geodetic work* and the pendulum are among the first applications to find recognition, but the expectation of M. Guillaume is that it will prove possible to adapt other nickel-steel alloys for substitution for the filament of the common 'incandescent' lamp, a work in fact already in progress.

M. L. Dumas, in his 'Les aciers au nickel à haute teneur'† describes the mechanical properties of above one hundred and fifty of the alloys of these metals. At least one Paris firm, Radiguet et Massiot, on the rue Château-d'eau, has undertaken the marketing of these alloys.

These new discoveries and their outcome may not have as impressive aspects as those which have given us nickel-steel armor-plate or gun-barrels; they perhaps have more real importance to the world. The supply of nickel ores seems likely to prove ample for the immediate future, at least, and scientific men and engineers will be hopeful of still other and useful products in this field. Meantime, M. Guillaume deserves great credit and large returns for his part in the work of exploitation.

R. H. THURSTON.

RADIUM.

SIR WILLIAM CROOKS has written to the London *Times* the following letter:

In the presence of a mystery like that of radium any reasonable attempt at explanation will be welcome, so I will ask your permission to revive a hypothesis I ventured to submit to the British Association in my presidential address in 1898. Speaking of the radio-active bodies then just discovered by M. and Mme. Curie, I drew attention to the large amount of energy locked up in the molecular motions of quiescent air at ordinary pressure and temperature, which, according to some calculations by Dr. Johnstone Stoney, amounts to about 140,000 foot pounds in each cubic yard of air; and I conjectured that radio-active bodies of high atomic weight might draw upon this store of energy in somewhat the same manner as Maxwell imagined when he invented his celebrated 'demons' to explain a similar problem. I said it was not difficult so to modify this hypothesis as to reduce it to the level of an inflexible law, and thus bring it within the ken of a philosopher in search of a new tool. I suggested that the atomic structure of radio-active bodies was such as to enable them to throw off the slow-moving molecules of the air with little exchange of energy, while the quick-moving missiles would be arrested, with their energy reduced and that of the target correspondingly increased. (A similar sifting of the swift-moving molecules is common enough, and is effected by liquids whenever they evaporate into free air.) The energy thus gained by the radio-active body would raise its temperature, while the surrounding air would get cooler. I suggested that the energy thus gained by the radio-active body was employed partly in dissociating some of the gaseous molecules (or in inducing some other condition which would have the effect of rendering the neighboring air a conductor of electricity) and partly in originating undulations through the ether, which, as they take their rise in phenomena so disconnected as the impacts of molecules, must furnish a large contingent of Stokesian pulses of short wave-length. The shortness in the case of these waves appears to approach, without attaining, the extreme shortness of ordinary Röntgen rays.

Although the fact of emission of heat by radium is in itself sufficiently remarkable, this heat is probably only a small portion of the energy radium is constantly sending into space. It is at the same time hurling off material particles which reveal their impact on a screen by luminous scintillations. Stop these by a glass or mica screen and torrents of Röntgen rays still pour out from a few milligrams of radium salt, in quantity to exhibit to a company all the phenomena of Röntgen rays, and with energy enough to produce a nasty blister on the flesh, if kept near it for an hour.

In conclusion, if it is not too much trespassing on your space, I should like to express the great admiration which I have, in com-

* The recent measurement of the meridional arc on Spitzbergen was effected with this alloy in the measuring wires.

† Published by Dunod, Paris, 1900.

mon with all English men of science, for the brilliant discovery of radium, and its unique properties—the crowning point of the long and painstaking series of researches on radio-active bodies undertaken by Professor Curie and his talented coadjutor, Mme. Curie.

THE MARINE BIOLOGICAL LABORATORY OF THE U. S. FISH COMMISSION.

THE Marine Biological Laboratory of the U. S. Fish Commission at Beaufort, North Carolina, will be opened to investigators on June 1, 1903, for a period of four months.

The laboratory is well equipped with glassware, reagents and running water, both salt and fresh, and is lighted with electricity. The apparatus needed for the collection of materials for investigation is furnished, and an experienced collector will assist in this work. A sailboat and steam launch are available for dredging, trawling and other collecting in the harbor and there is a prospect that facilities will be provided for deep-sea dredging and collecting in the Gulf Stream for a considerable time during this season.

Rooms and board for a limited number of men are furnished at about the cost of supplying the table and caring for the rooms. A well-trained and experienced cook will be in charge of the 'mess.' All water used on the table and for cooking comes from an artesian well driven on the island to a depth of 236 feet. Last season all expenses of living at the laboratory were covered by $5.25 per week and it is probable that this season they will be a little less.

It is well known that the marine fauna of Beaufort is very rich and that pelagic organisms are especially abundant. The climate is neither unpleasant nor unhealthful. The temperature rarely rises above 85° F., and there are few days when a sea breeze does not prevail. The atmosphere is humid, but fogs are almost unknown. With the water and diet provided at the laboratory mess there is no danger to health.

Beaufort is connected with Morehead City, the nearest railroad station, situated across the harbor, by a line of launches which stop at the laboratory wharf. The Atlantic and North Carolina Railroad connects at Goldsboro with the Southern and Atlantic Coast Line railroads. The laboratory may also be reached by an almost all water route via Norfolk, Elizabeth City and New Bern.

Those desiring to occupy tables in the laboratory should write for application blanks to Caswell Grave, Johns Hopkins University, Baltimore, until May 28. After that date to Beaufort, North Carolina.

MONOGRAPH OF NORTH AMERICAN MOSQUITOES.

DR. L. O. HOWARD, of the U. S. Department of Agriculture, is engaged in arranging plans for an elaborate monograph of the mosquitoes of North and Central America and the West Indies under a grant from the Carnegie Institution. It is proposed to devote at least three years to the work, and to make the monograph as perfect as possible, both on the systematic and biological sides. The large collections of the U. S. National Museum and the Department of Agriculture will be used as a basis. Trained observers will be stationed at different points, the faunal regions being taken into consideration in choosing localities. Up to the present time the following localities and observers have been selected: Chicopee, Mass., Mr. Frederick Knab; Ithaca, N. Y., Mr. O. A. Johannsen; Minneapolis, Minn., Professor F. L. Washburn; Kaslo, B. C., Dr. H. G. Dyar; Stanford University, Cal., Professor V. L. Kellogg, or an assistant; Salt Lake City, Utah, Mr. R. V. Chamberlin; Victoria, Texas, Dr. W. E. Hinds; Baton Rouge, La., Professor H. A. Morgan; Clemson College, S. C., Professor C. E. Chambliss; Havana, Cuba, Mr. J. R. Taylor; Guanajuato, Mexico, Dr. Alfredo Dugés. Additional localities and observers will be selected later. Dr. Howard will be assisted in the systematic work on the adults by Mr. D. W. Coquillett, of the National Museum, and on the larvæ, by Dr. H. G. Dyar, also of the National Museum, since both of these observers are skilled in these subjects.

Volunteer observers are greatly needed, and it is Dr. Howard's hope that persons interested in this subject, and especially those resident