serve to show is the case, then what of it from the university standpoint? No one would question that many government publications are abundantly worthy of the honor, but consider first the usually composite authorship which makes it exceedingly difficult to attribute to any single individual his due share of the work or to stamp it in any sense as research on his part; add to this the full financial and legal responsibility of the particular government bureau for the character and scope of this piece of investigation. Consider further the absolute lack of control on the part of the university over the correctness of the results reached, together with the omission of even its name from the text of the paper, and it is hard to say wherein this procedure differs from granting the degree purely *honoris causa*. After all, there are many men in actual work to-day who achieve results which *per se* would warrant granting them a doctorate. The best elements in university circles unite in agreeing that such a practise is dangerous, subversive of the best interests of graduate work and tending to break down the real university which we are now striving to build up in this country. This new tendency is equally disastrous and if seen in its true light is only another form of the ancient error against which university men should be on their guard. X.

AN INTERMITTENT FLOWING WELL.

Some months ago the city of Albany, Georgia, in order to get rid of an objectionable pond of water in the suburbs, attempted to drain it off underground by boring a well to a cavernous limestone, ninety or one hundred feet below the surface, when this rather singular phenomenon was discovered. Mr. Charles Tift, former city engineer, and a very accurate observer, gives the following description of the well:

A low place in the city requiring drainage and there being no natural outlet, it was decided to bore an eight-inch well to the cavernous limestone, by which method other ponds in the city had been drained. This special pond covered an area of about one half of an acre, the water having an average depth of eighteen inches. The well was bored at the edge of the pond, a small dam having been previously made to keep back the water. At the depth of ninety feet, the drill dropped some six or eight feet into a cavity. The drill was then withdrawn and the dam removed. The water at once began to run very rapidly into the well, not completely filling the bore hole, however. In six and one half minutes the well filled and the water began to bubble and almost immediately thereafter the entire column of water was ejected with considerable violence to an estimated height of about thirty feet. When the ejecting force spent itself, the water again commenced to flow into the well, and the same phenomenon was again repeated.

For about an hour the ejections continued, but with gradually decreasing violence and at longer intervals, but ceased entirely only when the static head of the water in the pond became greatly reduced. This well is said to repeat its geyser-like action whenever a heavy rainfall fills the pond.

S. W. McCallie.
Georgia School of Technology, Atlanta.

'THE WIRELESS TELEGRAPH AND AURORA.'

Some time ago I conceived the idea that the wireless telegraph might give assistance in unravelling the mystery of the aurora. The result was not exactly what I expected, and at the present time seems to add more complication to what was already complicated.

I have a record of observation by the wire on six nights during the last year, grouped in three, one and two, respectively, giving what are known as 'freak distances,' during spells of aurora, or the brilliant clear weather associated with aurora. During these three periods we received signals and read messages over abnormal ranges of 700 to 1,600 miles with an apparatus that ordinarily will not operate over more than 250 miles.

The apparatus could receive, but not send, and directly the aurora ceased or diminished, in at least four cases, the long distance messages also ceased to reach our wire.

My facilities are woefully inadequate, and I hope some weather service station with

wireless equipment, or one of the several wireless telegraph companies will take the matter up; for although it may not lead to a better understanding of aurora, it might help to the understanding of 'freak distances' over the wire.

C. J. STUART.

MONTREAL, October 29, 1906.

THE GLACIAL EPOCH.

TO THE EDITOR OF SCIENCE: While I much regret having overlooked the references to which Professor Chamberlin calls attention in the first few lines of his communication to SCIENCE (October 26, page 531), his further remarks (tending to demonstrate that Dr. Manson's theory is untenable), when considered in connection with the equally modern and equally reliable views of Professor E. W. Hilgard (as expressed in the last paragraph of his paper quoted on page 440 of this journal) afford an instructive illustration of how difficult it is, even for an able and conscientious investigator, to avoid dogmatism in science.

J. M. SCHAEBERLE.

ANN ARBOR,
October 29, 1906.

SPECIAL ARTICLES.

VARIATION IN PARTHENOGENETIC INSECTS.

IF, as the Neo-Darwinians claim, amphimixis is the principal cause of variation (of the continuous or fluctuating sort taken by Darwin and Weismann to be the material used by natural selection for species-building), it would seem to follow that much less variation, of this type, should occur among parthenogenetically produced individuals than occurs among individuals of bi-sexual parentage. The Neo-Darwinians explain variation as a product of sex and sex as a product of the necessity for variation.

The variation of bisexually produced individuals is proved by limitless miscellaneous observation and the more recent better compiled and expressed work of biometricians. But data and facts concerning the variation in parthenogenetically produced individuals are not so readily accessible. In the following paragraphs will be found a summary statement of the results of certain observations made by several assistants[1] and myself, on the variation exhibited in certain series of parthenogenetically produced insect individuals.

It is obvious that a comparison of the variation in agamically produced individuals with that of those of bi-sexual parentage *in the same species* would be particularly pertinent. And this we have been able to make in the case of the honey-bee. The variation[2] of various wing characters (dimensions of wings and vein-parts, modification of venation, number of costal hooks of hind-wing, etc.) has been studied in series of drones (parthenogenetically produced individuals) from queen-laid eggs (and also in series from worker-laid (!) eggs) and in series of workers, which are of bi-sexual parentage. Among these series are some (both of drones and of workers) in which the individuals were taken directly from the brood-cells (just as they were ready to issue) and hence before their exposure to any intraspecific (individual) selection on a basis of their adult characters (among which are all wing characters), and other series made up of actively flying, *i. e.*, exposed individuals. There are also series of drones hatched from worker-laid eggs and reared in worker cells (instead of in the usual larger drone cells), the variation in these series having a special interest because of the possibility of its modification by the extrinsic factor, size of cell. In addition to the bee series the variation in wing characters in a series of parthenogenetically produced female plant-lice (Aphididæ) has been studied. The studies are all statistical and quantitative and have been compiled, tabulated and summarized according to the now fairly familiar methods of biometric variation study. In this note only the baldest statement of results can be made, and their presumable significance suggested.

Variation in drone (parthenogenetically produced) and worker honey-bees (of bi-

[1] R. G. Bell, B. E. Wiltz, A. Wellman and F. Yantis.

[2] Some of these data of variation in the honey-bee have already been published by Kellogg and Bell, 'Studies of Variation in Insects,' *Proc. Wash. Acad. Sci.*, Vol. 6, pp. 203–332, 1904.