Prussia — by the way, why is not the perfectly familiar *Culturkampf* used in the title, instead of a word which is partly foreign in form, and wholly so in sound? — is the first clear and adequate description in English of that very significant and important movement in Prussia's political history. The book-reviews are as numerous and as well done as usual. We observe that a very severe criticism is passed on the volume on New York in the 'American Commonwealth' series. Prof. Richmond Smith reviews Prof. H. C. Adams's 'Public Debts' in a very appreciative manner, describing the book as "careful, scholarly, and extremely suggestive." We observe this sentence, which Professor Smith uses in speaking of the industrial effects of public debts: "Professor Adams's discussion is acute and logical, and, in my opinion, a distinct advance upon the treatment of the same question by Leroy-Beaulieu, the distinguished French financier."

— Some remarkable facts as to the change in the population of Alsace-Lorraine are brought out by the recent publication of the results of the census taken in those provinces in December, 1885. The statistics are published in the *Landes Zeitung*, the official journal in the provinces. It appears that in December, 1885, the total population was only 1,564,355 as compared with 1,566,670 five years before, — a decrease of 2,315 in five years. Classified according to nationality, there were in December, 1885, 1,368,711 natives of Alsace-Lorraine, 151,755 Germans from other parts of the empire, and 43,829 foreigners; whereas in December, 1880, the natives of Alsace-Lorraine numbered 1,418,025, and the immigrants from Germany only 114,797. So in five years the native population has decreased by 49,254, while the immigrants have increased by 36,958. The increasing emigration of the native population explains their falling-off; and the *Landes Zeitung* estimates, that, if the present rate of diminution continues, the native population will have disappeared entirely in less than thirty years.

LETTERS TO THE EDITOR.

**** *The attention of scientific men is called to the advantages of the correspondence columns of* SCIENCE *for placing promptly on record brief preliminary notices of their investigations. Twenty copies of the number containing his communication will be furnished free to any correspondent on request.*

The editor will be glad to publish any queries consonant with the character of the journal.

Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

The Total Solar Eclipse of 1886.

THE following brief account is penned in order that it may be published in time to be of service to the observers of the eclipse of 1887.

It was found that by using rapid gelatine plates an exposure of one or two seconds was sufficient to show the details of the inner corona satisfactorily with an ordinary telescope-lens. With a portrait-lens the ratio of whose aperture to its focus was as one to five, one or two seconds' exposure showed the outer corona satisfactorily, as far as a distinct falling-off place in the light. This was at a distance of from 15′ to 30′ from the limb of the moon. Beyond that the light was very decidedly fainter, and was shown best by exposures with lenses of the same ratio, of from eight to forty seconds. This light extended to from one to two degrees from the moon's limb, was very faint, and seemed analogous in character to the zodiacal light. It was clearly not a mere reflection of the corona in the camera-lenses, as it did not extend over the moon's image, where it would, in that case, have been brightest. Measurements of the actinic brightness of different portions of the corona were made, which will appear in a subsequent paper.

The corona showed the usual short rays of light proceeding from the sun's poles, and from the south-western quadrant a very conspicuous ray, appearing like a hollow cone projected to a distance of some twenty minutes of arc. On one of the long-exposure plates it was noticed that this was crowned by a curious fountain-like structure, — three fine jets, about a minute in diameter, shooting up 35′ to 40′ from the moon's limb, curving round, and falling back towards the sun. On closer inspection, seven other jets were counted, all more or less well marked, and all proceeding from the summits of bright rays of the corona. Some of these returned towards the sun, but the majority faded away at about 30′ distance from the limb. Unfortunately, only one of the plates was taken on a sufficiently large scale, and with sufficient exposure, to show this phenomenon, and the whole appearance may therefore be due to defects in the gelatine film of that plate. But, as the markings are certainly on the plate, I have ventured to describe them; the more readily, as a somewhat analogous appearance, though on a smaller scale, is represented in Mr. Ranyard's 'Observations made during Total Solar Eclipses' (Memoirs of the Royal Astronomical Society, xli., Plate x.)

Passing from the corona to the prominences, a number of them were seen near the equator, on both sides of the moon; but the most conspicuous one of all was situated in the north-western quadrant. It extended to a height of about one hundred thousand miles, and had apparently a somewhat spiral structure. The spectra of the various prominences were shown very clearly by the prismatic camera. In the equatorial ones the hydrogen and H and K lines were prominent, superposed on a background of continuous spectrum; but in the large prominence the hydrogen lines were all absent, confirming Professor Tacchini's observation of its invisibility both before and after totality.

The H and K lines, however, were strongly marked; and it seems quite probable that numbers of prominences may escape ordinary observation by the spectroscopic method, merely because they shine only by the actinic radiations, and are hence invisible to the eye. The remedy for this difficulty would be, either to use a fluorescent eyepiece, or, better, to photograph them, instead of trusting merely to eye-observations. The position of the maximum density in the continuous spectrum of the prominences was found to be quite different from that of the corona. In the prominences and in the sun it is found to be not far from the G line, while in the corona it lies between G and F. This may indicate, that, besides the gaseous constituent, the corona is composed also of incandescent solid or liquid matter, which, while cooler than the sun, still shines by its own light. In this case, the position of the maximum might give us a hint as to the temperature of the corona.

Photometric measurements of the general light during totality were made, which, roughly stated, indicate a brightness equal to one candle at about 29 inches or 73.5 centimetres distance. Previous observations by Mr. W. O. Ross in 1870 had given 18.5 inches; and by Dr. J. C. Smith in 1878, 51.25 inches. It had been intended to make some observations on the actinic power of the sky during the eclipse, but unfortunately the plates reserved for this purpose were found to have been spoiled by the excessive moisture of the Grenada climate; so that no result was obtained. In some of the longer exposures, however, where a large field was used, portions of the landscape appeared upon the plates, showing that considerable actinic radiation was given out even during the total phase.

A large number of persons observed the shadow-bands, which appeared before and after totality. The general result of their observations indicated that the bands were about five inches wide and eight inches apart, that they were colored like the spectrum, and that they moved with a velocity comparable with that of an express-train; at all events, much faster than a man could run. Before totality the bands lay N. 12° W. and S. 12° E., and travelled west: after totality they lay N. 60° E. and S. 60° W., and travelled north-west. The wind during totality blew from the point S. 35° E.: during the partial phases it was blowing from six to nine miles an hour, but fell during the three minutes of totality to between two and four miles. The thermometer ceased rising as totality approached, but afterwards rose more rapidly. The extent of the effect produced on it amounted to .4° C. This figure may seem small, but it must be remembered that the fluctuation between sunrise and noon in these tropical islands in the summer season seldom exceeds two or three degrees.

In general results, the expedition may be said to have proved successful, although one of the most important instruments, the forty-foot photo-heliograph, failed to work, through lack of sunlight previous to totality, which prevented the application of the necessary adjustments to the mirror. It is hoped, however, that this omission will be in part rectified at the present eclipse, as a similar instrument, even better equipped, has been sent in charge of Professor Todd to Japan; and, if the weather favors, some excellent pictures should be the result.

W. H. PICKERING.

Harvard Observatory, Cambridge, June 23.