responding figures for October 25, 1897, are also given:

	1887	1898
Literary department	1276	1254
Engineering department	269	245
Medical department	425	407
Law department	710	713
Dental department	218	230
Homœopathic department	59	60
Pharmaceutical department	76	73
	3033	2982

THE attendance in Oberlin College shows a falling off of nearly one hundred, the figures to date being 1,040 as compared to 1,135 last year. The increase in tuition may account for part of the loss. Tuition now is placed at $75.00 per year.

DR. JOHN GUITERAS, professor of pathology in the University of Pennsylvania, will resign at the close of the present year to accept the chair of the practice of medicine at the University of Havana. Dr. Guiteras has been greatly interested in the liberation of Cuba and wishes to build up the medical courses in the University of Havana.

C. E. MENDENHALL, PH.D. (Johns Hopkins), has been appointed instructor in physics in Williams College. Dr. J. C. Hardy has been appointed instructor in mathematics in the same institution.

THOS. CLARKE, B. S. (University of N. C., '96), Ph.D. (Bonn, '98), has been appointed assistant in chemistry at the University of North Carolina.

AMONG foreign appointments we note that Dr. Frentzel has been promoted to a professorship in the Agricultural College at Berlin and Professor Wälsch to a professorship of mathematics in the Technical Institute at Brünn. Dr. H. E. Ziegler, of Freiburg, i.B., has been appointed successor of Professor Kückenthals, 'Ritter' professor of phylogeny in the University at Jena; Dr. E. Reinbach, of Berlin, professor in the Chemical Institute at Bonn, and Dr. Fenner, of Aix, professor of geodesy in the Technical Institute at Darmstadt. At Vienna, Dr. Zukal has been made professor of phytopathology in the Agricultural College, and Dr. Ritter Lorenz V. Liburnau has qualified as docent in zoology; in the University Dr. Werner has qualified as docent in zoology, and Dr. Reithoffer in technical electricity.

DISCUSSION AND CORRESPONDENCE.

MEASUREMENTS OF PRECISION.

AN article in the *Physical Review*, September–October, 1898, by S. N. Taylor, should not be overlooked by those who are interested in knowing the degree of precision which may be reached in linear and other measurements.

The paper itself should be consulted, but a few of Mr. Taylor's most remarkable accomplishments may be mentioned here. It comes in his way to measure several diameters of a coil of wire, consisting of fifteen layers, with fifteen turns in each layer, the mean diameter of the coil being about 20 cm., and the wire being *No. 18, copper, double-silk insulated, passing through a bath of hot paraffine during the process of winding.*

It is wound upon a cup-shaped cylinder of plaster of Paris, which was soaked in a mixture of linseed oil and liquid dryer sometime before its use. Mr. Taylor tabulates his measurements of these diameters, each layer, as it is wound on, in figures carried to *thousandths and ten thousandths of a millimeter*, thus implying that his measures are made to one part in two millions.

They are made, he says, by means of a cathetometer, before which the coil is mounted on an axis, that it may be turned into six different positions. Unfortunately, he does not say how far the coil was from the cathetometer, or give the name of the maker of an instrument of a type so extraordinary as to justify these figures on the diameters of a wire coil. Still more unfortunately, he fails to give the results of several independent measurements in each position. which he says were taken.

A thousandth of a millimeter is always worth struggling for, and, as a variation of a single degree in the temperature of his cathetometer bar would probably change its length by 15 or 20 of them, it is to be inferred that highly perfected methods of determining that temperature were used, although the author is also silent on that point. The level on the cathetometer

telescope must have been an uncommonly sensitive and well-behaved attachment, the name of the maker of which should not be concealed. It cannot be that these measurements are in any degree doubtful, for, otherwise, Mr. Taylor would hardly use them, as he has, in computing the constant of his instrument, in which operation he carries results to eight significant figures, the unit of the last place in his final mean standing for about *one part in thirty millions*. A 'sudden drop' is experienced, however, in the very next paragraph, where he says that the same calculation has been made by other people and by a different method, resulting in a quantity differing from the former by about one part in five or six hundred, and which he proceeds to use instead of the result of his own labors.

But it is not in linear measurement alone that marvelous skill is shown in this piece of work. There is weighing which must also excite admiration. A movable coil of the same kind of wire, which must have weighed not much less than a kilogram, was suspended from the arm of a balance; and the 'pull' on this coil, amounting, it is inferred from the tables, to about 23 grams in one case and about 45 grams in another, was weighed to within one-tenth of a milligram. This, of itself, is not, perhaps, remarkable, but it becomes so when it is remembered that this coil is anchored to solid ground by two thin slips of 'crimped' sheet copper, 7 mm. in width. The getting of a tenth of a milligram under such conditions implies rare skill. But the reader is again doomed to bitter disappointment when he is informed that the result of all this exquisite work is to give a value for the E. M. F. of a Clark cell differing from all of the many good determinations that have been made before by more than one part in two hundred and fifty or nearly one-half of one per cent., and that the author himself concludes that, as absolute measurements, his results 'don't count.'

'Figuratively speaking,' Mr. Taylor's paper is, or ought to be, almost unique, but it is only justice to him to add that it really contains much that is interesting and valuable from points of view other than that of metrology.

X.

LIFE-ZONES IN NEW MEXICO.

A NEW bulletin by Dr. C. H. Merriam has just come to hand from the Department of Agriculture, entitled 'Life-Zones and Crop-Zones.' It contains a colored map showing the zones, and a great deal of valuable information about the agricultural products of each zone. On p. 13 it is stated:

"The colored maps prepared by the Biological Survey furnish the first rational basis the American farmer and fruit grower has ever had for the intelligent distribution of seeds and the only reliable guide he can find in ascertaining beforehand what crops and fruits are likely to prove successful on his own farm, wherever it may be located."

On p. 7 it is stated that "great care has been taken to make the lists accurate and trustworthy *as far as they go*." Also, "the intention in the present report is to omit doubtful records."

On p. 42 we find these words: "Raisins and wine grapes, oranges, lemons, olives, prunes, peaches, apricots, English walnuts and almonds are among the important products of the Lower Sonoran area, and the fig ripens several crops each year." Immediately following is a list of the crops of the Lower Sonoran, including even guavas and the loquat, among a variety of other things.

On p. 41 it is said that the Lower Sonoran "sends an arm northwest to a point a little north of Albuquerque, New Mexico. Another arm reaches up the valley of the Pecos." The map shows these arms, the Pecos valley one going about to Eddy. These arms are colored as typical Lower Sonoran, and no word appears in the text to suggest otherwise.

On pp. 15–17 the special value of these arms is insisted upon, because "by growing particular crops at points remote from the usual sources of supply, and at the same time conveniently near a market, the cost of transportation is greatly reduced and the profit correspondingly increased."

After all this, the reader will be surprised to learn that heavy frosts occur annually in the supposed Lower Sonoran arms in New Mexico, and that the cultivation of oranges, lemons or olives is totally out of the question anywhere within the bounds of the Territory. The fig,