tween boiler and condenser pressures, and which, with the best of engines employing saturated steam, amount to ten or twenty per cent. and to a multiple of such figures for small machines. The interior surfaces of the turbine, in steady working, remain at precisely the same temperatures and absolutely without those fluctuations which produce waste in the reciprocating, and in the other forms of rotary, engine. As it is to reduce this particular waste that superheating is employed, ordinarily, there would not be expected to be found any other gain by its use in the steam-turbine than that increase of thermodynamic efficiency which is due to the widened range of temperature, in this case amounting to about one-tenth of one per cent. per degree of superheat. Investigations by Messrs. Schieren and Thomas, above alluded to, show, on the contrary, a gain of about one per cent. for each one and two-thirds degrees, C., three Fahrenheit degrees, of superheat and the remarkable and unexpected result of an increase in the capacity of the machine of about one hundred per cent. by the use of but 20° C., 37° Fahr., superheat. The 'water-rate' of the turbine, a La Val machine of ten horse-power as rated, decreased from about 21.7 kgs., 48 lbs., to 1.99 kgs., 44 lbs, with pressure rising from three atmospheres to eight, with a two-thirds vacuum, and with saturated steam; while the figures fell off about 12 per cent. with superheating, rising to a very moderate maximum as above. Reduced to thermal units per horse-power per hour, the same effect appears in a very similar proportion. The causes of the gain in thermodynamic efficiency and of capacity are presumably identical—the extinction of the friction-wastes due to the retardation of the current of fluid traversing the passages of the turbine by concurrent resistances coming of the weighting of the current of steam with drops and mist and the adherence of moisture in mist, drops and even streams, very probably, to the walls of the steam-passages of the turbine. The phenomenon will however, be the subject of extended investigation in the course of the work in research constantly in progress and a way will probably be found of precisely identifying the cause and determining the laws governing its action in the production of these variations of efficiency and capacity. That this apparently obvious explanation is the correct one and, certainly, that the gain is not due any such action as produces the remarkably beneficial effects observed in the reciprocating engine, is tolerably well indicated by the fact that the gain in this case, by superheating, is substantially proportional, so far as here carried, to the amount of superheat and the graphic log shows a straight line of decreasing consumption of steam.

R. H. THURSTON.

THE MORINGUOID EELS IN AMERICAN WATERS.

NOTWITHSTANDING the numerous eels which have been discovered in American waters, none has yet been found which has been referred to the family of *Moringuidæ*. Indeed, from the literature it would appear that the group was peculiar to the seas of India and the Molucca-Indian archipelago. However, Dr. Smith recently received from Mr. George M. Gray, of Woods Hole, an eel found in branching coral at San Geronimo, near San Juan, on the north shore of the island of Porto Rico, which he was at a loss to allocate and took it to Dr. Gill. The latter was struck by its resemblance to *Aphthalmichthys*, and the subsequent comparison with the figures of Bleeker's 'Atlas Ichthyologiques des Indes Orientales Néêrlandaises' revealed no differential characters to separate it from that genus. Further, a consideration of the very elongated whip-like forms referred by Jordan and Evermann

to the subfamily *Stilbiscinæ* of the family *Murœnesocidæ* shows that all are true *Moringuidæ*, the genus *Stilbiscus* being identical with *Moringua*, having the same structure of the fins. Instead of American waters being destitute of representatives of the family, it now turns out that they are the headquarters of the group and that four genera are found therein—*Moringua*, *Aphthalmichthys*, *Leptoconger* and *Gordiichthys*.

The Porto Rican *Apthalmichthys* agrees most closely with the *A. abbreviatus* of the Indo-Moluccan archipelago (Java, Celebes, Amboyna, etc.). It has a more elongated body (the depth about 54 times in the length), and the head forms one-thirteenth of the length. No true pectorals are developed, although a slight fold exists behind the upper portion of the branchial aperture. The tail forms a little more than one-third of the length. The color in life was a uniform gray olive. The specimen is 270 mm. long. The species may be called *Aphthalmichthys caribbeus*. A detailed description will be published hereafter.

This discovery is of unusual interest. It takes a family out of the category of geographically restricted types and adds one to those of tropicopolitan distribution. It is probable that species will be found under analogous conditions in all tropical seas and that they are rare only in museums. But they are of such a shape and occur amidst such environments that they can only be secured by some happy accident, unless they may be deliberately sought for with proper appliances. The family itself has special interest for the morphologist. The species differ from all others in the great extent of the abdominal cavity (about two-thirds of the total length) and the situation of the heart, which is far behind the gill arches and not close to the hindmost one as in fishes generally.

Theo. Gill.
H. M. Smith.

A PRELIMINARY ACCOUNT OF THE SOLAR ECLIPSE OF MAY 28, 1900, AS OBSERVED BY THE SMITHSONIAN EXPEDITION.

Partly in deference to the report of the United States Weather Bureau, from which it appeared that the chance of a fair eastern sky on the morning of the eclipse was about 8 to 1, and after examination by Mr. Abbot of many stations in North Carolina, Wadesboro, of that State, was selected early in April as the site of the Smithsonian observations. The advantages of Wadesboro being also recognized by Professor Young, of Princeton, Professor Hale, of Yerkes Observatory, and the Reverend J. M. Bacon, of the British Astronomical Association, it came about that four large observing parties, besides several smaller ones and numerous excursionists from the surrounding country, were all joined to produce at Wadesboro one of the largest company of eclipse observers ever assembled for scientific purposes. It is a matter for congratulation that the sky at Wadesboro upon the day of the eclipse was cloudless and clearer than the average, so that the efforts of the observing forces were not thwarted by any circumstances beyond their control. The provisions of the Mayor and authorities of Wadesboro for preventing intrusion before and during the eclipse, and thus securing an undisturbed field of operations, deserve especial recognition. Further than this, the many acts of courtesy and hospitality to the visiting astronomers on the part of the townspeople, will long be remembered by the recipients.

The Smithsonian party proper consisted of thirteen observers, and included Mr. Langley, Mr. Abbot, Aid Acting in Charge of the Smithsonian Astrophysical Observatory, Mr. Smillie, in charge of photography, Mr. Putnam, of the United States Coast Survey, Mr. Fowle, Mr. Mendenhall, Mr. Child, Mr. Draper, Mr. Gill, Mr. Kramer and Mr. Smith. Included with these the