above this break should be considered apart from the Universities of Missouri, Toronto, Pennsylvania, Minnesota and Nebraska, which come immediately below.

It must also be noted that the figures in regard to annual incomes are not absolutely to be relied upon. Many institutions say frankly that the return under this head is only an approximation, and although the foundation has made every effort to exclude such extraordinary items as gifts, special legislative appropriations for the erection of buildings, etc., from this calculation of annual incomes, it can not feel certain that in all cases the figures given under this head represent the normal yearly income of the institution—the income which can be devoted to running expenses. Thus the Ohio State University at Columbus, in estimating its annual income, included the unexpended balance of a legislative appropriation for building operations granted several years before, and Harvard University included in its annual income the value of certain securities which it had sold during the year in order to make a reinvestment. The foundation has been unable to obtain copies of all college treasurers' reports, and so has been unable to check all the returns made. Such inclusion of building appropriation, bookkeeping items, etc., will doubtless account for some cases where, according to the institution figures, a disproportionately small percentage of the income is devoted to the salaries of the instructing staff. In many small colleges, on the other hand, the regular income is

insufficient to pay the salary account, and it is necessary every year to make up the deficiency by the solicitations of gifts.

It may be mentioned here that the income of the University of Oregon, as given in the following table, is the income appropriated for it by the legislature a year and a half ago. The legislature of 1907 passed an act making an annual appropriation to the university of \$125,000, but the referendum has been invoked against this act under the new initiative and referendum provision of the constitution of Oregon and the university, therefore, can not tell whether it will receive this appropriation until the referendum is held in June (1908). In the meantime, the university has to maintain itself upon the remnant of the old appropriation. This is the first time that the initiative and referendum has appeared in higher education in the United States.

Besides these reasons for not favoring the annual income as a means of classification, it should also be noted that in many institutions, particularly in women's colleges, the payments of the students for board are included in the income of the college. Wherever this is the case it is indicated in the table by a footnote. But while this footnote guards the reader from error, it does not enable the figures thus "starred" to be used for any useful purpose of calculation. To accept an income so calculated as if it were a real income would indicate that Vassar College was in receipt of a larger revenue than Princeton University, and the Randolph-Macon Woman's College than Radcliffe.

Since American colleges and universities fail under any system of classification to fall into natural groups, the only available method is to choose arbitrarily a system which is most useful for the purpose in view. A system of classification based on the amount of money expended

annually for teachers' salaries has been adopted. This system results in incongruities. It places the College of the City of New York above the University of Virginia, and the Agricultural College of Utah above Clark University. But it results in fewer incongruous arrangements than any other single criterion.

There is one grave fault in this system of classification, and that is the impossibility of bringing within it the colleges and universities of the Roman Catholic Church. Almost all of these institutions are under the control of religious orders, and at least in the collegiate and graduate departments the teachers are priests who receive in money but a nominal compensation. The University of Notre Dame du Lac (Congregation of the Holy Cross) and Georgetown University (Society of Jesus), possessing incomes equal to those of Syracuse University and of Colgate University, must thus be omitted from this calculation, together with a number of less wealthy institutions whose revenues are on the scale of Rutgers and of De Pauw. But while the omission of these colleges and universities makes the list look incomplete, the omission is really unimportant in the economic sense. It would be meaningless to attempt a financial comparison between teachers to whom teaching is an ordinary economic function and teachers whose teaching is a part of their priestly duties. At some future time the foundation hopes to present from the pen of a distinguished ecclesiastic an adequate study of the Roman Catholic institutions.

The calculation on the basis of teachers' salaries will also be inadequate in regard to such institutions as New York University, where, as its syndicate reports, a number of professors in all departments donate their services, in whole or in part, to the university. It will be necessary also to consider carefully the cases where

houses or apartments are added to the salaries of the members of the instructing staff. The houses at the University of Virginia and the suites of rooms at some of the colleges of the University of Toronto are a considerable addition to the stated salary, and even when, as at Washington and Lee University, a charge is made for the houses allotted to professors, the charge, in view of the character of the residence, is a nominal one.

Taking the salaries paid to teachers as a basis of classification of American and Canadian degree-giving institutions, we have the following table:

TABLE I  
*Institutions Classified by Expenditure for Teachers' Salaries*

Number of Institutions	Figures Indicating Range of Expenditure for Teachers' Salaries
92	\$ 5,000-\$10,000
91	10,000- 15,000
48	15,000- 20,000
29	20,000- 25,000
19	25,000- 30,000
18	30,000- 35,000
17	35,000- 40,000
17	40,000- 45,000
7	45,000- 50,000
6	50,000- 55,000
7	55,000- 60,000
8	60,000- 65,000
8	65,000- 70,000
4	70,000- 75,000
2	75,000- 80,000
4	80,000- 85,000
2	85,000- 90,000
1	90,000- 95,000
3	95,000-100,000
2	100,000-105,000
2	105,000-110,000
4	110,000-115,000
2	115,000-120,000
4	120,000-125,000
8	125,000-150,000
2	150,000-175,000
5	175,000-200,000
3 <sup>2</sup>	200,000-225,000

<sup>2</sup> Johns Hopkins University, Northwestern University, New York University.

4 <sup>3</sup>	225,000-250,000
1 <sup>4</sup>	250,000-300,000
4 <sup>5</sup>	300,000-400,000
4 <sup>6</sup>	400,000-500,000
3 <sup>7</sup>	500,000-600,000
University of Chicago	\$ 699,000
Harvard University	841,000
Columbia University	1,145,000

It will be seen from the table that five ninths of the institutions making reports have an instructional pay-roll of less than twenty thousand dollars. Failure to report this item is very common among the smaller institutions. Almost all the large institutions, on the other hand, send in this report. It is, therefore, safe to say that if the figures were obtainable in every case, two thirds of the degree-granting institutions of the United States and of Canada would show a budget for teachers' salaries of less than twenty thousand dollars. Seven ninths of the institutions making reports spend less than fifty thousand dollars on instructional salaries. If the list were complete, institutions of this character would number six sevenths of those granting degrees.

The average salary of a professor is reported in many more cases by the college authorities than is the college's total annual expenditure in professional and other instructing salaries. From a study of these figures it appears that one third of the degree-granting institutions pay on an average less than a thousand dollars a year to their full professors; indeed, in

<sup>3</sup> McGill University, University of Missouri, University of Nebraska, Ohio State University (Columbus).

<sup>4</sup> University of Minnesota.

<sup>5</sup> Massachusetts Institute of Technology, Princeton University, University of Toronto, Leland Stanford Junior University.

<sup>6</sup> University of California, University of Pennsylvania, University of Wisconsin, University of Illinois.

<sup>7</sup> Cornell University, Yale University, University of Michigan.

thirty-five institutions making reports the average salary of the full professor is less than five hundred dollars a year. These salaries are poor enough under any circumstances, but it must be remembered that most of the institutions paying such salaries are not colleges in any sense, except that they are called colleges and that they confer collegiate degrees. These poorly paid professors are therefore not really doing the work of higher education, nor have they in most cases given themselves adequate preparation for college teaching. In the vast majority of cases these professors are teaching high-school and even grammar-school subjects; they have devoted to their training only the time ordinarily given to preparation by a teacher in secondary education; and their salaries, although small, are not so utterly incommensurate as they would be if paid to a professor doing collegiate work.

To study the financial standing of the teachers in all of the degree-granting institutions would therefore be to deal with a large number of institutions that are simply high schools. Conclusions drawn from such a heterogeneous group would be of little value. Yet to draw a line across this ascending scale of college salary budgets is a difficult task. Wherever the line is drawn there will be reasons for moving it down to include a few more institutions or up to have it exclude a few others.

It will necessarily be an arbitrary line, but at one place in the gradation of institutions it will be less an arbitrary line than if drawn at any other place. A glance at Table I. shows that at the point where forty-five thousand dollars a year is spent on salaries to the instructing staff the number of institutions drops sharply. Above this abrupt drop are one hundred and three institutions. Let us, therefore, take these institutions as typical of Ameri-

can higher education, and see what are the results obtained from an analysis of the status of their professors and instructors. Table II. gives these one hundred and three institutions, with their appropriate figures, in the order of their annual expenditure in teachers' salaries.

It may be that there are colleges not included in Table II. which are better representatives of higher education than some which are there listed. The table does not pretend to give the one hundred institutions in America which are the best from an educational point of view, any more than the arrangement of institutions in the table is meant to indicate anything beyond the total size of the annual salary accounts. The value of this table is that it is an impersonal selection of colleges and universities according to a fairly representative criterion. For the purpose of this table, it is more valuable to have the selection made according to an objective standard which every one can estimate, than to have a more exact approximation into which personal judgment enters.

The foundation recognizes, however, that the salary budget of an institution is closely related to the size of the institution, and that the size of a college is an imperfect method of estimating its educational value. Table IX., in a later part of this paper, is therefore intended as a necessary supplement to Table II. It contains the names of fifty-four institutions, which were not included in Table II. on account of the comparative smallness of their expenditure for salaries, and yet which in the opinion of the foundation ought to be considered if the higher education of the United States is to be rightly estimated. Table IX. and the discussion thereon will show what excellent educational results can be obtained by resources which are within moderate limits.

These two tables, the one a purely ob-

jective selection on a mathematical basis, the other an attempt of the foundation to correct the false impression which a selection only on that standard might give, will together present an approximately complete statement of the financial status of the teacher in the institutions of higher education in the United States and Canada. Nevertheless the total number of institutions which assume to deal with the higher education can not be disregarded, although many of them are occupied in a large part with education that is not of a collegiate grade. While these colleges of meager support and limited facilities can not be grouped, as mentioned before, in significant educational divisions, it is evident to one who studies the countries as a whole that the problem of higher institutions must be taken up from the standpoint of the state or province as a unit. The state governments have themselves in all cases a system of education limited by state lines. The same denominations have erected colleges and universities in different states, so that the problem of higher education is almost necessarily studied from the standpoint of the state.

Looked at from this standpoint, it is evident that if the system of higher education is finally to have unity, strength, and thoroughness, enormous sums of money must be spent to develop these numerous institutions, or else many of them must be in the end abandoned. One can scarcely doubt that the latter course will finally come about by the mere progress of events, for there can be no doubt that many of these institutions are wholly unnecessary. They have been produced partly from a genuine interest in education; partly by denominational and local rivalry; sometimes by the enterprise of real estate agents; and under a system of laws which allowed any group of men to come together and call the institution which they founded a college. There are in most

states many more such institutions than are necessary for the work of higher education and the multiplication of the number undoubtedly lowers the general standard of institutions.

Thus the State of Iowa contains six institutions of higher education in organic connection with the Methodist Episcopal Church.<sup>8</sup> Two of these, Cornell College and Upper Iowa University, are both under the control of the Upper Iowa Conference of that church. The combined revenues of these six institutions are only a little over one fifth of the sum appropriated each year by the people for the support of the state university. They about equal the annual revenue of Vanderbilt University. It is apparent that here has been a great dissipation of energy, when by a wise concentration of resources the Methodists of Iowa could have built up a single institution comparable with the excellent facilities of Vanderbilt, and able, if its organization had not been too widely extended, to have been an admirable colleague of the state university. The Presbyterian Church has also controlled four colleges in Iowa,<sup>9</sup> whose incomes, if combined, would have been equal to the incomes of Haverford or of Lafayette.

In Ohio the Methodist Episcopal Church has founded or given its official patronage to five separate institutions of learning.<sup>10</sup>

<sup>8</sup> Cornell College, Mount Vernon; Morningside College, Sioux City; Simpson College, Indianola; Upper Iowa University, Fayette; Iowa Wesleyan University, Mount Pleasant; and Charles City College, Charles City.

<sup>9</sup> Coe College, Cedar Rapids; Parsons College, Fairfield; Buena Vista College, Storm Lake; Lenox College, Hopkinton. Coe College, however, with the consent of the Synod of Iowa has recently taken into consideration an abrogation of this relationship to the Presbyterian Church.

<sup>10</sup> Ohio Wesleyan University, Delaware; Ohio Northern University, Ada; Mount Union College, Alliance; Scio College, Scio; and Baldwin University and the German Wallace College, Berea.

TABLE II

*Degree-conferring Institutions in the United States and Canada appropriating Annually \$45,000 or over for the Total Payment of the Salaries of their Instructing Staffs*<sup>11</sup>

Institution	Total Annual Income	Annual Appropriation for Salaries of Instructing Staff	Average Salary of Professor	Average Age at Entrance to Grade of Professor	Average Salary of Associate Professor	Average Salary of Assistant Professor	Total Number of Students in University	Total Instructing Staff in University	Ratio	Total Number of Students in Undergraduate Colleges and Nonprofessional Graduate Schools	Total Instructing Staff in Undergraduate Colleges and Nonprofessional Graduate Schools	Average Salary \$2,048 Cost per Student \$280 Ratio
Columbia Univ.....	\$1,675,000	\$1,145,000	\$4,289	37.5		\$2,201	4,087	559	7.3	2,545	253	10
Harvard Univ.....	1,827,789	841,970	4,413	39	\$3,600	2,719	4,012	573	7	2,836	322	8.8
<sup>19</sup> Univ. of Chicago....	1,304,000	699,000	3,600		2,800	2,200	5,070	291	17.4	3,902	211	18.4
Univ. of Michigan....	1,078,000	536,000	2,763		2,009	1,624	4,282	285	15	2,899	198	14.6
Yale Univ.....	1,088,921	524,577	3,500	35		2,000	3,306	365	9	2,620	236	11.1
<sup>12</sup> Cornell Univ.....	1,082,513	510,931	3,135			1,715	3,635	507	7.1	2,917	283	10.3
Univ. of Illinois.....	1,200,000	491,675	2,851		2,168	1,851	3,605	414	8.7	2,281	190	12
Univ. of Wisconsin...	998,634	489,810	2,772	32.8	2,081	1,636	3,116	297	10.4	2,558	231	11
Univ. of Penna.....	589,226	433,311	3,500			1,850	3,700	375	9.8	2,618	166	15.7
Univ. of California...	844,000	408,000	3,300		2,200	1,620	2,987	350	8.5	2,451	218	11.2
Stanford Univ.....	850,000	365,000	4,000	35	2,700	2,000				<sup>17</sup> 1,668	146	10.7
Univ. of Toronto.....	610,000	324,000	3,600	42.5		2,400	3,498	368	9.5	1,732	153	11.3
<sup>14</sup> Princeton Univ. ....	442,232	308,650	2,914	35		1,824				1,301	158	8.2
Massachusetts Inst. ...	505,000	301,000	3,192	38	2,115	1,653				1,415	211	6.7
Univ. of Minnesota...	515,000	263,000	2,600	32		1,700	3,889	303	12.8	2,169	116	18.6
Ohio State Univ.....	475,000	244,000	2,041		1,692	1,400	2,014	127	15.8	1,376	87	15.8
Univ. of Nebraska....	425,000	240,000	2,200	35		1,500	2,886	173	16.6	1,808	90	20
Univ. of Missouri....	655,000	239,110	2,355	33		1,575	2,070	144	14.3	1,360	101	13.4
McGill Univ.....	425,000	225,000	3,060		2,150	1,700	1,163	191	6	542	95	5.7
New York Univ.....	303,500	220,000	3,466			1,830	3,110	211	14.7	827	46	17.9
Northwestern Univ...	491,132	218,157	3,265	35	2,325	1,535	2,485	261	9.5	936	56	16.7
Johns Hopkins Univ..	311,870	211,013	3,184			1,344	651	172	3.7	328	75	4.3
Univ. of Texas.....	339,577	199,394	2,889	32.5	2,300	1,893	1,693	110	15.3	1,169	80	14.5
Syracuse Univ.....	279,000	180,000	1,806		1,291	978	2,875	199	14.4	1,807	89	20.3
Smith College.....	278,717	177,150	2,150			1,646				1,482	97	15.2
Univ. of Kansas.....	285,000	176,000	2,100		1,600	1,200	1,786	126	14.1	1,282	97	13.2
N. Y. City College....	455,000	175,270	4,788		3,189	2,250						
State Univ. of Iowa...	324,048	173,355	2,152	37.5		1,271	1,791	149	12	1,200	86	13.9
Dartmouth College...	250,000	155,000	2,600	40	2,200	1,800	1,219	88	13.8	1,161	70	16.5
Tulane Univ.....	274,000	146,000	3,000	35	2,000	1,500	1,433	148	9.6	525	55	9.5
Iowa State College....	210,000	140,286	2,000		1,600	1,300				1,098	108	10.1
<sup>14</sup> Wellesley College...	438,493	136,586	1,900			1,350				1,209	118	10.2
Vassar College .....	483,000	129,500	2,896			1,690				996	81	12.2
Kansas State College..	393,500	129,100	2,140	34.5		1,435				1,034	69	14.9
Indiana Univ.....	215,000	129,000	2,400	35	1,707	1,200						
Purdue Univ.....	255,000	128,920	2,200			1,800	1,713	124	13.8	1,605	119	13.4
Oberlin College .....	223,729	128,400	1,941	33		1,250	1,406	109	12.8	803	44	18.2
Univ. of Cincinnati...	254,699	123,141	3,000	35	2,000	1,300	994	120	8.2	638	52	12.2
Armour Institute.....	215,000	123,000	2,150	35	1,682	1,328				622	62	10
Univ. of Virginia....	202,190	122,960	3,100	35		1,425	785	91	8.6	467	61	7.6
Univ. of Washington.	202,000	122,400	1,950		1,700	1,450	1,061	72	14.7	907	64	14.1
Westrn. Reserve Univ.	179,661	116,141	2,700		1,880	1,790	914	155	5.8	566	53	10.6
Agric. Col. of Utah....	130,566	115,400	1,800	35		1,300				530	55	9.6
<sup>15</sup> Brown Univ.....	124,198	114,630	2,680	37	1,843	4,389				924	81	11.4
Washington Univ.....	158,051	114,034	2,471			1,400	1,124	174	6.4	331	45	7.3
West Virginia Univ...	200,000	110,000	2,080	35	1,600	1,350	667	62	10.7	284	41	6.9
Michigan State Col...	325,000	110,000	2,300	34	2,000	1,200				683	78	8.7
Lehigh Univ.....	166,500	107,000	2,137	30		1,537				674	75	11.8



TABLE II—continued

*Degree-conferring Institutions in the United States and Canada Appropriating Annually \$45,000 or over for the Total Payment of the Salaries of their Instructing Staffs*<sup>11</sup>

Institution	Total Annual Income	Annual Appropriation for Salaries of Instructing Staff	Average Salary of Professor	Average Age at Entrance to Grade of Professor	Average Salary of Associate Professor	Average Salary of Assistant Professor	Total Number of Students in University	Total Instructing Staff in University	Ratio	Total Number of Students in Undergraduate Colleges and Nonprofessional Graduate Schools	Total Instructing Staff in Undergraduate Colleges and Nonprofessional Graduate Schools	Average Salary \$2,048. Cost per Student \$280. Ratio
Bryn Mawr College...	\$126,808	\$106,687	\$2,500		\$2,000	\$1,500				362	47	7.7
Tufts College.....	180,000	104,600	1,870			1,375	1,083	198	5.4	453	45	10
George Wash. Univ...	189,643	101,610	1,693	32.5		1,094	1,258	196	6.4	643	82	7.8
Penna. State College..	251,920	97,190	2,010			1,390				784	81	9.6
Univ. of Colorado.....	175,000	95,000	2,050	32		1,400	840	112	7.5	726	57	12.7
Williams College.....	168,000	95,000	2,714	32	2,100	1,730				475	58	8.1
Clemson Agric. Col...	271,720	93,650	2,100		1,800	1,400				658	41	16
Univ. of Utah.....	156,000	85,653	1,881		1,900	1,700	565	50	11.3	390	39	10
Amherst College.....	133,214	85,500	2,853	36	1,700	1,566				513	38	13.5
Vanderbilt Univ.....	169,000	83,000	2,800		1,900	1,400	902	110	8.1	342	44	7.7
Boston Univ.....	186,484	82,340	2,419	35		1,628	1,428	150	9.5	519	34	15.2
<sup>14</sup> Mount Holyoke Col.	225,000	81,000	1,350	40		1,100				711	87	8.1
State Col. of Wash....	130,000	80,000	1,750	35	1,700	1,400				1,100	65	16.9
<sup>15</sup> Univ. of Tennessee..	153,877	78,000	2,000	39	1,600	1,300	694	106	6.5	353	34	10.3
Western Univ. of Pa...	137,139	76,617	1,864	38			966	144	6.7	187	23	8.1
Texas College.....	160,000	74,000	2,000			1,300				623	52	11.9
Univ. of North Car...	104,121	72,326	1,975			1,242	731	73	10	483	48	10
State Univ. Oklahoma	110,000	72,274	1,800			1,400	394	36	10.9	201	28	7.1
Clark Univ.....	145,000	70,000	3,000			1,650				159	37	4.2
Stevens Inst. of Tech.	108,000	69,000	3,200			2,000				429	42	10.2
Univ. of Maine.....	135,000	69,357	1,800	34	1,500	1,200	702	74	9.4	514	50	10.2
Drake Univ.....	101,856	67,849	1,500	32		1,000	866	93	9.3	515	20	25.7
Miami Univ.....	113,000	66,300	2,000		1,650	1,150	570	41	13.9	313	28	11.1
Ohio Wesleyan Univ.	165,000	66,000	1,800		1,300	850	1,178	119	9.8	580	43	13.4
Univ. North Dakota..	153,136	65,500	2,200	35		1,550	425	49	8.6	230	30	7.6
Wesleyan Univ.....	123,000	65,000	2,575	33		1,750				316	29	10.8
Alabama Polyt. Inst..	92,000	65,000	2,000		1,700	1,500				543	50	10.8
Worcester Polyt. Inst..	89,594	61,107	2,369			1,725				465	46	10.1
Simmons College.....	127,024	61,000	2,900		2,266	1,660				545	59	9.2
Colgate Univ.....	114,532	60,930	1,740			1,500				287	24	11.9
Va. Polytechnic Inst.	118,000	60,764	1,980	33		1,260				577	57	10.1
Case Sch. Applied Sci.	145,500	60,205	2,861	32.5		1,443				440	40	11
Ohio Univ.....	165,000	60,160	1,900	25	1,600	900	1,224	38	32.2	414	21	19.7
Union Univ.....	110,126	60,159	2,300	35		1,400	627	108	5.7	270	33	8.1
Univ. of Vermont.....	105,000	60,000	2,100	35	1,650	1,375	497	65	7.6	345	37	9.3
Rensselaer Poly. Inst.	110,400	58,721	3,300	35	2,500	1,800				485	29	16.8
Howard Univ.....	91,555	58,619	1,837	32.5		1,000	785	92	8.5	265	17	10.1
Queen's University...	88,221	58,351	2,000			1,200	1,134	80	14.1	914	48	19
Univ. of Mississippi...	105,000	57,300	2,000		1,325	1,000	344	28	12.2	274	24	11.4
Univ. of S. Dakota...	80,000	56,000	1,650			1,100	359	44	8.1	173	18	9.6
Swarthmore College...	84,000	55,335	2,100			1,400				332	36	9.2
Ga. Sch. Technology.	82,500	55,000	1,945			1,000				562	42	13.3
Univ. of Idaho.....	99,639	54,920	1,800			1,581				231	28	8.2
Temple College.....	72,895	54,272	1,500	35			2,343	198	11.8	199	31	6.4
Radcliffe College.....	90,000	53,000	1,500									
Rutgers College.....	87,000	53,000	2,300			1,600				255	34	7.5
North Dakota College	114,000	52,150	2,000	30		1,300				820	33	24.8

TABLE II—continued

*Degree-conferring Institutions in the United States and Canada appropriating Annually \$45,000 or over for the Total Payment of the Salaries of their Instructing Staffs*<sup>11</sup>

Institution	Total Annual Income	Annual Appropriation for Salaries of Instructing Staff	Average Salary of Professors	Average Age at Entrance to Grade of Professor	Average Salary of Associate Professor	Average Salary of Assistant Professor	Total Number of Students in University	Total Instructing Staff in University	Ratio	Total Number of Students in Undergraduate Colleges and Nonprofessional Graduate Schools	Total Instructing Staff in Undergraduate Colleges and Nonprofessional Graduate Schools	Average Salary \$2,048 Cost per Student \$280 Ratio
Wash. and Lee Univ.	\$70,000	\$50,000	\$2,600	35		\$1,500	468	35	13.3	385	32	12
State Univ. of Ky.....	90,247	49,250	2,000	33		1,200				466	43	10.8
James Millikin Univ.	64,003	49,160	1,400	30		1,000				231	32	7.2
N. Carolina College...	114,000	49,000	2,000	30		1,240						
Montana State College	133,000	48,650	1,800			1,500				291	32	9
Univ. of Oregon.....	60,000	47,927	1,800	40		1,400	570	87	6.5	340	34	10
Haverford College.....	78,650	45,300	3,440	35		2,240				143	22	6.5
Univ. of Rochester...	60,334	45,000	2,383			1,750				340	21	16.1

<sup>11</sup> The data for instructors and assistants are omitted.

<sup>12</sup> Not including Medical School.

<sup>13</sup> Including the preceptors as assistant professors.

<sup>14</sup> Including payments of students for board.

<sup>15</sup> Most of the faculty receive a small extra compensation for teaching at the Women's College.

<sup>16</sup> Faculty consists of members of the faculty of Harvard University, paid a certain amount per course.

<sup>17</sup> Law students are not classified separately from collegiate undergraduates.

<sup>18</sup> A combination of the average salary of associates, \$1,469, and the average salary of instructors, \$1,050.

<sup>19</sup> Professors who are heads of departments receive on an average \$5,800.

The Presbyterian Synod of Tennessee (north) elects the trustees of Maryville College, and also the trustees of Greenville and Tusculum Colleges. Washington College, while its trustees are not elected by the synod, is a Presbyterian institution. All three of these colleges are located in the mountainous region of East Tennessee. The Northern Presbyterian Church, through its recent union with the Cumberland Presbyterian Church, has also come into possession of Cumberland University in Central Tennessee. The Southern Presbyterian Church has a university in West Tennessee. If all of these institutions are really devoted to higher education, it is evident that one or more of them are superfluous. Throughout the country there are numerous instances of single bodies in one denomination, like the

Northern Presbyterian Synod of Tennessee, having within their own limited area more than one college or university. There is something pathetic in the devotion which is poured into some of these unnecessary colleges. One finds an institution in which the few college students who come are instructed by perhaps a single competent teacher, assisted by professors who are young boys just out of college. The salaries are pitifully small, the "dean" in such a college sometimes receiving not more than \$800 a year and the professors \$50 a month. The small endowment which has been given suffices to keep the institution alive and there is often poured into it a large measure of sincere but misguided devotion, the more to be regretted because the students who come to such an institution can usually

TABLE IX

*Data concerning Partial List of Institutions in which Annual Expenditure for Instructing Salaries Ranges from \$10,000 to \$45,000*

Institution	Total Annual Income	Annual Appropriation for Salaries of Instructing Staff	Average Salary of Professor	Average Age of Entrance to Grade of Professor	Average Salary of Associate Professor	Average Salary of Assistant Professor	Total Number of Students in Institution	Total Instructing Staff in Institution	Ratio	Total Number of Students in College	Total Instructing Staff in College	Ratio
Iowa College.....	\$60,000	\$44,250	\$1,500	33	\$1,000	\$ 950	<sup>21</sup> 553	35	15.8	450	31	14.5
Polytech. Inst., Brooklyn.	59,000	43,150	2,783			1,234				250	40	6.2
University of the South...	60,845	42,836	1,500	35		1,100	<sup>21</sup> 317	34	9.3	119	11	10.8
DePauw University.....	67,000	42,750	2,000			850	<sup>21</sup> 753	35	21.5	548	25	21.9
Pomona College.....	50,000	42,000	1,500			<sup>22</sup> 1,050	<sup>21</sup> 317	31	10.2	267	23	11.6
Lafayette College.....	77,142	40,374	2,000			1,370				442	36	12.2
Bowdoin College.....	72,063	39,550	2,000	30		1,350	394	53	7.4	305	20	15.2
University of Wyoming...	84,299	39,080	1,900	34	1,700	1,500	<sup>21</sup> 222	30	7.4	110	21	5.2
Colorado College.....	<sup>20</sup> 60,000	38,000	1,775			1,056	<sup>21</sup> 607	44	13.7	407	31	13.1
Dickinson College.....	61,748	37,576	1,700	33		<sup>21</sup> 1,200	392	26	15	314	18	17.4
Adelphi College.....	54,000	37,575	2,000			1,400	<sup>21</sup> 463	27	17.1	295	24	12.2
University of Arizona.....	90,000	37,300	1,900			1,200				<sup>21</sup> 63	<sup>23</sup> 7	9
Univ. of South Carolina...	72,857	36,730	2,000		1,500	1,200	<sup>21</sup> 285	29	9.8	191	18	10.6
Cornell College.....	55,436	36,702	1,220	32		<sup>22</sup> 900	<sup>21</sup> 455	39	11.6	395	27	14.6
Woman's Col., Baltimore.	67,151	36,450	1,818	32.5		<sup>22</sup> 1,167				340	28	12.1
Trinity College, Conn.....	43,045	36,250	2,000			1,400				208	22	9.4
Beloit College.....	75,000	35,000	1,600	32		1,200				303	30	10.1
Wash. and Jeff. College...	46,880	34,500	1,823							264	16	16.5
Allegheny College.....	47,000	34,200	1,800	34		1,200				266	19	14
Lawrence University.....	43,000	34,000	1,400	31		950	<sup>21</sup> 493	33	14.9	327	26	12.5
Dalhousie University.....	40,240	33,500	2,300			<sup>22</sup> 1,500	358	48	7.4	266	21	12.6
Trinity College, N. C.....	63,000	33,060	1,850			750	<sup>21</sup> 280	26	10.7	264	23	11.4
Lake Forest College.....	41,165	32,932	1,800	33		1,300				<sup>21</sup> 217	19	11.4
Rand.-Mac. Woman's Col.	<sup>24</sup> 130,713	32,707	1,639	37.5		<sup>25</sup> 1,307	<sup>22</sup> 358					
Hamilton College.....	50,000	32,500	1,800			1,300				178	19	9.3
Rose Polytechnic Institute	43,756	31,600	2,250	37.5	1,800	1,200				229	23	9.9
Colorado School of Mines.	110,000	30,500	2,233			1,550				<sup>22</sup> 294	17	17.2
University of Wooster....	43,057	31,380	1,500	37.5		<sup>21</sup> 1,100	547	34	16	362	28	12.9
University of Montana.....	71,500	30,100	1,800				<sup>22</sup> 247	20	12.3	189	19	9.9
Olivet College.....	46,600	29,200	1,300	35		1,000	<sup>22</sup> 255	29	8.7	211	20	10.5
Albion College.....	37,078	28,775	1,550	30		900	<sup>22</sup> 383	25	16.1	239	17	14
Kenyon College.....	<sup>27</sup> 47,000	<sup>27</sup> 28,500	1,600	32.5						118	15	7.8
College of Wm. and Mary	43,000	28,495	1,800			<sup>21</sup> 1,000						
Mt. St. Mary's College....	50,000	28,000	<sup>28</sup> 1,000			<sup>28</sup> 400						
Bates College.....	39,167	26,500	1,433	32						438	23	19
Wilson College.....	<sup>24</sup> 110,000	26,500	<sup>28</sup> 1,000	32		<sup>28</sup> 900	<sup>22</sup> 344	34	10.1	240	22	10.9
Earlham College.....	58,000	24,000	1,550	30			<sup>22</sup> 380	31	12.2	325	27	12
Wabash College.....	41,608	23,550	1,600			930				<sup>22</sup> 291	17	17.1
Carleton College.....	34,900	23,150	1,400	32		<sup>21</sup> 1,300	<sup>22</sup> 315	20	15.7	281	17	16.5
Colby College.....	56,939	23,033	1,800	32.5		<sup>21</sup> 1,350				<sup>22</sup> 237	15	15.8
Marietta College.....	24,244	22,670	1,433			<sup>21</sup> 1,120	275	21	13	129	16	8
Centre College.....	32,369	21,827	1,600	30						<sup>22</sup> 154	20	7.7
Hobart College.....	37,200	21,657	1,700	35	1,400	1,100				104	16	6.5
Wells College.....	<sup>24</sup> 90,041	21,150	1,600	36.5	1,275	900				169	24	7
Drury College.....	29,000	21,000	1,400			687	<sup>22</sup> 461	21	21.9	269	14	19.2
Coe College.....	23,137	20,989	1,200	30		700				<sup>22</sup> 206	28	7.3
Ripon College.....	47,100	20,900	1,336			800	<sup>22</sup> 201	24	8.3	157	20	7.8

TABLE IX—continued

*Data concerning Partial List of Institutions in which Annual Expenditure for Instructing Salaries Ranges from \$10,000 to \$45,000*

Institution	Total Annual Income	Annual Appropriation for Salaries of Instructing Staff	Average Salary of Professor	Average Age of Entrance to Grade of Professor	Average Salary of Associate Professor	Average Salary of Assistant Professor	Total Number of Students in Institution	Total Instructing Staff in Institution	Ratio	Total Number of Students in College	Total Instructing Staff in College	Ratio
Middlebury College.....	\$28,491	\$20,160	\$1,870	32						<sup>22</sup> 178	11	16.1
Penna. Col. for Women...	41,000	20,000	<sup>23</sup> 900	28						45	10	4.5
Elmira College.....	38,139	18,672	<sup>23</sup> 1,000	30						197	12	16.4
Monmouth College.....	36,967	18,500	1,270	35		\$1,075	<sup>22</sup> 425	25	17	233	18	12.9
Franklin College .....	37,552	15,000	1,350	28			<sup>22</sup> 214	15	14.2	160	13	12.3
Clarkson Me. Sch. of Tech.	24,540	11,950	1,350							<sup>22</sup> 80	11	7.2
Knox College.....	28,012	11,509	1,400	32		1,200	<sup>22</sup> 521	27	19.2	224	19	11.7

<sup>20</sup> Interest at 5 per cent. on \$500,000 additional endowment will be available in 1909.

<sup>21</sup> Entitled "associate professors."

<sup>22</sup> Catalogue for 1906-7.

<sup>23</sup> Exclusively in college.

<sup>24</sup> Including payments of students for board.

<sup>25</sup> Entitled "adjunct professors."

<sup>26</sup> Catalogue does not separate the students in the department of music, of art and of physical culture from the students in the college.

<sup>27</sup> Including Bexley Hall, the theological seminary.

<sup>28</sup> Also board, apartments and laundry.

find much better instruction in near-by colleges, or high schools, where the teaching staff is stronger, the facilities better, and the temptations to low standards are not present. In some parts of the union, colleges which are only high schools are fulfilling a most useful educational function. It might well be considered by these latter colleges, however, whether it would not be better for education in general, and more dignified on their part, for them to discontinue granting the college degrees, and frankly call themselves high schools or academies or junior colleges.

At an early date the foundation hopes to present a thorough study of the institutions of higher learning in several states from the point of view of the area, population, material resources and probable expansion of each state. There are states

whose territory is so great or which are so divided by natural barriers that duplicate institutions may be justified, just as there are states whose citizens are justified in thinking more in terms of the future than of the present. All these things should be taken into account in estimating the field of higher education within a single state.

Occasionally in this paper figures will be given and comparisons made which might be considered to imply criticism of the internal administration of institutions. It must be remembered in this connection that there has been but little study in comparative college economics. It would seem that colleges and universities have managed their finances and drawn up their budgets with slight knowledge of similar problems in other colleges and universities. Data on this subject were not easily

obtainable. But from the data collected it is evident that widely differing systems of administration prevail.

Table II. does not contain the names of all the colleges and universities in the United States and Canada which pay \$45,000 or over in salaries annually to their instructing staffs, because some such institutions did not answer inquiries of the foundation, or return answers in a form available for statistical purposes. The table contains the names of one hundred and three colleges and universities in the United States and Canada which have given specific information that their total payments in instructing salaries exceed \$45,000 annually.<sup>10a</sup>

*THE TEACHING OF MATHEMATICS TO  
ENGINEERING STUDENTS IN  
FOREIGN COUNTRIES<sup>1</sup>*

YOUR committee has asked me to speak of the teaching of mathematics in foreign engineering colleges. My remarks will have reference almost exclusively to the German colleges and schools, partly because I am most familiar with the conditions existing in Germany and partly on account of the rather instructive campaign for reforming the whole teaching of mathematics, recently inaugurated in Germany.

As regards other countries I will only say that the situation in England and Scotland where, during the last quarter of a century, technical education has rapidly developed on quite characteristic and individual lines, deserves careful attention. But I am not sufficiently well acquainted with the facts to discuss this educational movement. In France, it is well known that the theoretical training given to engineers is on a very high level, higher even

<sup>10a</sup> The data for instructors and assistants are not reproduced.—Ed.

<sup>1</sup> Read before Sections A and D, American Association for the Advancement of Science, and the Chicago Section of the American Mathematical Society, Chicago meeting, December 30, 1907.

than in Germany, I believe. Thus, the requirements for admission to the *École Polytechnique*, or even to the *École Centrale*, include in mathematics almost as much as our engineering students get in their college course. On the top of this preparation, the student receives in the *École Polytechnique* an excellent two years' course in higher analysis and theoretical mechanics, and then only is he allowed to enter upon his special technical work. It must also be taken into account that admission to the *École Polytechnique* is by competitive examinations held throughout France, so that this institution, receiving as it does the pick of students from the whole country, can maintain a high level of theoretical excellency. The *École des Ponts et Chaussées* and the *École des Mines* to which the student passes from the *École Polytechnique*, are thus what we might call graduate schools of the highest rank.

Turning now to the German engineering colleges, a comparison with our own best engineering colleges shows apparently but little difference, both as regards requirements for admission and as to the schedule of courses offered in the schools themselves. Nevertheless, I believe that the scientific standard is decidedly higher in the German than in the American engineering college. I am not here concerned with the question whether such a high standard of theoretical knowledge is essential, or even desirable, for the engineer; I merely state the fact. Moreover, it is quite possible that ultimately the average German engineer knows no more mathematics than the average American engineer. All I wish to maintain is that, in my opinion, an able German student, in his *Technische Hochschule*, or engineering university, can gain a more thorough scientific equipment than an equally able American student in his alma mater.