Molybdenum in the Electric Furnace,' Charles L. Sargent; 'A Method for the Rapid Determination of Carbon in Steel,' Robert Job and Charles T. Davies; 'Determination of Iron in Magnetite Ore by the Specific Gravity Test,' Joseph W. Richards; 'Irregular Distribution of Sulphur in Pig Iron,' Randolph Bolling; 'The Composition and Analysis of London Purple,' J. K. Haywood; 'Detection of Foreign Coloring-matter in Spirits,' C. A. Crampton and F. D. Simons; 'A Rapid Method for the Detection of Aniline Orange in Milk,' Hermann C. Lythgoe.

THE December number (Volume 7, Number 3) of the *Bulletin of the American Mathematical Society* contains: 'Report of the October meet- of the Society,' by the secretary, 'On Linear Dependence of Functions of One Variable,' by M. Bôcher; 'Report on Groups of an Infinite Order,' by G. A. Miller; 'A Review of Ewing's Strength of Materials,' by Dr. Chas. Chree; 'A Review of Scheffer's Differential Geometry,' by J. M. Page; 'Notes'; 'New Publications.'

Popular Astronomy for January opens with an illustrated article by Miss Caroline E. Furness on the new 'Photographic Catalogue of North Polar Stars,' which has just been published from Vassar College Observatory. Professor Kurt Laves continues his discussion of the 'Adjustment of the Equatorial Telescope,' and Charles P. Howard his account of the 'Total Solar Eclipse.' Professor Francis E. Nipher's 'Positive Photography with special reference to Eclipse Work' is timely. Professor Herbert A. Howe, director of Chamberlin Observatory, of University Park, Colorado, begins his series of articles on astronomical books for the use of students. Professor Asaph Hall contributes a note on multiplication showing some peculiarly symmetrical results. The department of Astronomical Phenomena announces the eclipses of the coming year, and gives much space to news of comets, asteroids, etc. The number includes the usual general, spectroscopic and variable star notes, and W. W. Payne's second article on 'The Figure and the Attraction of the Earth.'

Nature announces that the Anthropological Institute will issue an anthropological journal to be entitled *Man*, which will appear monthly. Special attention will be given to the data concerning the origin of those forms of civilization which have become dominant.

SOCIETIES AND ACADEMIES.

BIOLOGICAL SOCIETY OF WASHINGTON.

THE 330th meeting was held on Saturday evening, December 15th.

F. A. Lucas exhibited the under portion of the skull of a large specimen of the gar pike, *Lepisosteus tristoechus*, showing fracture and repair of the sphenoid. He stated that this was a good example of the fact that many animals could successfully recover from very severe injuries, since in the present case the breaking of the sphenoid must have entailed severe injury to and deflection of the entire cranium, and yet recovery had taken place. C. W. Stiles spoke of 'Some Tropical Parasites that may be introduced by our Returning Troops,' saying that the present conditions in China where troops were gathered from many parts of the world were particularly favorable for the interchange of parasites that were ordinarily confined to certain areas. The conditions in Manila were also favorable for attacks of parasites and their subsequent introduction into this country. The speaker described the various species of parasites that might be met with, their structure, mode of reproduction, the manner in which they entered the system and their effect upon it, illustrating his remarks by diagrams. But one or two of these species it was pointed out, were really to be apprehended, and as most of them were taken through the medium of drinking water, the danger could be almost entirely obviated by boiling the water.

E. W. Nelson presented a paper on 'The Caribbean Seal,' saying that while this was the first seal met with by the early explorers of the New World, and was an animal of considerable size and former extensive distribution, it was one of the least known of North American mammals and not accurately described until 1884. The various accounts of this seal, from the time of its discovery by the sailors of Columbus up to the present time were briefly no-

ted, the speaker then describing the habits of the animal as observed by him during a recent visit to the Triangles, in the Gulf of Campeche, to which the seal now appears to be restricted. They were sluggish and stupid, making practically no defense when attacked, and very easy to approach. While on shore they commonly laid on their backs, basking in the sun for hours, although the heat was so intense that iron exposed to the sun became too hot to handle with comfort, and dead seals soon had the epidermis so heated that the hair slipped off. Owing to the killing of these seals for oil, sold for lubricating purposes, their numbers had been greatly reduced, it being estimated that under one hundred were now living so that the extinction of the species would probably soon take place.

F. A. LUCAS.

TORREY BOTANICAL CLUB.

THE scientific program on November 28th consisted of a paper, soon to be printed, by Mr. Frederick H. Blodgett, on 'The Seed and Seedling of *Lilium tenuifolium* Fisch,' in which the seed characters were presented in detail, and with comparisons with those of *Erythronium*. Interesting differences were found in the size of the *Lilium* seeds about 93 per cent. of which germinated the small seeds as quickly as the larger, though with less vigorous subsequent growth.

On Tuesday afternoon, December 11th, the Club met at the Botanical Garden at Bronx Park. The program included a brief address by Professor Charles E. Bessey, a visit to the Garden conservatories with explanations by Dr. Britton, and the exhibition by Miss Anna M. Vail of valuable books recently added to the Garden library. Mr. R. M. Harper exhibited a very interesting series of specimens and photographs of plants from Georgia, and gave notes on their habitat and distribution. Dr. J. K. Small described a series of tree and shrub specimens from the south, with critical notes. Dr. D. T. MacDougal presented notes on the bulbils of *Lysimachia terrestris*. These bulbils are formed during the latter part of the season, in the axils of many leaves, and are morphologically branches. On completing their growth they pass into rhizomes. They are killed by freezing and desiccation.

Another paper was by Dr. M. A. Howe, 'Remarks on rare North American Hepaticæ.' The first hepatic discussed was *Riccia Beyrichiana*, a species which was discovered about seventy years ago 'between Jefferson and Gainesville, North America,' by the German traveller Beyrich, but which has of late been a subject of considerable doubt, inasmuch as it has not been seen since. Now, however, it has apparently been rediscovered by Mr. R. M. Harper, who found it during the last summer at Athens, Georgia, scarcely more than twenty miles from the locality where it was evidently first collected.

Dr. Howe also furnished a brief account of a collection of Hepaticæ made in the Yukon region by Mr. R. S. Williams—a collection of much interest, inasmuch as it contained one species which appears to be entirely new, one which has not heretofore been reported from this continent, five others new to the Alaskan region, and, besides these, two or three which have been rarely collected in America. The report on Mr. Williams's Hepaticæ is soon to be published.

EDWARD S. BURGESS,
Secretary.

THE ACADEMY OF SCIENCE OF ST. LOUIS.

AT the meeting of the Academy of Science of St. Louis of December 3, 1900, fifteen persons being present, Mr. William H. Roever, of Washington University, read a paper on 'Brilliant Points and Loci of Brilliant Points.' The paper gave the analytical conditions which define the brilliant point of a surface, the brilliant point of a space curve, the brilliant point of a plane curve and the brilliant point in space of two dimensions, when the source of light is such that the incident rays are normal to a given surface and the recipient is such that the reflected rays are normal to another given surface. Formulæ were given for the important special case in which the source and recipient are points. The paper also contained a general method for finding the equation of the locus of the brilliant points of a moving or variable surface or curve, together with a number of applications. Such loci may often be perceived when an illuminated

polished surface is rapidly moved, as when a wheel with a polished spoke is rapidly rotated. Another interesting example in loci of brilliant points is that of a circular saw which has been polished with emery in a lathe and thus received a great number of concentric circular scratches. The locus of the brilliant points of this family of scratches was shown in this paper to be a curve of the fourth degree. In the special case when the point source of light and the eye of the observer (the point recipient) are in a plane through the axis of the saw, the curve degenerates into a circle and two coincident straight lines. A photograph of the saw curve has been taken in which the optical center of the camera lens is the point recipient. Other interesting facts and a number of geometrical constructions were also given in this paper.

Three persons were elected to active membership in the Academy.

William Trelease,
Recording Secretary.

DISCUSSION AND CORRESPONDENCE.

THE ELECTRICAL THEORY OF GRAVITATION.

It is, perhaps, by the severe but impartial criticism of his work that the greatest of all possible obligations is laid upon the scientific investigator, for thereby his theories are purged of what may be incorrect or trivial, and that part of them which may be true is compacted and separated from what might otherwise hide its value, and cause it to be neglected.

Unfortunately I have been unable to profit as much as I felt I had a right to expect from Dr. Franklin's letter, Science, December 7th, as he has apparently been unable to find time for that careful examination and study which the subject, aside from the paper, demands. It is a matter of regret, also, in view of Dr. Franklin's admirable qualifications for dealing with the question, that he should have directed his criticism, in every single case, against theories which are the exact opposite of those which I hold, and which I have explicitly set forth in the paper referred to.

But though Dr. Franklin has with some slight lack of courtesy invited his readers to 'ignore' my remarks on the methods by which my theory was deduced, I shall not return the compliment by 'ignoring' his criticism, because it contains a number of very serious misstatements which should be promptly pointed out, as otherwise they may become sources of error.

To consider, first, his criticism of my paper, he says (par. 1):

"Professor Fessenden in a recent number of Science discusses the nature and velocity of gravitation. There is, no doubt, something of value in Professor Fessenden's suggestions and much that is new. However, the explanation of gravitation which Professor Fessenden offers is by no means so adequate as would appear from Professor Fessenden's discussion."

On careful perusal we find his reasons for making this statement to be three in number. In regard to the first he says:

"If we admit that the diminution of volume of the ether at each point is proportional to the resultant intensity of the electric field, then the part of the energy which depends upon diminution of volume cannot be separated in its effects from the part of the energy which depends upon the shearing distortion, inasmuch as both are proportional to the square of the resultant field intensity. Therefore a diminution of volume of the ether could not explain gravitation, but would only be involved in the explanation of ordinary electrical attraction and repulsion."

But, *so far from my theory implying a diminution of the density of the ether at each point proportional to the resultant field intensity, F, I have expressly stated that the change of density is proportional to* F^2, as witness the following extracts from my paper:

"Whilst the one which is a density must decrease with the *second* power of the corresponding intensity."

"And hence, as my experiments prove, the change in density is proportional to the *square* of the electric intensity."

As a matter of fact, even a cursory examination of my paper will show that the whole point of my argument rests on the fact that it is the second and not the first power which is involved. For the qualitative equation is

$$M/L^3 = T^2/L^2 \times M/LT^2,$$