NOTES AND NEWS.

J. McKeen Catttell, M.A., Ph.D., Professor of Experimental Psychology in Columbia College, has in preparation a work entitled "A Course in Experimental Psychology." Laboratory instruction in experimental psychology is now given in the leading universities of America, Great Britain, Germany, and France, but owing to the recent introduction of the subject, there is no text-book. A laboratory handbook on the lines which have been proved useful in physical and biological science will make instruction easier for the teacher and more profitable for the student, and will permit the introduction of the subject in colleges where it could not otherwise be taught. It is to be published by Macmillan & Co.

—Probably no American vegetable product is appeciated less than the commonest and most useful of all, namely, our maize or Indian corn, which Dr. John W. Harshberger, of the University of Pennsylvania, has made his especial study for the past three years. His results have just appeared in an attractive volume which forms the second number of the contributions from the Botanical Laboratory of the University. Its botanical side is now more valuable than its study of the history of the plant and its economic importance. Dr. Harshberger has carefully exhausted the field of philology, archæology, and history in his investigation into the origin of the plant, which has hitherto been so uncertain. His conclusion, based upon a series of well-represented convergences, is that the plant originated in Central Mexico, between the 22nd parallel and the river Coatzocoalcos, and was first cultivated by the Nayas. From them it was spread southward along the entire west coast of South America, and northward over the great territory where it is now found. Light was thrown on this research by botany and meteorology, a very primitive form of maize having been found in 1890 in Mexico, which has afforded many points in the evolutionary history of the plant. Probably no part of the work would attract more attention from the average reader than the table of the principal products of the maize plant, ranging from whiskey to soap, and from paper to baskets. Improved machinery is making it possible to use every part of the plant, and its utility, as exhibited by Dr. Harshberger, is quite surprising. The economic portion of the work is a careful review of the conditions determining the agricultural prosperity of the nation, and an appeal for a wider cultivation of maize in the districts for which it is best fitted. The work is accompanied by several excellent maps and botanical charts, and has been recognized already in scientific circles as an important addition to our knowledge of American plants.

—The first volume of the new series of the catalogue of scientific papers published by the Royal Society of London is now ready. Vols. I to VI form the first series and cover the years 1800–1863, while the second series is from 1864 to 1873. Vol. IX commences the third series, which comprises the titles of papers published or read during the decade 1874–1883. They have been compiled on the same plan as the second series, and in like manner include a certain number of titles which were omitted in former volumes. The numbering of the titles of the papers of each author whose name does not now appear for the first time is consecutive with that in former volumes. The list by no means comprises the whole of the scientific periodicals, which at the present day are being constantly published in various languages, but a supplementary volume will probably be issued, in which will be catalogued all the most important papers that have appeared from 1800 to 1883 in periodicals not hitherto indexed. Vols. X and XI, completing the third series, are already in press.

—Richard L. Lull has been appointed assistant professor of zoölogy at the Massachusettes Agricultural College. Since his graduation from Rutgers Professor Lull has been in the employ of the Entomological Division of the United States Department of Agriculture at Washington, and has done special work in Maryland.

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TO EXCHANGE.—Works on entomology, botany and palaeontology for works on Indians and archæology. H. Justin Roddy, Millersville, Pa.

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DOUBLE honor graduate in Science and Philosophy desires any suitable work in science, of the nature of [illegible]. Address, E. A. Beckett, Trinity College, Toronto, Ontario.

WANTED.—Theory of the Earth, by Hutton. Principles of Geology, by Lyell. Manual of Geology, by Phillips. Lehrbuch der Geolgie und Petrefacenkunde, by Carl Vogt. Etudes sur le Métamorphisme, by Daubrée.

WANTED.—Second-hand books on osteology, embryology, and comparative anatomy. Send list, stating condition and cash price. Can offer a few good sets of birds' eggs if desired. R. C. McGregor, Palo Alto, California.

WANTED.—A copy of Chapman's Flora of the Southern United States. I have on hand for sale or exchange sets of the lichens of this vicinity. List furnished on application. Address, C. F. Maxwell, Box 127, Dublin, Tex.

WANTED.—Addresses of persons interested in archæology. Copies of the new archæologic journal in exchange for lists of collectors. A collection of 10,000 valuable objects, the results of my nine years' exploration in the Mississippi Valley, for sale. Price, $7,650. Warren K. Moorehead, Waterloo, Indiana.

WANTED.—Vol. Birds of the Standard or Riverside Nat. Hist. Preferred in parts. F. A. Lucas, U. S. National Museum, Washington, D. C.

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What is the Problem?
IN seeking a means of protection from lightning-discharges, we have in view two objects,—the one the prevention of damage to buildings, and the other the prevention of injury to life. In order to destroy a building in whole or in part, it is necessary that work should be done; that is, as physicists express it, energy is required. Just before the lightning-discharge takes place, the energy capable of doing the damage which we seek to prevent exists in the column of air extending from the cloud to the earth in some form that makes it capable of appearing as what we call electricity. We will therefore call it electrical energy. What this electrical energy is, it is not necessary for us to consider in this place; but that it exists there can be no doubt, as it manifests itself in the destruction of buildings. The problem that we have to deal with, therefore, is the conversion of this energy into some other form, and the accomplishment of this in such a way as shall result in the least injury to property and life.

Why Have the Old Rods Failed?
When lightning-rods were first proposed, the science of energetics was entirely undeveloped; that is to say, in the middle of the last century scientific men had not come to recognize the fact that the different forms of energy—heat, electricity, mechanical power, etc.—were convertible one into the other, and that each could produce just so much of each of the other forms, and no more. The doctrine of the conservation and correlation of energy was first clearly worked out in the early part of this century. There were, however, some facts known in regard to electricity a hundred and forty years ago; and among these were the attracting power of points for an electric spark, and the conducting power of metals. Lightning-rods were therefore introduced with the idea that the electricity existing in the lightning-discharge could be conveyed around the building which it was proposed to protect, and that the building would thus be saved.
The question as to dissipation of the energy involved was entirely ignored, naturally; and from that time to this, in spite of the best endeavors of those interested, lightning-rods constructed in accordance with Franklin's principle have not furnished satisfactory protection. The reason for this is apparent when it is considered that the electrical energy existing in the atmosphere before the discharge, or, more exactly, in the column of dielectric from the cloud to the earth, above referred to, reaches its maximum value on the surface of the conductors that chance to be within the column of dielectric; so that the greatest display of energy will be on the surface of the very lightning-rods that were meant to protect, and damage results, as so often proves to be the case.
It will be understood, of course, that this display of energy on the surface of the old lightning-rods is aided by their being more or less insulated from the earth, but in any event the very existence of such a mass of metal as an old lightning-rod can only tend to produce a disastrous dissipation of electrical energy upon its surface,—"to draw the lightning," as it is so commonly put.

Is there a Better Means of Protection?
Having cleared our minds, therefore, of any idea of conducting electricity, and keeping clearly in view the fact that in providing protection against lightning we must furnish some means by which the electrical energy may be harmlessly dissipated, the question arises, "Can an improved form be given to the rod so that it shall aid in this dissipation?"
As the electrical energy involved manifests itself on the surface of conductors, the improved rod should be metallic; but, instead of making a large rod, suppose that we make it comparatively small in size, so that the total amount of metal running from the top of the house to some point a little below the foundations shall not exceed one pound. Suppose, again, that we introduce numerous insulating joints in this rod. We shall then have a rod that experience shows will be readily destroyed—will be readily dissipated—when a discharge takes place; and it will be evident, that, so far as the electrical energy is consumed in doing this, there will be the less to do other damage.
The only point that remains to be proved as to the utility of such a rod is to show that the dissipation of such a conductor does not tend to injure other bodies in its immediate vicinity. On this point I can only say that I have found no case where such a conductor (for instance, a bell wire) has been dissipated, even if resting against a plastered wall, where there has been any material damage done to surrounding objects.
Of course, it is readily understood that such an explosion cannot take place in a confined space without the rupture of the walls (the wire cannot be boarded over); but in every case that I have found recorded this dissipation takes place just as gunpowder burns when spread on a board. The objects against which the conductor rests may be stained, but they are not shattered.
I would therefore make clear this distinction between the action of electrical energy when dissipated on the surface of a large conductor and when dissipated on the surface of a comparatively small or easily dissipated conductor. When dissipated on the surface of a large conductor,—a conductor so strong as to resist the explosive effect,—damage results to objects around. When dissipated on the surface of a small conductor, the conductor goes, but the other objects around are saved.

A Typical Case of the Action of a Small Conductor.
Franklin, in a letter to Collinson read before the London Royal Society, Dec. 18, 1755, describing the partial destruction by lightning of a church-tower at Newbury, Mass., wrote, "Near the bell was fixed an iron hammer to strike the hours; and from the tail of the hammer a wire went down through a small gimlet-hole in the floor that the bell stood upon, and through a second floor in like manner; then horizontally under and near the plastered ceiling of that second floor, till it came near a plastered wall; then down by the side of that wall to a clock, which stood about twenty feet below the bell. The wire was not bigger than a common knitting needle. The spire was split all to pieces by the lightning, and the parts flung in all directions over the square in which the church stood, so that nothing remained above the bell. The lightning passed between the hammer and the clock in the above-mentioned wire, without hurting either of the floors, or having any effect upon them (except making the gimlet-holes, through which the wire passed, a little bigger), and without hurting the plastered wall, or any part of the building, so far as the aforesaid wire and the pendulum-wire of the clock extended; which latter wire was about the thickness of a goose-quill. From the end of the pendulum, down quite to the ground, the building was exceedingly rent and damaged. . . . No part of the aforementioned long, small wire, between the clock and the hammer, could be found, except about two inches that hung to the tail of the hammer, and about as much that was fastened to the clock; the rest being exploded, and its particles dissipated in smoke and air, as gunpowder is by common fire, and had only left a black smutty track on the plastering, three or four inches broad, darkest in the middle, and fainter towards the edges, all along the ceiling, under which it passed, and down the wall."
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