kind are to be expected rather than severely commented on; especially considering the imperfect material which the authors had in some cases at their command, and the doubt which still hangs over the origin and preparation of some drugs familiar to pharmaceutists in this country. Only in a few instances is the species depicted for the first time; but in all other cases it has been, where possible, drawn afresh either from a living plant or from a dried specimen in the herbarium of the British Museum. No botanist's or pharmaceutist's library will be complete without this work, which will long be the standard book of reference on all subjects connected with the origin, preparation, and uses of the products of medicinal plants.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.*]

Novel Source of Frictional Electricity

I WISH to put on record the fact which I communicated to the Physical Society last week, that the motion of a chalk cylinder under a metallic surface generates an electric current having an E. M. F. of rather over one-third of a volt.[1] The strength of the current depends on the rate of rotation and the pressure on the surface of the chalk; the latter simply diminishes the internal resistance, which is of course very high. The discovery is due to a suggestion made to me so long ago as last November, by Prof. Silvanus Thompson, who wished me to try whether the motograph receiver of the Edison telephone could be used as a transmitter. I was unsuccessful at the time, but under favourable circumstances I find the voice is faintly but accurately transmitted on speaking into the receiver, so long as the chalk is made to rotate. W. F. BARRETT

Royal College of Science, Dublin, March 1

Carnivorous Wasps

IN NATURE, vol. xxi. p. 308, there is a statement as to an exceptional case of carnivorous habits in honey-bees, which I can believe all the more easily, as I know that bees, apparently from a lack of their usual food, occasionally attack plums and other fruits, of which in ordinary seasons they take no notice.

Several years ago, when grouse-shooting in the county of Sutherland, I observed a wasp (a rare insect in those parts) struggling with something on the ground, and found that it was in the act of devouring a caterpillar, which was still alive, but considerably mangled by the mandibles of the wasp. In Sutherland this species of smooth, green caterpillar is abundant, and is a favourite food of the black game, whose crops are sometimes full of it.

Is it not unusual for the common wasp to eat living creatures of any sort?

To all of our party the thing appeared extraordinary, and I thought of writing to NATURE at the time, but omitted doing so until reminded of the occurrence by reading about bees devouring moths. DAVID WEDDERBURN

March 2

Stags' Horns

MISS BIRD sends me, in answer to my inquiry, the following additional information as to the cast stags' horns found in the high valleys of the Rocky Mountains:—

"There are several small valleys opening from Estes Park, Colorado, which were resorted to by elks for the purpose of shedding their horns. In one of these, at the time of my visit in 1873, they lay quite thick. Some were quite recent, and others were bleached with age. I have not myself seen any but elk horns, but hunters told me that the spotted deer resorted to a valley near Long's Peak to shed their horns. I also came upon a large number of elk horns in a valley near Tarryall Creek, South Park, Colorado.

"Near Estes Park some of the horns were so recent and in such good order, that I hoped to procure some to take home; but on examining even the most recent closely, I found that they were all more or less injured by abrasion against some hard substance, as I thought. Two hunters, named Comstock and Nugent, told me that with good glasses, from certain points which they named, they had seen the elk violently rubbing their heads against the rocks, with the view, as they supposed, of ridding themselves of their horns. I am sorry that I cannot contribute more accurate observations on the subject."

B. W. S.

[1] The chalk had been impregnated some months before with a solution of phosphate of soda, but when used was practically dry, and had a hard, smooth surface, almost like polished marble.

PIERRE ANTOINE FAVRE

WE are called upon to chronicle the death, at Marseilles, on February 17, of Prof. Pierre Antoine Favre, whose name is so intimately connected with the history of thermo-chemistry. Born at Lyons, February 20, 1813, he entered upon a career of scientific study at Paris, devoting himself especially to chemistry, under the direction of Peligot. After completing the usual course of study, he accepted a position in the laboratory of Prof. Audral, under whose guidance, as well as under that of Dr. Jecker, he made a series of researches in physiological chemistry. Returning to his former teacher, Prof. Peligot, at the Conservatoire des Arts et Métiers, in the capacity of assistant, he speedily created a reputation by his investigations in thermo-chemistry, and was appointed Assistant Professor of Chemistry in the Medical Faculty of Paris. After filling this position for nine years, Favre was appointed to the Chair of Chemistry in the Scientific and Medical Faculties of Marseilles. Here his marked abilities caused his election as Dean of the Scientific Faculty. Failing health forced him to give up the active duties of his professorship in 1878.

Favre's first research (1843) was on the atomic weight of zinc, and had in view the ascertaining of its being a whole multiple of that of hydrogen. Following this (1844) came an extensive research on mannite, yielding a number of new and important reactions. The most noteworthy of his investigations in physiological chemistry were those on the blood of persons suffering from scorbutic complaints (1847), in which he signalled an increase of fibrine and a decrease of the number of corpuscles and on the composition and properties of the perspiration of the human body (1852). For this latter purpose he succeeded in collecting no less than 40 litres of perspiration, a quantity which allowed him to discover the hydrotinic acid peculiar to this liquid, as well as to show the predominating presence of NaCl among its soluble constituents. Favre's only contribution to technical chemistry was his proposal in 1856 to decompose the refuse sulphides of the soda works by hydrochloric acid, and conduct the sulphuretted hydrogen liberated to the pyrite furnaces or into solution of sulphurous acid.

Apart from the above-mentioned researches, his career as an investigator—extending over a period of nearly thirty years—was devoted almost exclusively to solving the problems of thermo-chemistry, devising necessary apparatus of the most exact precision, gathering an enormous mass of experimental data, correcting and comparing the results of other workers, and elaborating the entire structure of this important branch of chemical physics. For the first six years J. T. Silbermann, like himself at the time assistant in the Conservatoire des Arts et Métiers, was associated with him in the investigations. The first requisite for the correct determination of thermic equivalents was a series of calorimeters of the utmost exactitude, and this want was met by the construction of the two well-known pieces of apparatus bearing the names of the two chemists. The first, intended for the determination of the heat given off by reactions between solids and liquids, consists of a large mercurial thermometer with a reservoir of iron or glass inclosed by a non-conducting material. In the sides of the reservoir tubes of glass or platinum are introduced, extending deep into the mass of mercury. In these tubes the reactions between weighed amounts of various substances take place, and the heat given off to the surrounding mass of mercury causes a corresponding rise in the thermometer tube. The second apparatus devised for measuring the heat ensuing from the combustion of gases, is much more complicated, being modelled after Dulong's classical calorimeter, but altered in a variety of ways so as to ensure the utmost accuracy in the results. It is to these instruments, or modifications of the same, that we owe a large proportion of the data serving as a basis for our present knowledge of thermo-chemistry. Among the long series of observations carried out by their means, the most important were the series of experiments on combustions in oxygen gas; on the action of gases on each other, and on liquid or solid bodies; on the influence of dimorphism on the heat evolved by combustion, as in the case of red and vitreous phosphorus, where there is a difference of 16 per cent. in the number of units of heat resulting from oxidation; on the influence of polymerism, in which it was shown that the amount of heat evolved decreases with the increase of density in the vapour resulting from combination with oxygen; on the property of metameric bodies to yield different degrees of heat; on the relative diminution in the heat evolved by the combustion of a compound body, compared with that due to the combustion of its various constituents; on the combination of bases with acids, in which it was shown that the amount of heat evolved by the union of equivalent quantities of different acids with a given base is nearly always the same; on the heat evolved by metallic precipitations; on the heat developed by the solution of salts and gases; on the heat evolved by the absorption of gases in porous bodies, especially in connection with the condensation of hydrogen by means of palladium or platinum; on the phenomena of heat resulting from the mixture of liquids; on the development of heat in connection with the compression of liquids; on the specific and latent heat of a number of bodies; on the heat developed by the electrolysis of various compounds, and on the development of heat in electric conductors, and in electric action generally. Closely allied to some of the above researches were studies on the changes in volume consequent upon solution; on the dissociation of crystals; on the chemical effect of light; on electrolysis; and on the influence of pressure on solubility, in which connection he ascertained that the solubility of certain salts was increased when submitted to a pressure of from thirty to sixty atmospheres. Of the labour attendant upon the observation and recording of so extensive a series of experiments, it is difficult to form an adequate idea. As a monument of the patient, painstaking, conscientious collation of valuable physical constants, they rank among the achievements of modern physical chemistry, while too much praise cannot be accorded to the address and ingenuity with which the mechanical difficulties of so wide and varied a range of experiment were successfully met and overcome.

The results obtained by Favre alone or in connection with Silbermann, united with those due to the classical contemporaneous researches of Andrews, form practically the basis of modern thermochemistry, the introduction of their methods of exact measurement having much the same influence as Lavoisier's introduction of the chemical balance. Under the impetus given by their investigations, Berthelot in Paris, and especially Thomsen in Copenhagen, have during the last decade rapidly perfected and elaborated this subject, until at the present day there are few branches of chemical physics based on so numerous and varied experimental data.

The labours of Prof. Favre were recognised in France by his nomination to the Legion of Honour, and by his election as a Corresponding Member of the Academy of Sciences in the Section of Chemistry.

ARAGO

WE recently gave some account of the inauguration of a statue to Arago at Perpignan. We now give an illustration of that statue, with some extracts from the interesting address delivered by Dr. Janssen, who was present at the ceremony as representative of the Paris Academy of Sciences. After speaking of Arago's visit to Spain, and his election as a member of the Academy, Dr. Janssen went on to say:—

The young physicist was not long in surpassing the hopes which they (the Academicians) had placed in him. Within two years of his election he had laid before the Academy many very important memoirs, and a noble discovery which gave birth to a beautiful chapter of optics, the discovery of chromatic polarisation, as it is now called. He observed that polarised light acquired certain entirely new properties when made to pass through properly prepared crystalline plates. The brilliant phenomena of colours to which polarised light could give birth in these circumstances had a great theoretical bearing, and in the hands of Arago they became the bases of the most ingenious and important applications, the principle one being the invention of a polariscope which disclosed the least traces of polarised light, and which Arago was able to employ in determining the gaseous nature of the sun's dazzling surface.

Gentlemen, it was a great and glorious epoch for our Academy. The discoveries regarding light and the principles which regulated its phenomena succeeded each other almost regularly. Malus, Arago, and Fresnel were at the head of this great scientific movement in France. After Malus, who in 1808 discovered polarisation by reflexion, and a little later assigned its laws, Arago published this series of his beautiful works on chromatic polarisation, on circular polarisation, and the photometer; he adduced in favour of the wave theory the capital fact of the retarding influence of a thin metal plate in this system of two interfering rays of light. Finally Fresnel appeared on the scene, and this genius, so simple, yet so profound, connected these discoveries without an effort, and attached them again to the principle of undulations, of which he showed the fruitfulness, and which in his hands received its final definite triumph. Arago then has taken his place in this aristocracy, but posterity owes to him a still greater obligation. Thanks to his perspicacity in divining merit, thanks to the natural generosity of his disposition, exempt as it was from all jealousy, Fresnel, an obscure provincial engineer, was found out, encouraged, and called to Paris, where he had a situation. Arago formed a friendship for him which was never dimmed by a cloud and he missed no opportunity of supporting his works and the interests of his fame. Between such rivals in glory, a sentiment so pure and noble is one of the finest spectacles which the human mind can offer us. Truly, gentlemen, posterity should delight to allow a moral share to Arago in the grand scientific monument which it has received from the genius of Fresnel.

"The movement which produced these remarkable discoveries in light began to slacken when there came to us from Denmark in 1820, the announcement of a scientific fact of a very different character but of immense importance, and which threw back on electricity almost all the activity of the scientific world. Every one knows Œrsted and the discovery of the action of the current on the magnetised needle. The relations which ought to unite magnetism and electricity had long been foreseen, but the common bond had always eluded those who attempted to seize it. Now the bridge was thrown, and