which formerly thronged our whole coast, have been so nearly wiped out by agents of the milliners that this year's onslaught, already fully organized, will glean almost the last pair from the few small breeding colonies which remain, wherever these are unprotected. And the larger Gulls, which are not only very beautiful, but absolutely essential as harbor scavengers, are also being decimated for the same purpose.

All these species, with their exquisite beauty, their wild voices and their most romantic lives, peopling a realm which, without them, would be oppressive in its dreary grandeur, will reach their breeding places in a few weeks, and the Terns, especially, are liable to be slaughtered the moment they get there; therefore the promptest action is necessary, if we are to save even the few pairs of the latter which could restock our devasted coast when the evil eye of fashion shall have turned to other victims.

Simple economic considerations make it a matter of course that the Gulls *must* be saved. An immense horde of them, which naturalists think number anywhere from a hundred thousand to a million, gorge twice a day in New York Bay upon garbage. As the hour of the 'dump' approaches, their multitudes fill the whole air to an immense height, over an area of several miles, then gradually settle on the sea in vast white sheets. The whistle of the police boat, the signal to 'dump,' seems to waft them simultaneously into the air, to gather, like dense snow clouds, over the floating masses just emptied from the many scows.

Imagine from what an amount of putrid matter these birds, as big as hens, save the adjacent beaches, not to speak of their perpetual gleaning in the actual harbors! And this is a specimen of what occurs at every port. And shall this incalculable sanitary benefit, and all this beauty, terminate forever, and for no worthy purpose?

If money enough can be raised, the Committee of the American Ornithologists' Union will guard every breeding place where there is a law to back them, as Mr. Mackay and Mr. Dutcher have done at Vineyard Sound Islands and Great Gull Island. The utmost caution will be used in choosing wardens, and the Committee will be glad to receive names of men especia ly suited for the post. Light-house keepers and Life-Saving Station captains will be employed wherever feasible. A very encouraging sum is already in the hands of the Committee.

The places to be protected are certain islands on the coast of Maine, Long Island, New Jersey, Maryland, and perhaps Virginia and Florida. In Maine alone there is need of all the money we can possibly get, since there single wardens are afraid to face the rough plumers, and some more elaborate organization is the only hope.

The American Ornithologists' Union therefore appeals to every bird-lover for money to be used in hiring wardens to protect the birds while nesting. Contributions should be sent to Mr. William Dutcher, treasurer of the Union, at 525 Manhattan avenue, New York City, who will furnish all desired information.

ABBOTT H. THAYER, WILLIAM BREWSTER, Pres. Mass. Audubon Society; WITMER STONE, Chairman A. O. U. Com. on Bird Protection; ROBERT RIDGWAY, President A. O. U.; C. HART MERRIAM, Chief U. S. Biological Survey; Vice-Pres. A. O. U.; A. K. FISHER, Ass't. Biologist, U. S. Biological Survey; J. A. ALLEN, Curator Vertebrate Zoology, Am. Mus. Nat. His.; FRANK M. CHAPMAN, Ass't. Curator Ver. Zoology, Am. Mus. Nat. His.; WILLIAM DUTCHER, Treasurer A. O. U.

March 17, 1900.

NOTES ON ELECTRICAL ENGINEERING.

A NEW INDUSTRIAL SITUATION.

IN a pamphlet recently issued by the Westinghouse Companies, Mr. Geo. Westinghouse calls attention to the prospective use of the gas engine on a great scale for the generation of power and, in connection with central gas plants and pipe lines, for the distribution of power. Mr. Westinghouse says that "long familiarity with the electrical industry, the pipe line transportation of natural gas in great quantities, and an active interest in the development of large gas engines, satisfy me that the great economies which will result from the distribution of power by means of gas generated at central points, and conveyed in pipes along the lines of railway for the operation of gas

engines and electric generators, will be sufficient to justify the expenditure of the capital necessary for such installations in connection with the electrical equipment of railways, particularly metropolitan and suburban lines. The advantages of the use of gas engines can be best appreciated when it is understood that if a gas company were to supplant the present gas illumination by an equal amount of electric light obtained from gas-driven dynamos, it would have left for sale or other purposes over 60 per cent. of its present gas output."

In a communication to the New York *Times* of January 10, 1900, Mr. Westinghouse suggests the employment of fuel gas and gas engines for supplying light and power to the whole of Manhattan Island. He calls attention to the fact that city garbage is much better adapted for the manufacture of fuel gas than for use under a steam boiler, the large percentage of water in garbage being little or no disadvantage in the manufacture of fuel gas. He mentions the fact that fuel gas manufacture is a smokeless process, and he points out that the water consumption of gas engines may be kept far below that of steam engines. "Bearing on these questions" says Mr. Westinghouse "and of especial importance, are the partially executed plans of the electric power and light corporations, viz, the Metropolitan, Third Avenue and Manhattan Elevated Railways, the New York Gas and Electric Light, Heat and Power Company, and the United Electric Light and Power Company. If their present plans, which are fairly well known to the engineering profession, are carried to completion, each will have one large steam station on the East River between Twenty-ninth street and the Harlem River, with about 75,000 horse-power of engines, boilers, and electric machinery, making an aggregate of 375,000 horse-power, and which may be largely increased when the underground rapid transit railway is completed, and still further when the electric locomotive is used on all steam railways within the city limits.

"If these corporations were to unite in a common plan to provide the electricity needed in their operations by the adoption of the best available methods, the saving to each in capital expenditure would be very great, and the decreased cost of their supply of electricity would make an important addition to their earnings applicable to the payment of dividends; while, most important of all, the citizens of New York would have solved for them the garbage, smoke, and very largely the water questions.

"I believe the contemplated plans of the corporations above named, which can be shown to be based upon an imperfect knowledge of the subject, will stand in the way of vast public interests, and, so believing, I have said to representatives of some of these companies that the near future would demonstrate the projected power stations and systems of electrical distribution incidental to the character of such stations, to be as far from the best as are the old cable systems for the propulsion of cars."

It seems to the present writer that the recent improvements in the gas engine and the consequent commercial possibility of its use on a vast scale in the transmission and generation of power, warrant the title of the pamphlet issued by the Westinghouse companies 'a new industrial situation,' and it is a matter of especial satisfaction that the plan proposed by Mr. Westinghouse for New York City which promises such great benefits to the community, also commends itself to the business interests of the corporations concerned. Mr. Westinghouse's plan is entirely sound, at least the scientific and technical points involved are clear and certain, and it should engage the attention of every public spirited citizen.

WIRELESS TELEGRAPHY.

The Transactions of the American Institute of Electrical Engineers for December, 1899, contains an interesting discussion on wireless telegraphy. Professor R. A. Fessenden, in particular, describes some interesting experiments by himself and Professor Kintner. These two experimenters being unable to use the ordinary coherer as a measuring instrument, devised a small induction galvanometer (originally due to Elihu Thomson) for measuring the intensity of the electrical waves at the receiving station, and this induction galvanometer is said to be more sensitive than the coherer and well adapted as a receiving instrument in practice. Professor Fessenden also gives a good description, based

upon the mathematical work of Hertz, J. J. Thomson and Heaviside, of the character of the electrical waves which pass out from the vertical wire at the sending station; he calls attention to the rational basis for Marconi's law, or rather a modification of Marconi's law, that the range of signalling in miles is proportional to the product of the heights of the vertical wires at the sending and receiving stations, and explains why longer distance signalling is possible over water than over land. Those who are interested in this matter will find Professor Fessenden's discussion instructive and interesting.

Long distance wireless telegraphy seems to be now almost within reach, with high sending and receiving wires and with very powerful electrical disturbances at the sending station, very slight improvements in the sending and receiving apparatus will likely carry the range up to a thousand miles or more.

W. S. F.

CURRENT NOTES ON PHYSIOGRAPHY.

IOWAN DRIFT.

CONTINUED studies of the drift of Iowa by members of the State Geological Survey give new details regarding the topographic differences between the three chief drift sheets (Kansan, Iowan and Wisconsin), indicative of their differences of age. Calvin describes the Iowan drift sheet (*Bull. Geol. Soc. Amer.*, x, 1899, 107–120) as forming a broad plain of long, gently sweeping undulations, on which stream erosion has in general done little work; only the main drainage lines, many of which follow sags in the drift that are taken to indicate pre-Iowan valleys of erosion, are well defined; small lateral channels have been eroded only a mile or so from the main valleys. In contrast with this little carved surface, the Kansan sheet, next south, was maturely and deeply eroded before the Iowan sheet was deposited. The Kansan-Iowan interval is thought to have been fifty times the post-Iowan period. About the middle of the latter period is taken as the date of the lobe of Wisconsin drift that enters from Minnesota and overlaps both the Iowan and Kansan sheets. The surface of this lobate area shows even more distinct signs of youth than are found in the Iowan area; undrained depressions are of frequent occurrence on its undulating prairies; oxidation and leaching have hardly begun; stream erosion is insignificant. The value of topographical evidence as indicating geological dates is seldom better illustrated.

The same author described 'a notable ride' from the driftless area of northeastern Iowa to the Iowan drift sheet, where the contrasts of a maturely dissected upland of normal development, and the broad swells and troughs of a till plain are well presented (*Amer. Geol.*, xxiv, 1899, 372–377).

WESTERN AUSTRALIA.

AN account of part of western Australia by Cadell ('Some geological features of the Coast of Western Australia,' *Trans. Edinb. Geol. Soc.*, vii, 1897, 174–182) ascribes the absence of harbors to a recent slight elevation after prolonged denudation. The elevation is indicated by raised beaches, now 10 or 15 feet above sea level, one beach being from 12 to 18 miles wide and reaching 25 miles inland. The beaches lie on a low, flat plain of denudation, monotonous and desolate, sloping imperceptibly to the sea. An inland excursion of seventy miles was chiefly over a perfectly flat surface of granite, clay slate and other rocks, strewn with wind-worn pebbles and relieved by occasional crystalline knobs which rise over its prairie-like expanse. No mention is made of incised valleys; the few water courses of the region, usually with dry beds, seem to lie but little below the general level. The rocks are as a rule deeply weathered; water being commonly found in wells at depths of 45 or 50 feet. The inland termination of the plain is not described. The possibility of accounting for such a plan by subaërial or by marine denudation is recognized, and a preference is expressed for the latter agency in this case (although the deep weathering of the rocks seems to be more accordant with a subaërial history). A comparison is made between this denuded lowland and the flat pavement on which the Cambrian rocks of northwest Scotland rest; it is further suggested that if the Australian plain were scoured by glacial action, it would be transformed to a hummocky surface, resembling the 'rough