and along the south coast, a wave of less height was experienced

"The *Meda*, on our passage down from Ashburton River (when distant from 50 to 100 miles off the west coast of Australia, and about 1000 miles south-south-east of Sunda Strait), was visited by a shower of volcanic dust (in appearance like prepared "fuller's earth"), which fell some time between sunset of August 30 and sunrise of August 31, the wind being on-shore at the time.

"If the dust were associated with the disturbances in Sunda Strait of August 27 and 28, it must have travelled 1050 miles in three days."

BICENTENARY OF BACTERIA

[WE have received the two following communications on this subject:—ED.]

AT the present time, when so many anniversaries of great men and great events are celebrated, it seems opportune to remember that exactly two centuries have passed since a discovery of the greatest consequence was made in the Netherlands. In a letter dated September 14, 1683, from Delft, to Francis Aston, F.R.S., of London, Antony van Leeuwenhoek gives notice to the Royal Society that with the aid of his microscope he has discovered in the white substance adhering to his teeth very little animals moving in a very lively fashion ("animalcula admodum exigua jucundissimo modo sese moventia." "Arcana naturæ detecta," Delft, 1695: "Experimenta et Contemplationes," p. 42). They were the first Bacteria the human eye ever saw. Among them Leeuwenhoek distinguishes several species, the descriptions and drawings of which are so correct that we may easily recognise them. The rods, with rapid movement penetrating the water like fishes, are *Bacilli*; the smaller ones rotating on the top are *Bacterium*; one undulating species is *Vibrio rugula*; the parallel threads of unequal length but of equal breadth are *Leptothrix buccalis*; though motionless, they belong to the moving *Bacilli*. Leeuwenhoek wonders how, notwithstanding the scrupulous care with which he cleans his teeth, there could live more animalculæ in his mouth than men in all the provinces of the States-General. Some years later, not perceiving again the movements of the Bacteria between his teeth, he supposes he had killed them by taking hot coffee at breakfast; but very soon he discovers anew the old species, and the new drawings of *Bacillus* and *Leptothrix* which he sends to the Royal Society in the middle of September, 1692 (*loc. cit.*, p. 336) are still more accurate than those of 1683. They have not been surpassed till within the last ten years. It deserves our highest admiration that the first discoverer of the invisible world could already reach a limit which has never been overstepped, though the members of the Royal Society, when considering two hundred years ago the curious communications of the philosopher of Delft, may have scarcely foreseen that his astonishing discovery had opened to science a new path which only in our own days has led to the most important revelations about fermentation and disease.

FERDINAND COHN

Breslau, November 27

It cannot be a matter of indifference to English men of science, and especially to the Fellows of the Royal Society, that the bicentenary of the discovery of those immensely important agents of putrefaction, fermentation, and disease, the Bacteria, is at hand.

It was to the Royal Society of London that Antony van Leeuwenhoek communicated his discovery, and we may be sure that neither he nor the Royal Society of that day anticipated the extraordinary interest which would attach itself in two centuries' time to the organisms discovered by the patient and accurate student of minute life.

Leeuwenhoek's "discovery" is a remarkable example of that unexpected giving of rich gifts to future generations of men which marks the progress of scientific research in all its branches. It is for the Royal Society to devise some means of celebrating this bicentenary in such a fashion as to use the great interest and even fascination which Bacteria have at this moment for the English public, so as to excite sympathy with pure and unremunerative scientific research. Antony van Leeuwenhoek is the type of the single-minded student of living structures. The investigation of the properties and life-history of Bacteria, although commenced by him two hundred years ago, is still in its infancy. Schwann, Pasteur, Lister, Cohn, Nägeli, and Koch have brought us within the last fifty years far beyond Leeuwenhoek's first discovery, but a hundred such men are needed to carry on the work of discovery. Who will employ them? Are we to wait two centuries more for knowledge about Bacteria which lies, as it were, ready to our hands, waiting to be picked up? knowledge which will probably save many thousands of lives annually—if we may judge by the results already attained by the discovery of the relation of Bacteria to the supuration of wounds and to the production of diseases.

The Royal Society could not better celebrate the bicentenary of its Dutch correspondent's discovery than by taking steps to urge on the English Government the expenditure of ample funds upon a new and vigorous prosecution of the study of the relations of Bacteria to disease, in fact upon the foundation of a national laboratory of hygiene.

L.

THE UPPER CURRENTS OF THE ATMOSPHERE

ALL winds are caused directly by differences of atmospheric pressure, just in the same way that the flow of rivers is caused by differences of level; the motion of the air and that of the water being equally referable to gravitation. The wind blows from a region of higher towards a region of lower pressure, or from where there is a surplus to where there is a deficiency of air. Every isobaric map, showing the distribution of the mass of the atmosphere over any portion of the earth's surface, indicates a disturbance more or less considerable of atmospheric equilibrium, together with general movements of the atmosphere from regions of high pressure towards and in upon low-pressure areas. All observation shows, further, that the prevailing winds of any region at any season are merely the expression of the atmospheric movements which result from the disturbance of the equilibrium of the atmosphere shown by the isobaric maps as prevailing at that season and over that region. All observation shows, in a manner equally clear and uniform, that the wind does not blow directly from the region of high towards that of low pressure, but that, in the northern hemisphere, the region of lowest pressure is to the left hand of the direction towards which the wind blows, and in the southern hemisphere to the right of it. This direction of the wind in respect of the distribution of the pressure is known as Buys Ballot's Law of the Winds, according to which the angle formed by a line drawn to the centre of lowest pressure from the observer's position, and a line drawn in the direction of the wind is not a right angle, but an angle of from 60° to 80° . This law absolutely holds good for all heights up to the greatest height in the atmosphere at which there are a sufficient number of stations for drawing the isobars for that height; and the proof from the whole field of observation is so uniform and complete that it cannot admit of any reasonable doubt that the same law holds good for all heights of the atmosphere.

In low latitudes, at great elevations, atmospheric pressure is greater than it is in higher latitudes at the same height, for the obvious reason that owing to the lower temperature