then a last look into the huge abyss, we run easily down the side of the cone, and are in a few minutes at the Casa degli Inglesi again. Here we turn off towards the eastern side of the mountain, and soon come upon the edge of the Valle del Bove, to enjoy perhaps the most remarkable spectacle in Europe. We find ourselves now on the summit of an almost vertical cliff, nearly 4,000 feet high, which constitutes the head of an enormous cleft or valley, about eight or ten miles long by four or five broad; it is as if a piece, constituting about one-sixth part of the mountain, had been cut out of it. On either side it is bounded by cliffs of from one to three thousand feet high, and consisting of layers of lava and ashes traversed by dykes of basalt, trachyte, &c.; several volcanic cones are seen in it, of which Monte Simone, to the northern side, with its lava of 1811, and Centennario, Calanna, and Giannicola to the southern side, with the barren black lava of 1852, are the most noticeable; this immense depression was caused, according to the opinion of Sir Charles Lyell and of Gemmellaro the great Sicilian vulcanologist, by the subsidence of an ancient felspathic volcano, which must, according to calculations made from the inclination of its lava currents, have been much higher than the modern pyroxennic one. (La Vulcanologia dell' Etna, del Professore Carlo Gemmellaro; Catania, 1858.) Such a subsidence is well illustrated on the small scale by the Cisterna, a round hole about 300 yards in diameter, and at least 200 feet deep, which was formed precisely in the manner just mentioned during the eruption of 1792, and which we can see on our way back to the Montagnola; indeed, when we consider how much material is ejected during the various eruptions in the form of lava and of ashes, &c., we see that it would be strange if subsidences, and great ones too, did not happen occasionally.

We now descend quickly, finding our last night's tracks behind the Montagnola, and by 10.30 are off the snow, and find the mules ready for us. In returning to Nicolosi we are able to observe the various lava currents, and to study their sections in the channels of the streams which rush down during the melting of the snow in the summer months, and also to notice the gradual change in the vegetation which the darkness prevented our remarking during the ascent.

We find the heat more and more oppressive, and are afflicted with very severe headaches; on arriving at Catania we find it covered by a dense fog (an extremely unusual occurrence there), and so the congratulations on our safe arrival are mixed with wishes that the weather had been more favourable.

In a future communication some remarks will be made on a few observations taken during this excursion.

W. H. CORFIELD

Paraplegia in Kangaroos

SOME time ago I obtained from Mr. Fairgrieve the bodies of two Kangaroos, male and female, which died during the visit of Wombwell's Menagerie to the West of Scotland. In the female, which I received first, there was extensive ecchymosis in the nuchal region strongly suggestive of bites inflicted by her cage companions. To this I was disposed to refer the softening of the cervical spinal cord, which struck me when removing the brain. On visiting the menagerie, however, I found that her male companion was completely paraplegic, and that he had exhibited the same symptoms. The paraplegia had been progressive, and at the date of my visit, respiration was markedly thoracic. The animal was excited, but I could not satisfy myself whether this indicated cerebral disturbance or arose from the contagion of fear, a younger specimen in the same cage being much alarmed at my approach. The animal died at some distance from Glasgow. I made a careful post-mortem, and found no lesion save in the spinal cord and medulla oblongata. The removal of the cord was difficult, on account of the thickening of the membranes, and their adhesion to the bony walls of the canal. The cord was not merely softened; it was semifluid as far up as the origin of the cervical plexus, and welled out like thick cream from an accidental puncture of the sheath. Dr. Joseph Coats who assisted me in the examination, failed to detect any fatty degeneration of the nervous tissue. Its disintegration was, however, very complete. The other organs were healthy, and the body was well nourished. The disease was manifestly of short duration, and I can only hazard this conjecture as to its cause, that the cage was placed at the angle of the square formed by the cars, and that its inmates were thus exposed to draughts and damp, giving rise to acute meningitis. As, however, an Australian sportsman informs me that something of the same kind has been observed in Kangaroos kept in confinement, and thus deprived, to a large extent, of their customary exercise, I ask space for this abstract of the case, in hope that some of your contributors may be able to throw light on an interesting pathological question.

JOHN YOUNG, M.D.,
Glasgow University — Keeper of the Hunterian Museum

Geology and the Chatham Dockyard

BELOW the Alluvial deposit of St. Mary's Island is a very irregular surface of gravel, varying in thickness from 2 to 12 feet, and composed of flints but little rounded, and pebbles of Tertiary Sandstone; beneath the gravel is the Chalk. Now, the success of the Chatham Dockyard Works depends upon the stability of foundations that are built on piles driven into the underlying gravel, through which percolate considerable streams of water; this water must denude the chalk to an appreciable extent and form pot-holes, and the subsidence of the works can but be a matter of time. I can form no idea of the rate at which the Chalk would be denuded under the above conditions, as I am not aware of any experiments having yet been made on the "Action of Water on Chalk."

R. C. HART

Dust and Disease

PERMIT me to add my mite to Mr. Horace Waller's theory respecting the utility of mosquito curtains in warding off fever, generated by the miasma of decaying vegetation.

For the last twenty-five years I have held to this opinion, and acted on it in all my wanderings in the jungles of Ceylon, on the east coast of Africa, and in New Zealand, and I am convinced of its great utility. I have always likened it to Davy's "safety lamp," and I believe that over and above the "sieve-like" property, which a few days' use imparts to it, its value is great as warming the air which passes through its meshes, and keeping the temperature within it more steady and equal.

When the body is relaxed in sleep and the pores of the skin act freely, then is the time that the deadly miasma, cold and damp, even in the tropics, seizes on its victim. What jungle traveller does not know the feeling of the air an hour and a half or two hours before daylight? But the warmth from the body and breath within a well-secured mosquito net, I think effectually protects the sleeper.

This morning I compared the temperature outside and inside my mosquito net, and found it differ 8°, being 62° outside and 70° within, and even this was not a fair trial, for the bed is a large double one (two persons in it), exposing a large surface to the external air; the mosquito curtain being the largest sized *Net* that can be got (and not *Leno*) which I would advise for a travelling curtain in fever latitudes; and moreover, as our mosquito season is past, not tucked in all round as a well-secured curtain should be, yet with all these disadvantages the temperature inside was 8° warmer.

Then, again, who doubts that the body, invigorated by sound sleep, is not more able to resist disease in the day-time? Without a net in mosquito lands I find sleep impossible, and I suppose others do the same.

Let me therefore raise my voice in favour of the mosquito curtain, and advise all travellers in fever countries to look on it as their sheet anchor. E. L. LAYARD

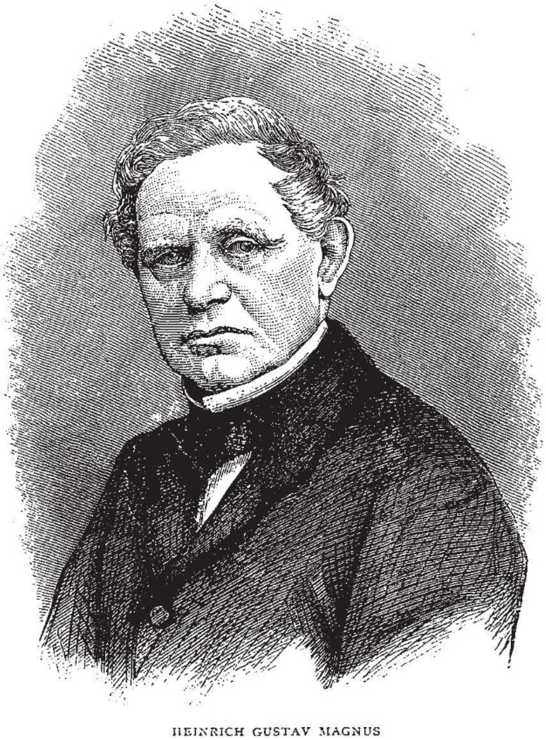
Cape Town, Cape of Good Hope,
May 3

HEINRICH GUSTAV MAGNUS

IN giving expression to the sympathy generally excited by the loss of Magnus, Professor Tyndall has raised the interest of the British public in a philosopher's life, simple, yet most eminently useful. At the present moment a mere outline of it is all we can venture to offer. Unable to appease, it may yet prove sufficient to keep up the interest in Magnus's life until a fuller biography will do more ample justice to his merits.

Heinrich Gustav Magnus was born on the 2nd of May, in the year 1802. Four years later, Berlin, his native town, had to resign its position as the residence of an independent kingdom. The French war raged with ever-increasing fury, and though Mr. Magnus, the banker, found the means of sheltering his children from the most severe consequences of the national calamity, their youth was naturally a severe one. It appears more than probable that the energy and ambition which raised all of them high above the level of mediocrity, may have originated in the stern impressions of their childhood. Thus one of the brothers, Edward, rose to the highest distinction as a historical painter, and is now one of the ornaments of the Berlin Academy of Arts. A younger brother distinguished himself as a physician; while the eldest, whose death preceded that of Gustav by some months only, continued and extended his father's banking business. A son of the latter became prominent during the last war in Mexico, where, representing Prussia at the Court of Maximilian, he showed great energy in his endeavours to save that misguided monarch's life.

The peculiar talents of Heinrich Gustav showed themselves at an early age. He exhibited a rare proficiency in mathematics when a mere child, and soon expressed a wish to devote himself to the study of nature. At the Berlin University, founded some years before, the Chair of Chemistry had passed from the hands of Klaproth into those of Mitscherlich, who was then at the height of his reputation. Young Magnus was twenty-three years old when he published his first paper on the pyrophoric nature of finely-divided metals. Two years later he received his Doctor's degree, and published a dissertation on tellurium. He subsequently passed twelve months at Stockholm, in the laboratory of Berzelius, who gave to Germany some of its greatest *savants*, of whom Wöhler, in Göttingen, and Gustav Rose, in Berlin, now alone survive. From Sweden he removed to Paris, returning to Berlin in 1831, and began there his university career as a lecturer on technology, a subject which he continued to teach till last summer.



HEINRICH GUSTAV MAGNUS

Nearly all his researches published during this time and up to 1833 were devoted to pure chemistry. A latent interest for natural philosophy can, however, be traced already in his earlier publications. Thus he determined the temperature at which oxide of iron is reduced by hydrogen, and analyses of several minerals were followed by determinations of the decrease of density which vesuvian and granite undergo in fusion. These determinations excited much interest at a time when the doctrine of isomerism was making its first appearance, and every two substances having the same composition and yet exhibiting different properties, were subjects of astonishment and of doubt. He even published papers on capillarity, and on the temperature of the interior of the earth and a thermometer fitted to register the same, as early as 1832. But the researches on which his early fame was founded are of a strictly chemical nature. A paper on the combinations of protochloride of platinum in 1828, contained the description of what is now called Magnus's salt, one of the first known of that important series of metallic ammonium salts, which acquired later an increased importance, as a support of the theory of substitution, and a link between mineral and organic chemistry. Five years later, in 1833, appeared his paper on the decomposition of ethyl-sulphuric acid, and on two new acids, ethionic and isothionic acids. These acids (together with the sulphobenzolic acid discovered by Mitscherlich in 1834) became the starting point of numerous discoveries. They increased our knowledge of isomerism; they prepared the way for the modern views on the constitution of natural bodies, and they enabled Strecker, in 1854, to form, artificially, a constituent substance of bile, taurin.

In the same year (1833) another important discovery concluded, so to speak, Magnus's career as a chemist. Together with Ammermüller, a doctor of medicine and head master of a public school in Würtemberg, he published his researches on periodic acid.

When Magnus appeared again before the scientific world, it was in a new science. He was created Professor of Natural Philosophy in 1834, and no research of his was published during the following three years, evidently spent in qualifying himself for his new position. Researches on steel magnets and on the boiling of liquids reopened the series of his discoveries in 1836; still he had not escaped the sway that chemistry exercised over his mind. Papers on the composition of a fossil resin, ozokerite, on the gases contained in blood, and on the combination of ethylene with sulphuric anhydride (carbyl-sulphate) were published in 1837 and 1838, and even later researches on the formation of tar from ethylene, and on the allotropic modifications of sulphur (1856),* show how much chemistry lost when natural philosophy took possession of Magnus's talents and energies. Later his modesty urged him to disclaim the honours so largely gained through his chemical researches. When after the opening of a university laboratory by Prof. A. W. Hofmann, the expanding scientific interest led to the formation of the German Chemical Society (in 1867), Magnus could only be prevailed upon with difficulty to become one of its vice-presidents, and although he worked on the committee with zeal, offering assistance and advice wherever it was needed, and publishing a paper on the diathermanity of chloride of potassium in the Reports of the Society, he pretended that he had lost all claims to be regarded as a chemist.

We have to revert, therefore, to the second side of his scientific work, his researches in natural philosophy. A determination of the expansion of air, instituted at the same time (1842) and in an analogous manner, by Magnus in Berlin, and by Regnault in Paris, and yielding all but absolutely the same numerical results, proved the exactness of both physicists. The most admirable conformity distinguished likewise researches on the tension of vapours, which both *savants* executed independently of each other in 1844, by entirely different methods. Relating chiefly to the tension of steam, the results thus obtained are as important for practical as for scientific purposes. Researches on the tension of vapours given off by mixtures of different liquids, and a comparison of the mercury thermometer and the air thermometer, preparatory to the great investigations just referred to, were published at the same time.

In 1855 Magnus investigated the form which jets of water assume when issuing from apertures of different shapes, and thereby opened to experimental study the surface-tension of liquids. His inquiry extended to the manner in which the motion of the aperture influences the form of the jet. Two years later he published detailed investigations on electrolysis. The discussion of this complicated question he founded on the theory of chemical substitutions. The temperature of vapours and the conducting power of gases formed the subject of his researches up to 1861. Until then gases had been considered as non-conductors. He proved that hydrogen conducts heat in the same way as do solid bodies, and thereby established a new and striking analogy between this element and metals.

During the last years of his life the radiation of heat formed the chief object of his researches. A paper on the polarisation of the dark rays of heat, the discovery of the diathermanous nature of native chloride of potassium, and lastly a full research on the emission, absorption, and reflexion of heat radiated at low temperatures, were the results of this protracted and fertile investigation. He showed that heat from different sources is refracted under different angles, and absorbed in different proportions by the chlorides of sodium and of potassium, by fluor-spar and other substances. He thus proved, that, if our eyes were able to distinguish different rays of heat, we should see the different substances glowing in the most varied colours at ordinary temperatures, just as we see them emit different rays of light when exposed to heat and observed with the spectroscope.

The receptacle of all his researches is the "Annals of Chemistry and Natural Philosophy" (*Annalen der Chemie und Physik*), published by his friend Poggendorff. He formed a fine collection of scientific apparatus, afterwards bought by the University and put under his control. As a lecturer, Magnus was a pattern of clearness. He loved teaching, and his diction, though plain, showed the high culture of his mind. While in his lectures he aimed at being comprehensible to the large number of students who wished to learn the rudiments of science, he instituted special classes for those who longed to enter into a deeper study of natural philosophy. Graduates and under-graduates assembled around him once a week, to enjoy what he called physical conversations. Here students in turn reported on investigations recently published, the master criticising the report and opening a discussion on those points which appeared to deserve a fuller explanation. Some favoured pupils were instructed in the methods of physical researches in his private laboratory, the master allotting subjects to them, urging them above all to exactness, and warning them against drawing hasty conclusions from their experiments. Many professors of natural philosophy, who have since obtained fame or reputation, have been educated in these classes. From a long list of names we will but mention those of Tyndall, Clausius, Wiedemann, Heusser, Quincke, Palzow, Villari, and Kundt. The laboratory joined his apartment, and he was thus enabled to watch from his sick-bed the investigations that occupied his thoughts. Magnus's health had been impaired for many months. He was suffering when he visited the last meeting of the British Association at Exeter. He was ill when he presided at the banquet given to Professor Hofmann on the 8th of January. Still he continued his work up to the beginning of February, when weakness and excruciating pain forced him to give up his lectures. He foresaw his death, and made the most minute arrangements, order being one of the characteristic properties of his mind. "I have written to you to ask for your advice," he addressed his physician, "but I foresee that my case will give you but little satisfaction."

Magnus married the daughter of M. Humblot, a well-known publisher. His wife, as well as two daughters and one son, survive him. The circle that assembled at his house was very large, and included the leading members of every profession, members of the university, merchants, statesmen, and artists. But he was equally accessible to every unknown youth who wanted his advice and assistance. Ever ready to help, he bestowed his aid, as if he received, not as if he conferred, a favour. Gentle-mannered, conciliatory, and persuasive, he was the mediating element of every society. Nothing can show better the kindness of his disposition than the love which, not his family or his pupils only, but even his domestics, bore for him. A faithful laboratory servant, who took care of his instruments and also nursed him through his last illness, bears witness that he could not endure to see unhappiness or unpleasantness around him. "Why," he would ask sometimes, "will you make life difficult to yourselves? Is it not sufficient your Master should make it difficult for you?"

His death is therefore felt, not only as a severe loss to science, but as a personal pain, by all who had the good fortune of approaching him. Numerous were those who, on the 8th of April, thronged the room where his coffin stood, hidden under palms and flowers. Some parting words were spoken by Dr. Müllensiefen, Professor of Divinity, and a song of Mendelssohn, sad, yet cheering, ascended from his grave. A. OPPENHEIM

* The latter investigation contained an error which was afterwards corrected by its author, and originated a new discovery. Magnus found that sulphur acquired a deep red or black colour when fused with minute quantities of various organic substances. This change was at first ascribed by him to an allotropic modification of the element.