short winter day, upon 300 or 400 acres of wheat and beet fields within half an hour's drive of Frankfort, from 400 to 500 hares. As they average in winter about eight pounds in weight, the result of such a day's shooting would be nearly or quite two tons of game, — a quantity which it would be, of course, impossible to dispose of otherwise than by sale. Game killed in such quantities must either be sold or wasted; and in this country, where waste is considered sinful, the hares or deer or partridges, as the case may be, are turned over to the game-dealer, who during the season loads daily a special car for the Paris market. The game-dealer pays from fifty to seventy-five cents each for hares in Germany: they retail for from five to seven francs in Paris. The French capital pays yearly millions of francs for game brought from beyond the Rhine. By the sale of his game, the lessee of shooting-grounds recoups, more or less fully, his expenditures for rent and keepers, and the money goes finally to the peasant or landed proprietor upon whose premises it was grown. From the beginning of the hunting season until the end of December, 1890, there have been killed in Prussia alone, according to official statistics, 2,500,000 hares, which, at 2.50 marks each, the usual wholesale price, represent an income of 6,250,000 marks, or nearly $1,500,000.

The invitations which are exchanged between sportsmen to make up the number of guns requisite for a drive-hunt constitute an important form of social courtesy in Germany. The entertainment always includes a mid-day breakfast, more or less luxuriantly served at the tavern in the nearest village or upon tables spread in the woods by servants, who bring warm dishes, wines, etc., from the home of the host in the city.

Such, in substance, is the German system. Could it be introduced successfully and profitably in the United States, and, if so, would such introduction prove desirable? Competent judges who have given the subject careful thought answer both these questions in the affirmative, and say that the game-laws of several Northern and Eastern States are already adequate to render the raising of game in the woods and fields of ordinary farms sufficiently secure to insure a successful result. A system which would add an additional crop to the farmer's fields and forests, and thereby increase substantially his cash income from his land, would certainly not lack support from the agricultural majority which controls most State legislatures.

There are, of course, many questions of detail which such an experiment would involve, and into which it is impossible at present to enter; but, after all that has been so successfully done in our country to restock the inland lakes and streams with fish, there ought to be some way of restoring in a measure the game birds and animals which were formerly so abundant, and which have become, through indiscriminate shooting, so rare to the sportsmen, so costly in our markets. This can only be done by making game-preservation easy, inexpensive, and withal profitable to owners of the land. The German system has made game abundant throughout the empire, and yields an important income to the class which is in most need of it.

The experiment in America would need to be systematic, but not necessarily expensive. A dozen pairs of partridges, pheasants, and hares, imported from Germany or Austria, turned loose on almost any American farm, and protected from molestation three or four years, would multiply so that they would thereafter hold their own against any reasonable and sportsman-like pursuit. The larger the territory included in such experiment, the more certain would be its success. There is the disastrous experience of Australia with the English rabbit, which might make some American farmers timid about introducing the hare; but it must be remembered that the European hare is a very different animal from the rabbit of either Australia or America. Besides being far less destructive and prolific than the rabbit, the hare does not burrow, and being, therefore, always above ground and accessible, its numbers can be easily kept within safe and reasonable limits.

NOTES AND NEWS.

ON Thursday, May 21, the second annual banquet is to be given at the Mercantile Club, St. Louis, in honor of Henry Shaw, the founder of the Missouri Botanical Garden and the Shaw School of Botany.

— Dr G. Baur will leave, May 1, for the Galapagos Islands, to be absent for six months. He intends to make the most careful examination of the fauna and flora of every island.

— At the annual commencement of the Jefferson Medical College, Philadelphia, on April 15, the honorary degree of doctor of laws was conferred on Dr. Daniel G. Brinton, in recognition of the merit of his researches in anthropology and ethnology.

— An international agricultural congress, says *Nature*, will be held at the Hague in September next, from the 7th to the 12th. A commission will be appointed at the Hague to arrange for the reception of the members.

— Dr. E D. Warfield, at present the president of Miami University, has accepted the position of president of Lafayette College at Easton, Penn. Dr. Warfield, who is but thirty-two years old, graduated with high honors from Princeton in 1882, and afterward from Oxford University, England.

— A meeting of the New York members of the American branch of the English Society for Psychical Research will be held, April 24, at 8 P.M., in Room 15, Hamilton Hall, Columbia College. Dr. Richard Hodgson, secretary of the American branch, will read "Narratives received by the Secretary." All persons interested are invited to attend.

— Bulletin No. 9 of the Agricultural Experiment Station of the Rhode Island State Agricultural School, Kingston, Washington County, R.I., is devoted to a record of experiments in apiculture, including the following subjects: "Artificial Heat for promoting Brood-Rearing;" "Hive on Scales, and Sources of Honey;" "Carniolan Bees;" "Foul Brood, its Cause, Prevention, and Cure." Samuel Cushman is the apiarist of the station.

— According to a telegram sent through Dalziel's Agency, a magnificent grotto has been discovered near Ajaccio. As described in *Nature*, it is entered with difficulty, owing to the smallness of the aperture; but upon his entrance, the explorer finds himself in a vast and lofty hall, the sides of which are some twenty-five yards in height. From this there are several passages leading to an indefinite number of other chambers. A thorough investigation of the grotto has not yet been made.

— Dr. Jordan, president of Stanford University, at Palo Alto, Cal., has completed arrangements for the appointments to the faculty of the university, and has made the following selections public: Dr. Andrew D. White, ex president of Cornell University, to be the non-resident professor of history; E. Stanford of Lake Forest University, to be the associate professor in physics; Horace B. Gale of Washington University, St. Louis to be professor of mechanical engineering; Professor Joseph Swain of Indiana University, to be the associate professor of mathematics; Douglass H. Campbell of Indiana University, to be the associate professor in botany.

— The following are some results of a study of 197 thunderstorms in Russia in 1888, with reference to their speed of travel, as given in *Nature* of April 2. The author (Herr Schönrock) obtained as mean velocity about 28.5 miles an hour, with variation

from 13 to 50 miles. In the hot season the velocity was less than in the cold (28 miles against 32 miles). It was least in the early morning, then increased, at first slowly, then faster, reaching a maximum between 9 and 10 P.M. Thunder-storms travel most quickly from south-west, west, and north-west. An interesting geographical difference was observed. From west to east the velocity increased at first; but about 30° to 35° east longitude a maximum was reached, and farther east the speed declined; the decline showing, however, a secondary maximum between 45° and 50°.

— With reference to observed changes in the earth's axis of rotation, says *Nature*, it has been pointed out that through changes in distribution of air-pressure and movement of water-masses, considerably differences of level in the ocean may be produced. Herr Lamp notes the displacement northwards of the maxima of air-pressure in the trade-wind region, and of ocean-currents, as the sun rises in summer. Thus a certain quantity of water passes over in summer from the southern to the northern hemisphere; and it is improbable that compensation takes place by means of undercurrents. As the year advances, water passes back to the southern hemisphere, reaching there a maximum in our winter. This periodical transferrence of mass is supposed to cause periodical variation in the earth's axis. Herr Lamp calculates that to cause a change of latitude of 0.5″, it would be sufficient, that, at 180° longitude from Berlin, a water-mass of 2,500 cubic metres should move in a meridional direction from 30° south latitude to 35° north latitude; and that, with reference to the oceanic area concerned, we need only suppose a mean elevation of 10 centimetres (or 4 inches) in the sea level.

— The annual report of the Berlin branch of the German Meteorological Society contains the results of rainfall observations at a number of stations in and near Berlin for the year 1890. This year is among the dryest experienced since 1848, when regular observations were begun. The months of February and September, especially, are the dryest on record. Dr. Hellmann, the secretary, has carried on some useful experiments to determine the influence of the height of rain-gauges upon the records of rainfall, — a matter of considerable importance in towns, owing to the difficulty of obtaining a good exposure at a low level. He finds, according to *Nature* of April 2, that about a quarter of the rainfall is lost in an elevated exposure, such as on the roof of a house, during strong winds; but he arrives at the important conclusion that an elevated exposure is permissible if the gauge can be protected from the disturbing influence of the wind. The report also contains a list of the severe winters since 1728. The coldest winter was 1788. On Dec. 28 a minimum of —21.6° was recorded.

—A new method has been devised and patented in England for ascertaining the requisite time of exposure in photography. An instrument for measuring the relative intensity of the photographically active rays reflected from any landscape or other object by observing the time required for the light from a phosphorescent compound to fade from its maximum intensity to the intensity of the light reflected from the object, is employed. It consists, according to *The Engineering and Mining Journal*, of an opaque tube with an eye-piece at one end; while at the other is a plate of glass, part of which is coated with Balmain's paint, or some similar phosphorescent substance emitting only rays which act upon an ordinary photographic plate. The paint must either be opaque, or must be made opaque by means of a backing. Behind this glass is a piece of ground-glass, and there may also be a piece of blue glass cutting off from the light reflected from the object all rays except those which act on a photographic plate. The frame carrying these glasses is hinged, so that it can be turned back in order to expose the phosphorescent substance to light. When a measurement is to be made, the frame is turned back and the phosphorescent surface is exposed to daylight, or to the light from burning magnesium, for a time sufficient to excite the maximum luminosity. It is then put back in position, and the apparatus is at once directed toward the object to be photographed. The light reflected from this object passes through the unobstructed portion of the ground-glass and blue glass, and at first appears dark as compared with the light from the phosphorescent surface. The brightness of the latter, however, gradually fades, until the two lights are equal in intensity. The time required for this to take place is observed, and, with this datum and a series of tables supplied with the instrument, the exposure necessary to obtain a good photograph of the object in question is ascertained.

— Steps are being taken in Paris to prepare the way for the holding of an international colonial exhibition next year on the Champ de Mars. According to the Paris correspondent of the London Times, the sections would be geographical, not political; all the West Indies, for instance, forming one section, all India another, and so on. Specimens of all the native populations would be brought over and housed as at their homes, and two congresses — a colonial and an ethnographical — would be held.

— The mineral hornblende has been artificially reproduced in well-formed crystals by M. Kroustchoff, and an account of his experiments is communicated to *Comptes Rendus*, an extract from which appeared in *Nature* of April 9. The last few years have been most fruitful in mineral syntheses; so much so, indeed, that there remain very few of the more commonly occurring rock-forming minerals which have not been artificially prepared in the laboratory. M. Kroustchoff, who not long ago described a mode of preparing most perfect crystals of quartz, has made many attempts to reproduce hornblende, and has at length succeeded by the adoption of the following somewhat remarkable process. This process essentially consists in digesting together for a long period of time, *in vacuo*, and at a high temperature, the various oxides contained in natural hornblendic amphiboles, in presence of water. Small flasks of green glass were employed, each of which was exhausted by means of a Sprengel pump after the introduction of the substances to be digested together. The ingredients digested consisted of (1) a dialyzed three-per-cent aqueous solution of silica; (2) an aqueous solution of alumina obtained by dissolving aluminum hydrate in an aqueous solution of aluminum chloride, and subjecting the solution to dialysis; (3) an aqueous solution of ferric oxide obtained by the addition of ammonium carbonate to ferric chloride in such quantity as to redissolve the precipitate first formed, and dialyzing the solution; (4) carefully prepared pure ferrous hydrate; (5) lime-water; (6) freshly precipitated hydrate of magnesia; and (7) a few drops of caustic soda and potash. The mixture presented the appearance of a gelatinous mud. The exhausted and sealed flasks were placed in a specially constructed iron many-chambered furnace, and heated for three months to a temperature of 550° C. At the expiration of this time the appearance of the contents had entirely changed, having become much darker in color; and distributed throughout were numerous brilliant little crystals, almost black in color, and reminding one forcibly of natural hornblende. On systematic examination, they were found to consist of flattened prisms identical in character with hornblende. Under the microscope they exhibited the hornblendic yellowish-green color and pleochroism. Their index of refraction was the same as that of natural hornblende, about 1.65. The angle between their optic axes was found to be 82°: that of natural crystals varies from 80° to 85°. Analyses gave the characteristic amphibolic percentages, that of SiO_2 being 42.3. In addition to these crystals of hornblende, it is interesting to note that pyroxenic crystals resembling those of the augite family were also found in the flasks, together with crystals of a zeolite and of a variety of orthoclase felspar; and, finally, some exquisite little quartz crystals were observed, showing cavities containing liquids and bubbles resembling those of natural rock crystals.

— Welch, Fracker Company, New York, have in preparation "Ohio in Art," by Francis C. Sessions, president of the Ohio Archæological and Historical Society, to be illustrated with etchings, photogravures, and many smaller cuts, reproduced from the most notable works of Ohio artists. Among these may be named Otto H. Bacher, James Beard, W. H. Beard, Robert Blum, Theo. E. Butler, Thomas Cole, Kenyon Cox, Charles C. Curran, John J. Enneking, C. H. Eaton, E. Peixotto, Hiram Powers, J. H. Twachtman, Edgar M. Ward, J. Quincy Ward; to be sold by subscription only.