de Grammatica' of the 'Brazilian' or Guarani language. He was on the return trip to the mother country, Portugal, when he became shipwrecked at the mouth of the Amazonas, at Marajó Island, attacked by the Aroan savages and put to death on July 6, 1638.

The main part of Platzmann's volume is followed by a series of 1991 Guarani terms of Figueira translated and commented upon in German. In reading this list we often wish to have the original of the *Arte* in hand for reference.

In the preface Platzmann discusses the phonetics of that language and the characters used by the *Padre* to express certain sounds. There are also literary sketches on previous and recent Portuguese authors on Brazil, its Indians and their languages, and on the area in which Tupi is spoken at present.

Another apostle of the Roman Catholic faith among the Brazilian tribes was Antonio Ruiz de Montoya. He was born in Lima, 1583, and died there in 1652; therefore he can be considered as an American-born missionary. His earliest work appears to have been the Tesoro, a Guarani-Spanish dictionary of 814 pages, which saw the light in Madrid, 1639. This was followed next year by the *Arte* or grammar of Guarani, the Vocabulario and the Catecismo; this last was reprinted by Platzmann in 1876. The words of the language are presented, analyzed and translated in 2236 items. This part of the volume is instructive, but the part of Platzmann's preface in which he compares Guarani radicals with those of European languages contains too many fanciful ideas to meet general approval.

Having previously republished Bernard Havestadt's 'Tractatus de lingua Chilensi,' in two volumes, Dr. Platzmann was informed that his publications of Havestadt's 'Opera' were not complete without his 'Lachrymæ salutares.' So he set himself to commit this Latin religious poem, although it has nothing to do with Indian philology, to press. It is written in fine trochaic verses, which were in vogue in his time for church poetry.

Juan Pelleschi is a civil engineer, who wrote his book in Italian and had it translated in Spanish. He treats of the customs and manners of the Matacos or Mataguayos, a roving people inhabiting the Gran Chaco, not in a strictly scientific manner, but in a colloquial way. This may be said also of his treatment of the Mataco language, which is identified with the Tonocoté. We find no paradigms of nouns or verbs, no rules, exercises, etc., but the character of this tongue is developed at length and in a general way without any strict plan or method. Of the two maps the first is a reproduction of an ancient map and exhibits in an excellent manner the early distribution of tribes on the Gran Chaco. A Spanish-Mataco and a Mataco-Spanish vocabulary concludes the publication.

ALBERT S. GATSCHET.

SOCIETIES AND ACADEMIES.

THE PHILOSOPHICAL SOCIETY OF WASHINGTON.

AT the 508th meeting of the Society, held on December 9th, at the Cosmos Club, biographical sketches of Mr. Edward Goodfellow and of George Brown Goode, were read; the former by Mr. H. G. Ogden, and the latter by Mr. Cyrus Allen. The regular papers of the evening were by Mr. E. D. Preston on the 'Language of Hawaii,' by Mr. F. H. Bigelow on 'Results of Recent Exploration of the Upper Atmosphere,' and by Mr. G. W. Littlehales on 'Possible Methods of Measuring the Resultant of the Centrifugal and Gravitational Forces on the Ocean.' The first paper dealt with the Polynesian languages in general and the Hawaiian in particular, from the standpoint of comparative philology. Similar constructions were followed out in the Oceanic and Indo-European tongues, and points of contact were noted between modern Hawaiian, on the one hand, and French, German, Spanish, Italian and English, on the other. In the last paper the author, after recounting the trials that were made by Mascart, nearly twenty years ago, to determine the variation of the force of gravity from place to place by means of a siphon barometer whose short arm was closed and contained a certain quantity of gas, referred to the experiments that have lately been made by Mohn of Christiania, according to a method that was reported to the U. S. Coast and Geodetic Survey, in 1890, by

Assistant Superintendent Tittmann, with a view to finding the gravitational correction in mercurial barometric readings by comparing the atmospheric pressure as indicated by the mercurial column with the true atmospheric pressure as deduced from the temperature of unconfined steam. He then proceeded to relate his own considerations and experiments concerning the possibility, in times of exceptional calm at sea, of using the Electric Clepsydra for the measurement of the relative quantities of mercury discharged in equal intervals of time at different places from an orifice in the bottom of a vessel of comparatively large cross-section, and also concerning the possibility of ascertaining the changing relation, with change of place between a given mass, and its weight, by the use of a modification of the standard aneroid barometer in which the vacuum chamber has been replaced by a heavy mass.

E. D. Preston,
Secretary.

ANTHROPOLOGICAL SOCIETY OF WASHINGTON.

The 296th regular meeting of the Society was held Tuesday evening, December 5, 1899.

Miss Alice C. Fletcher read a paper on 'The Building of the Earth Lodge' describing its minute structure, purpose and variety.

Dr. Washington Matthews read a paper on 'The Earth-Lodge in Art,' in which he stated that the earth-lodge was the most commodious aboriginal structure existing in America north of New Mexico. Henry in 1807 measured one in the old Mandau Village at Knife River which was 90 feet in diameter. Thousands of such lodges, inhabited by tribes of widely different stocks, existed in the Mississippi Valley at the time of the Columbian discovery; their remains are scattered from North Dakota to Louisiana and from Western Kansas to Eastern Tennessee.

Dr. Matthews stated that the embellishments in works of ethnography and travel were often false, and tended to lead the student astray rather than to aid him. He gave a number of general instances of false illustration in ethnography, but spoke chiefly of the misleading pictures of the earth-lodge published in various works. He exhibited pictures taken from the works of Gass, Catlin, De Smet and Morgan, and compared them with photographs of the real lodge. The most faithful pictures of the lodge not photographic were those of Mr. Bodmer, the artist who accompanied the Prince of Méd.

Mr. Jas. Mooney read a paper entitled 'The Earth-Lodge in the Gulf States.'

J. H. McCormick,
Secretary.

BIOLOGICAL SOCIETY OF WASHINGTON.

At the 314th meeting on December 16th, Lester F. Ward spoke of 'the Fossil Forests of Arizona,' saying that they were of Mesozoic age, the strata containing the petrified trunks ranging from just above the Permian up to and including the Upper Trias; the formation extended northwards into Utah. The territory in which the petrified forest lay was in Apache Co., east of Holbrook, but while the trunks were found over a very considerable tract the best portion of the 'Forest' was embraced in an area about eight miles square. In some portions of this the petrified logs lay much more thickly than they could have stood when living. In fact these trees did not lie where they had grown, but had been transported thither in Mesozoic time by strong and swift currents and had then been rapidly buried in sand. The trees were completely silicified and so well preserved that the microscopic structure could be clearly made out, showing that they were related to the Araucarian Pine of the Southern Hemisphere; hence the genus had been named *Araucari oxylon.* The speaker stated that his recent visit to the petrified forest was the result of a request from the General Land Office for a report as to the desirability of reserving the most interesting portion as a national park, a memorial to Congress to that effect having passed the Legislature in 1895. Owing to the visits of tourists, the more beautiful specimens were being steadily carried away and destroyed, while many car loads had been removed to be cut, polished and made into ornaments. Owing to the extreme hardness of the silicified trunks, it had been proposed to utilize them in the manufacture of a substitute for emery, and a crushing plant had actually been erected, al-

though never operated, owing to the development of the corundum industry in Canada.

Ex-Governor W. A. Richards, Assistant Commissioner of the General Land Office, who was present and was invited to speak, said that the Land Office was in earnest in this matter and was glad to have a truly scientific report on the subject. He stated that a very large amount of the material was now being worked up in this country into articles to be sold at the coming Paris Exposition.

F. A. Lucas described 'Blue Fox Trapping on the Pribilofs,' saying, that Mr. James Judge, Treasury agent on St. George Island, had experimented extensively in the feeding and trapping of foxes, and had devised methods by which they could be readily taken alive, so that the females could be liberated, as well as a certain proportion of the males, the other males being killed. The entire paper will appear in SCIENCE.

M. B. WAITE described a 'Soil Inoculation Experiment with Soy Beans,' in testing the effect of imported Japanese soil on the Soy bean. This plant is a native of Japan and in that country forms root tubercles abundantly. In this country the plants commonly do not form root tubercles, for the reason that the necessary germs do not exist in American soils. The Soy bean is thus unable to gather free nitrogen after the manner of other Leguminosæ.

Soil was imported from a Soy bean field in Japan and sown in small quantities in the drill with the seed. The experiment was tried on a newly cleared piece of sandy land poor in combined nitrogen, and the results were quite striking. The plants in the control rows at harvest time plainly showed nitrogen starvation. In the rows inoculated with Japanese soil the plants were larger, leafier and darker green in color. They showed the effects of nitrogen fertilization. On examining the roots they were found to be well supplied with the nitrogen, gathering tubercles, while the check plants had few or none. The comparative weight of the treated and untreated portions was as 14 to 8 in favor of the treated plants.

O. F. COOK,
Secretary.

ONONDAGA ACADEMY OF SCIENCE.

THE November meeting of the Academy was addressed by Dr. J. M. Clarke, the New York State paleontologist. He gave briefly a history of the work accomplished by the geological survey of the State from its inception in 1842 to the present time, and explained in detail the new system of nomenclature proposed for the State, giving reasons for accepting the same. The latter part of the address was devoted to an account of the transitional fauna of the Portage and Chemung formations.

At the meeting of the Geological Section Mr. C. E. Wheelock read a paper on 'The Marls of Onondaga County.' He showed that the principal deposit crossed the county just north of its center and in an east and west direction, corresponding quite closely with the southern extent of the extinct Lake Iroquois. The beds in the western part of the county were studied in detail, and would seem to bear out the theory that there had occurred several oscillations of the lake shore. Excavations within the limits of Syracuse seem to corroborate the same theory. Mr. Wheelock believed that this marl deposit was cotemporaneous in formation with the existence of Lake Iroquois. The few isolated and small deposits in other parts of the county he held to be of different and probably more recent formation.

At the December meeting Dr. W. M. Beauchamp spoke on local archæology. He said that the village sites and their approximate dates of occupation could be traced by the relics found on the various sites. As the Onondagas occupied usually only one village, their migrations are more easily traced than tribes consisting of several villages. The occurrence of implements of walrus tusks, and also a peculiar variety of stone knife, prove beyond reasonable doubt that the Eskimos were earlier inhabitants, even if only temporary, than the Indians.

Dr. W. G. Hinsdale described the character of relics found on local sites, speaking more particularly of the harpoons, barbed fish-hooks and other polished bone implements. Grooved axes are only rarely found in this section, and implements are seldom found buried with the skeletons unearthed.

H. W. BRITCHER,
Corresponding Secretary.

THE PHILOSOPHICAL SOCIETY OF THE UNIVERSITY OF VIRGINIA.

THE regular monthly meetings of this society have begun. At the first meeting of the present session the following officers were elected for the current year:

President, Dr. C. W. Kent; Vice-president, Professor W. H. Echols; Secretary, Dr. W. J. Humphreys.

After the election of officers, Professor Ormond Stone delivered the customary address of the retiring president. His subject was *The Moon*. His address, supplemented by many excellent photographs, was a clear presentation of the more recent theories in regard to the markings on the moon's surface, and probable past and future history of the moon's relation to the earth.

The second meeting, December 8th, was devoted to meteors. Professor Ormond Stone gave a brief outline of the preparations made under the auspices of the Leander McCormick observatory for studying the Leonid meteors. These included, among other things, six photographic stations on a north and south line about forty miles in length.

Dr. M. W. Humphreys explained his methods of making and recording eye-observations of meteors, and called attention to several very singular meteors--about half a dozen in all--seen on the nights of November 14th and 15th. These were all red and moved in wavy lines, the amplitudes being approximately one degree. It was admitted that this might be an optical illusion, but if so, not peculiar to the observer, as in the case of the most conspicuous meteor of this type the same phenomenon was noted by at least one other member—a young lady—of the party.

Dr. W. A. Lambeth gave an account of a shower of meteors he saw in November, 1892, in North Carolina. He said it was about eleven o'clock at night and that they appeared far too rapidly to allow even a guess at the number—that they presented the appearance of a veritable rain of fire, so much so that for a time the engineer of the train he was on refused to run his engine, and that the negroes, as in 1833, indulged in song and supplication, believing firmly that the end of the world had come.

Mr. J. A. Lyon gave a short history of the Leonid meteors, covering a period of about one thousand years.

Dr. W. J. Humphreys, described the photographs obtained, all of which, with possibly one exception, failed to show meteor trails. Several practical points were learned, however, and these were stated in view of the fact that renewed efforts will be made next year to photographically determine the radiant and the height of the atmosphere.

At the close of the meeting Professor F. L. O. Wadsworth, director of the Allegheny Observatory, showed to those interested a curved star negative of Orion and adjacent regions which he had recently taken. This remarkable negative, due to the combined skill of Wadsworth and Brashear, has, in excellent definition, more than one thousand square degrees, and shows, according to their estimation, more than 50,000 measurable stars.

W. J. HUMPHREYS,
Secretary.

ALABAMA INDUSTRIAL AND SCIENTIFIC SOCIETY.

THE regular autumn meeting of the society was held in the rooms of the Commercial Club, in Birmingham, on the afternoon of November 16, 1899.

Mr. T. H. Aldrich, ex-president of the society, in the chair. Present, Messrs. J. A. Montgomery, B. B. Ross, Col. Horn, E. A. Smith and representatives of the press. The reading of the minutes of the last meeting (annual) was dispensed with, as the proceedings of this meeting had already been printed and distributed. The Secretary made the statement that on the occasion of the spring meeting so few members and officers were present that it was decided not to have a meeting, notwithstanding the fact that Dr. Ross was present with a paper and Mr. James Bowron had consented to talk to the Society about Cuba.

After the regular routine, Dr. Ross gave an abstract of his paper on 'The Fertilizer Resources and Fertilizer Industries in Alabama.' This valuable paper will be printed in full in the Proceedings. Dr. Ross also exhibited to the members a number of samples of phosphate rock collected recently by him in the vicinity of Athens,

in Limestone County. The samples analyzed by him contained from 15 to 20 per cent. of phosphoric acid up to 36 or 37 per cent.; and he also showed a sample of superphosphate prepared by him from this rock, the manufactured article containing 13.15 per cent. water—soluble, 0.15 per cent. reverted, and 1.24 per cent. insoluble; total 14.9 per cent. phosphate.

In the discussion which followed, Mr. Aldrich said that a fertilizer manufactory in Meridian was using lignite from the Burning Cut in Sumter County, Ala., as a filler, and that it contained 1.5 to 2.0 per cent. ammonia. Mr. Aldrich had formerly sold from the Blocton mines several hundred tons of coal slack, to a Shreveport company, for the same uses. He also mentioned the fact that he had recently examined a lignite occurring in Mississippi, 17 miles west of Starkville, which had only 4.5 per cent. of ash and which made a very good coke.

Dr. Smith then read a preliminary report of the mineral statistics of Alabama for the second and third quarters of the current year; after which, there being no other business before the meeting, it was adjourned *sine die*.

EUGENE A. SMITH,
Secretary.

DISCUSSION AND CORRESPONDENCE.

DR. WILSON'S REPLY TO HIS CRITICS.

I CONSIDER it complimentary to an author that his works should be criticised. It shows that they are worthy of attention and consideration. The friendly criticism in SCIENCE, December 22d, of my address delivered in Columbus last August, before the Section of Anthropology of the A. A. A. S., appears under such misapprehension as seems to require a word of explanation. That address, as its title indicates, was 'A History of the Beginnings of the Science of Prehistoric Archæology.' It was a *résumé* or description of the discoveries made, or alleged to have been made, which led to the foundation of the science, and a statement of the theories advanced for its establishment. This being its purpose, it was proper that I should treat of all its topics, and this without binding me to an approval of them. I was recording a history of the science, not necessarily maintaining the truth of all the theories advanced by its founders. The friend who wrote the criticism seems not to have recognized the difference. He makes strenuous opposition to the classifications of the science as set forth in my address; but none of them were mine. They had been made in Europe many years since, were applicable to that country, and most of them are still in use there. In such a history as I was writing it would have been highly objectionable for me to have omitted them; and so with most of the other points in the criticism referred to.

THOMAS WILSON.

NOTES ON INORGANIC CHEMISTRY.

AN important practical application of the liquefaction of hydrogen is that of the production of high vacua, as described by Dewar in the *Proceedings* of the Royal Society. At the boiling point of hydrogen the vapor tension of air is less than a millionth of an atmosphere, hence when to vacuum tubes for the spectroscopic examination of gases is attached a temporary tube immersed in liquid hydrogen, the solidification of the air in the tube produces a very high vacuum. In this way the more volatile constituents of atmosphere become concentrated in the tube, and in numerous tests the presence of neon and of helium was revealed in a volume of air less than 50 cc. Some tubes showed a hydrogen spectrum, but others did not, so that the question as to whether free hydrogen exists in the atmosphere cannot be considered as settled.

A LATER number of the *Proceedings* contains a paper by T. G. Bonney on the parent-rock of the South African diamonds. The 'blue ground' of the Newlands mines, which are forty miles northwest of Kimberley, contains rounded boulders of eclogite, and in this eclogite are occasional colorless octahedra of diamond, apparently as an original constituent. As the eclogite boulders are water-worn, it follows that the 'blue ground' is not of igneous origin, but it is true breccia produced by the destruction of various rocks, one of which—the eclogite—has contributed the diamonds to the mixture.

THE analysis of a sample of Egyptian porcelain from Memphis is published by Le Chatelier