

according to the older (say Newtonian) definition. In particular, the function to be integrated might have a finite number of isolated discontinuities in the range of integration; isolated, that is, in the sense of being separated by finite intervals. Thus a new type of integrals, the Riemann integrals, had come under observation.

Quite recently the whole theory of integration has entered upon a new phase, mainly through the development of the theory of sets of points, and the enlarged notion of "function" now established. To Lebesgue is due a definition of a definite integral which is applicable in certain cases even when Riemann's is not. The Lebesgue integral agrees in value with the Riemann integral when the latter exists; just as the Riemann integral agrees in value with the ordinary integral when the latter exists. The very latest contributions to the theory are mainly due to Vallée Poussin and Baire, and apparently a kind of finality has been reached in the mathematical notion of an integral, at least in the light of our present mathematical knowledge. Students will find an excellent summary in Prof. G. A. Bliss's lecture, "Integrals of Lebesgue," published in the Bulletin of the American Mathematical Society for October, 1917. The reader must have a fair acquaintance with the theory of sets (including the notions of measure and content); otherwise the lecture is self-contained. References to recent works on the subject are also given.

Few things are more remarkable than the mathematical discoveries of the present generation, discoveries which have profoundly affected the very rudiments and foundations of logic, analysis, and geometry. They cannot be ignored even by the elementary teacher, and the problem of making them familiar to students is one that must be resolutely faced. G. B. M.

#### METEOROLOGY IN THE ARGENTINE REPUBLIC.

A COPY has reached us of the *Boletín Mensual* of the Argentine Meteorological Office—a new monthly weather review that has now been running for more than a year. The data summarised refer to the year 1916, and are given in useful form. The tri-daily meteorological observations for twenty-five stations are printed *in extenso*, and an abstract of these, along with returns from other fifty-two stations, are given in an extended table. The elements summarised are pressure, temperature, relative and absolute humidity, direction of the wind, rainfall, cloud, and the number of frosts experienced.

The stations range in latitude from 55° S. to 22° S., and in height from 4 to 3447 metres, so that all climates are represented. Tables of daily rainfall are given for more than 1400 stations. The distribution, as is to be expected in a country like Argentina, where the meteorological posts are in general also railway stations, is very irregular. In the province of Buenos Aires, which embraces an area equal to that of the United Kingdom without Wales, there are 556 rain-gauge stations, but in the equally large territory of Santa Cruz there are only eleven stations. The results are shown in six coloured maps, giving the rainfall, the departure of the rainfall from the average, the accumulated rainfall since the beginning of the agricultural year, viz. July 1, with departures from the average, the mean temperature, pressure, and prevailing winds, and the extremes of temperature. Detailed hourly values of declination, horizontal force, and vertical force as recorded at the Central Magnetic Observatory at Pilar (lat. 31° 40' S., long. 63° 53' W.) also appear, along with a summary of the seismic phenomena recorded at several points with the Milne or Bosch-Omori seismographs.

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The hydrometric branch of the service gives in each number of the *Boletín* the daily height of the principal rivers and lakes of the Republic as observed at fifty-eight places, with the departure from the average, also a special study month by month of the conditions at an individual station. So far the discussions refer to gauges at various points on the River Parana, where there are more than thirty years' observations available. Various interesting articles by members of the staff appear from time to time, and it is to be hoped that the prompt issue of meteorological data initiated by Mr. Wiggin, director of the Argentine service, will extend to other South American weather bureaux.

#### THE NEEDS OF OUR EDUCATION AT THE PRESENT DAY, WITH SPECIAL REFERENCE TO SCIENCE TEACHING.<sup>1</sup>

EARLY in the past year a work was published by a recently retired Ambassador which was understood in a special way to reflect the opinion of the Foreign Office. In this book he set forth the "necessary qualifications" for the diplomatic career, which in his opinion were "good birth, good breeding, good looks, and good health," and went on to say:—"Science is not necessary. Geography beyond elementary notions is not of great value. The diplomatist will acquire what geographical knowledge he needs of the country to which he is appointed while residing at the post. Few men can know it in sufficient detail beforehand."

We drifted into this war through sheer lack of expert knowledge of foreign countries and foreign languages. We have muddled and misconducted our war operations on sea and land through lack of expert knowledge, of science, on the part of those commanding at home, and sometimes—happily not always—of those commanding abroad. If by the proverbial good luck which saves Great Britain ever and again; if, still more, by the unparalleled bravery of our men in all branches of the combatant Services, by their innate common sense and coolness, and by the occasional streak of genius among their leaders, which not even a War Office or an Admiralty can occlude, we are sufficiently victorious to make peace on satisfactory terms, we shall need more than ever to reform our system of education and the general curriculum to be applied in all schools to the children and youth of both sexes. We shall not, I believe, conquer the Germans sufficiently in this round to be sure they will remain in the sphere allotted to them. We shall at best be able with the help of our Allies to turn them out of France, Belgium, and Italy. Serbia and Rumania, and leave them temporarily exhausted behind a frontier they only intend to respect until they regain strength. The one sure way to beat the Germans and keep them in their place is to become better educated than they are, and apply our new education to developing the resources of our own land and of the four or five million square miles in the tropics dependent on the London Government for direction.

Prior to the war, because of our contempt of a scientific education, we offered little or no inducement to our young men and women to serve the Home Country and the Empire in the application of science to industry, commerce, and the enlargement of the national intelligence. Therefore, we had to recruit our science teachers frequently from Germany. A great influx of clever men came to Britain from Germany under the ægis of the Prince Consort and from

<sup>1</sup> From the presidential address delivered before the Association of Public-School Science Masters on January 8 by Sir H. H. Johnston, G.C.M.G., K.C.B.