

to ascribe to the velocity of light this unique position. Nature forces us to a conclusion and if this conclusion is incompatible with our preconceived opinions, it is the opinions that must be changed.

Not many years ago, it was supposed to be possible to increase both heat and cold without limit, but we no longer hope to attain any temperature below  $-273^{\circ}\text{C}$ . To cool any body to the absolute zero would require an infinite amount of work. Now we find likewise that it would take infinite work to bring any body to the velocity of light, and just as  $-273^{\circ}\text{C}$ . became recognized first as the lowest possible temperature, then as the lowest conceivable temperature, so we must not only regard  $3 \times 10^{10}$  centimeters per second as the highest possible velocity, but we must so change our present ideas that this shall be the *highest conceivable velocity* in a material system.

In closing I should like to modify one of the statements in my previous paper. It was there intimated that the equations of non-Newtonian mechanics offered a means of determining absolute motion through space. In a recent paper by Mr. Tolman and myself<sup>3</sup> it is shown, on the other hand, that these equations maintain their full validity no matter what point is arbitrarily chosen as a point of rest.

GILBERT N. LEWIS

RESEARCH LABORATORY OF  
PHYSICAL CHEMISTRY,  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY,  
June 19, 1909

#### SOME TRENDS IN HIGHER EDUCATION

TO THE EDITOR OF SCIENCE: I was very much interested in the article by Mr. Marx entitled "Some Trends in Higher Education," which appeared in the issue of SCIENCE of May 14. While I believe that such investigations are of value, it seems to me that this article and others of a like nature, which have been appearing recently, show the need for more accurate and reliable statistics relating to higher education. In the great majority of cases the writers have all too often been inti-

<sup>3</sup>"The Principle of Relativity and Non-Newtonian Mechanics," *Proc. Amer. Acad.*, June, 1909.

mately acquainted with only one institution. They have realized that in the case of this institution, well known to them, allowance had to be made for the published statistics, but they have not shown equal generosity to those institutions concerning which they knew little or nothing, and have accepted all statistics at face value. All persons connected with universities know very well, for example, how little trust is to be placed in the average comparative tables regarding the total number of students at the various institutions of learning. Nearly every larger university, by means of due selection and suppression, has made out a good case at one time or another in the attempt to show that it is the largest university in this country. These methods savor very much of some of the advertising indulged in by insurance companies, but universities and those writing about them ought to have a somewhat more scientific standard.

Mr. Marx's article is not devoid of many of the faults to which I have alluded. To cite just one instance: take, for example, the last column of table 4 on page 784. This table is supposed to give the average salary per member of the instruction staff, but surely no one having an intelligent knowledge of higher education in America can suppose that the *average* salary per year at Johns Hopkins is \$1,226, or at Northwestern \$835, or at Minnesota \$867, or at Toronto \$881.

It is not surprising to find the most erroneous conceptions prevailing about the administration of our universities, when even a responsible paper like SCIENCE publishes figures such as these noted without further explanation. Such looseness of statement does great injustice to many an institution. In the College of Liberal Arts at Northwestern University, where the salaries average lower than they do in the professional schools of the same institution, the instruction staff consists of fifty-nine persons. Their salaries for the year 1909-10 will amount to \$117,450. This is an average annual salary of almost \$2,000 per individual. It is a fact that no teacher in the university, who is paid at all, receives for a year's work so small a sum as \$835. The low-

est salaries paid are, I believe, \$900 to one man, and \$1,000 to several others.

How then could such an average as \$835 be obtained at all? The explanation is simple. Northwestern University Medical School, by reason of its situation in the city of Chicago and in a section of the city where clinical material is very abundant, has a very large attendance, and the number of clinical professors, instructors, etc., is correspondingly large. According to what is almost the unbroken custom in this country, clinical instructors serve without pay, but since their income is not derived from the university at all, to count them in in computing an average salary is certainly a grave error.

I could show, I think, without much difficulty, that the statistics given for Harvard and several other of the institutions mentioned in the article in question are also entirely misleading without such explanations as Mr. Marx has seen proper to give in the case of the institution with which he happens to be connected.

In closing may I also protest against the slurring remark made about Temple College on page 784? I have never been connected in any shape, form or manner with this institution, nor have I had any friend who has been in attendance there. Still, I feel that it is no more than fair to inform Mr. Marx that this institution, situated in Philadelphia, is doing a very worthy work and certainly ought not to be referred to in the manner in which it was in the article in question.

WALTER LICHTENSTEIN

NORTHWESTERN UNIVERSITY LIBRARY

TO THE EDITOR OF SCIENCE: I have read Mr. Lichtenstein's letter with much interest and am grateful for the opportunity you so kindly offer me to comment on it. While my first feeling is that your correspondent's letter answers itself, the casual reader might draw the inference from silence on my part that the criticisms offered are sound and unanswerable.

The letter says: "Mr. Marx's article is not devoid of many of the faults to which I have

alluded." Let us see what these enumerated faults are:

1. "This article and others of a like nature, which have been appearing recently, show the need for more accurate and reliable statistics relating to higher education." True. The writer would call attention to statements to this effect on page 783, column two, paragraph two; the last paragraph of page 784; and the latter part of column one and top of column two, page 787, of the original article.

If, however, the inference is meant to be drawn that the writer's data are inaccurate, he must beg for more specific criticism as he is prepared to demonstrate the indubitable authenticity of his data. To give the entire tabular data on which the charts are based and the authority for each item would require nearly as much space, however, as the original paper occupied. The sources include long series of annual catalogues, reports of presidents and treasurers, as well as personal communications from administrative officers. The same mail which brought the letter of your correspondent this morning, also brought one from the president of one of the large universities, who has known of this investigation for a year and a half and to whom the writer is indebted for valuable data, containing these words:

Unfortunately a great majority of the articles on education are full of generalities based upon no special investigation, which really give no help to any one. In contrast with this you have carried on a very important comparative investigation in reference to facts as to actual tendencies.

Quotations in the same vein might be made from half a hundred letters received from similar authoritative sources. The men best acquainted with the facts best recognize the authenticity of the data compiled by the writer.

2. "In the great majority of the cases the writers have all too often been intimately acquainted with only one institution."

Is this one of the faults laid at Mr. Marx's door? If so, on what knowledge of facts is it based? The writer had the honor of contributing to the discussion of "The Condi-

tion and Needs of the University of California,"<sup>1</sup> and of preparing the "Report of the Committee on Salaries at Cornell."<sup>2</sup> These papers his critic may have seen, but what can he know of the writer's mass of correspondence and unpublished data, or of the duration and extent of his investigations?

3. "They have realized that in the case of this institution, well known to them, allowance had to be made for the published statistics, but they have not shown equal generosity to those institutions concerning which they knew little or nothing, and have accepted all statistics at face value." This broad charge very obviously refers to the writer's footnotes on page 784; but by what stretch of the imagination can these be interpreted as showing "generosity" to the institution he serves—figures which reduce the salary expenditure per student from \$219 to \$176.51, and the salary average from \$2,500 to \$1,500? These were obvious notes from other published data and the references were given.

4. "All persons connected with universities know very well for example, how little trust is to be placed in the average comparative tables regarding the total number of students at the various institutions of learning. Nearly every large university, by means of due selection and suppression, has made out a good case at one time or another in the attempt to show that it is the largest university in this country. These methods savor very much of some of the advertising indulged in by insurance companies, but universities and those writing about them ought to have a somewhat more scientific standard." So? Our critic "has a good eye. He can see a church by daylight." Specifically this can only refer to Table 4, page 784, a table compiled from data furnished, it is to be presumed, by the institutions themselves to the Carnegie Foundation and in the construction of which the writer's part was purely mechanical—dividing figures in one column by

figures in another. He didn't even use his head for the purpose—he did it with a slide-rule. If the results of these divisions are not exactly what had been foreseen by those who furnished the data, the blame must not fall on the writer. If there is fraud by all means let it be weeded out. The plain truth is what we are after. If "such looseness of statement does great injustice to many an institution," *whose looseness of statement is it?* If "no one having an intelligent knowledge of higher education in America can suppose that the *average* salary per year at Johns Hopkins is \$1,226, or at Northwestern \$835, or at Minnesota \$867, or at Toronto \$881," then that person, if of average intelligence, must infer that the figures furnished by these institutions to the Carnegie Foundation lacked that element of accuracy and coherence which one might have a right to expect in data emanating from such sources.

Your correspondent intimates that he could show the Harvard statistics to be entirely misleading. In this case the sources of my data are so readily accessible to all that I will give them:

Chart 3. Data 1880–1904, President Eliot's Annual Report, 1904–5, p. 15. Additional points for 1876, 1905 and 1906 from catalogues.

Chart 8. Same report, pp. 18–19.

Chart 13. Same report, p. 15.

Charts 22 and 27. Data for 1904, same report, p. 345. (The average salary is there given as \$1,570.) Data for 1907, Carnegie Foundation Bulletin No. 2, pp. 10–11. The only other Harvard statistics in the article are those of Table 4, p. 784, also from the Carnegie Bulletin, No. 2, pp. 10–11.

Where are these items at fault?

But this letter grows too long. Mr. Lichtenstein says the average salary computed for Northwestern is wrong because it includes men who get *nothing at all* for their services. Under the circumstances the argument is naïve. It reminds one of Sheridan's consoling remark to his very stout but rueful adversary in a duel: "To even things up we will draw two chalk-lines down you and

<sup>1</sup> *Trans. Commonwealth Club of Cal.*, October, 1907.

<sup>2</sup> *Cornell Alumni News*, May 6, 1908.

all my shots which hit outside them we sha'n't count." If we eliminate those who teach for nothing at all, why not disregard those who get less than a specified sum, say \$1,500? It would make a still more favorable showing for the average. The writer must confess inability to follow his critic's logic in this.

The writer has no prejudice against Temple College. It may be doing the worthy work your correspondent vouches for. The writer's passing curiosity was aroused by the fact that it appears to provide for the needs of 2,343 students, and a teaching staff of 198, out of an entire annual expenditure of \$72,895, and so he gave voice to it. When all the facts are known, it is quite possible that this institution may be found to have sounder standards than many another guilty of extravagant and ostentatious expenditures. The more light we can get on these points the better.

After all, your correspondent and the writer don't disagree on the main point at issue, namely, that honest and reliable statistics are vitally necessary. Only, the writer was laboring under the impression that, so far as concerned data not previously common property, he was supplying to a slight extent just that kind of accurate material. Assuredly he has made effort enough to have it so; his conscience acquits him on that score. And it will take rather more convincing proof than that offered by this correspondent to shake his faith in its value. GUIDO H. MARX

#### WARNING TO ZOOLOGISTS AND OTHERS

ZOOLOGISTS and geologists generally are warned that a clever swindler is making a canvass of the zoologists of New York, seeking money under false pretenses. He operates by claiming to be the "nephew" of some well-known scientist who is a personal friend of the intended victim; and the skill and thoroughness with which he prepares each case is fairly amazing. He knows thoroughly the scientific men of Washington, and especially those of the National Museum and the Cosmos Club.

In person he is tall (about 5 feet 10 inches), neatly and cleanly dressed, smoothly shaven

and weighs about 170 pounds. He can instantly be recognized by his broad, flat face, small shifty eyes set widely apart, wide mouth, flabby lips and a long conspicuous row of upper teeth, all of them very evenly discolored by tobacco. When attempting to work his game, he laughs nervously fully half the time that he is talking.

If any intended victim of this man will hand him over to a policeman, I will very willingly arrange for witnesses to appear against him, for the purpose of landing him where he belongs. W. T. HORNADAY

NEW YORK ZOOLOGICAL PARK,  
July 8, 1909

WE have also received the following statement from the secretary of the Smithsonian Institution: A man familiar with scientific men of Washington and New York, claiming to be a nephew of the secretary of the Smithsonian Institution, has recently been securing money as a personal loan from friends of the secretary upon false pretenses. The secretary has no such nephew; the man is a swindler. He may be described as follows: Tall and large, weight about 165 pounds; Eskimo-like face, smoothly shaven; mouth, wide; lips, flabby; long conspicuous row of upper teeth evenly discolored by tobacco; age about 35; carries head inclined to the right; laughs almost constantly while talking.

#### SCIENTIFIC BOOKS

*Ethics.* By JOHN DEWEY and JAMES H. TUFTS. New York, Henry Holt and Co. Pp. xiii + 618.

Characteristic phases of ethical study during the last twenty-five years are the interest shown in the history of morality and the attention given to social, economic and political questions. The works of Letourneau, Sutherland, Westermarck and Hobhouse are able examples of the fruitfulness of the genetic method in ethical science, while the books of Wundt, Paulsen and Bergemann combine with the historical and theoretical treatment a discussion of the larger social problems that are agitating the civilized peoples of to-day.