British ornithologists—Yarrell, Macgillivray, Gould, Meyer, and Morris—describe the eye of the Golden Eagle (the less rare of our two British species, and the one usually referred to by our poets) as *hazel* or *brown*. The eye of the Sea Eagle is described by the same authorities as yellow. I cannot think that so accurate an observer of nature as Shakespeare would call either hazel or yellow eyes *green*. Can Mr. Ingleby cite any authority for such a comparison as "green as is an eagle's eye"? while the keen piercing sight of the bird is as proverbial as the swiftness of its flight. I am well aware that green eyes were held in high estimation by the old poets, especially by those of Spain; Shakespeare, however, does not seem to me to have shared in this predilection, as, setting aside the doubtful play of "The Two Noble Kinsmen," and the passage now in question, he uses the epithet three times only, I think, as applied to the eye, and then always *in malam partem*, viz., "green-eyed jealousy," "Merchant of Venice," Act iii. Sc. 2; "It is the green-eyed monster," "Othello," Act iii. Sc. 3; and in "Midsummer Night's Dream," Act v. Sc. 2, where the "eyes as green as leeks" are met with in conjunction with "lily lips," "cherry nose," and "yellow cowslip cheeks." I cannot think with Mr. Murphy (NATURE, vol. xix. p. 197), that the eyes which the old poets so admired as green were what we call blue; they were more probably *grey*, which often has a shade of green in it—the "eyen grey as glas" of Chaucer's "Prioresse." These green or grey eyes were, I think, usually an attribute of feminine rather than masculine beauty, as in the passage from "The Two Noble Kinsmen," Act v. Sc. 1, where they are mentioned in an address to Diana (not Neptune, as Mr. Ingleby has it). Shakespeare well distinguished between the different colours of eyes—see "Two Gentlemen of Verona," Act iv. Sc. 4, and "Twelfth Night," Act i. Sc. 5, for grey eyes; "As You Like it," Act iii. Sc. 2 for blue eyes; "Romeo and Juliet," Act ii. Sc. 4 for black and grey eyes, and Act iii. Sc. i. of the same play, where hazel eyes are mentioned.

ROBERT BREWIN

Exeter, January 20

Intellect in Brutes

SIR HARRY LUMSDEN allows me to publish the following little incident:—Late last autumn some partridges, which he had tamed and kept about the house, disappeared as usual and became wild. When the excessive cold set in and Aberdeenshire was deep in snow, Sir H. Lumsden was greatly pleased and surprised one morning to find his old friends on the doorstep waiting to be fed. Next morning they appeared with a wild covey of eleven birds, and the tame cock sat on the doorstep and crowed to the wild birds, evidently encouraging them to come and eat the food, which, however, they declined to do till it was put further from the house. Soon after the tame birds appeared with two covies. How did they entice the wild birds except by actual bird talk?

WALTER SEVERN

Feeding a Python

THE attack of a constrictor, at all events in confinement, is very often unsuccessful; but perhaps this may be because the reptile is not hungry. I have often seen the constrictors in the London Zoological Gardens strike several times at birds, pulling out feathers and even getting a firm hold and then releasing their prey, to renew the attack presently either with or without success. When the membrane over the eye is becoming opaque in consequence of the change of skin they frequently fail to hit the prey at all, but still persist until they secure it. I saw one of the large pythons take a rabbit in a way which must be unusual, I think. The rabbit was hopping about near the snake's coils when the reptile suddenly made a loop in its body, and firmly inclosed the victim without touching it at all with the mouth, or even raising its head. The rabbit died there, but the snake paid no attention to it for a quarter of an hour and subsequently swallowed it very leisurely.

ARTHUR NICOLS

THE GRAHAM LECTURE, ON MOLECULAR MOBILITY

THIS lecture, the institution of which was referred to in NATURE, vol. xix. p. 254, was delivered on the 22nd inst., by Mr. W. Chandler Roberts, F.R.S., Chemist of the Mint, before the Philosophical Society of Glasgow, in the hall of the University, where Graham graduated in 1824.

The audience, which was very large, included most of the professors of the University.

Mr. James Mactear, president of the Chemical Section, pointed out that they were doubly fortunate in having secured the services of Mr. Roberts, whose co-operation in his work Graham repeatedly acknowledged in the warmest terms, and in the fact that Mr. James Young, F.R.S., of Kelly, the life-long friend of Graham, had consented to preside on this occasion; he therefore vacated the chair in favour of Mr. Young, who introduced the lecturer.

Mr. Roberts briefly traced the influence of Black and Thomson in turning the attention of Graham to the study of molecular physics, to which he patiently devoted his life. In connection with the law of the diffusion of gases the lecturer claimed that Priestley made in 1799 an observation on the escape of hydrogen from a cracked jar. The subsequent and independent discovery of this phenomenon by Doebereiner in 1823 has hitherto been considered the starting-point of the experimental study of gaseous diffusion to which it undoubtedly attracted Graham's attention. After a brief review of the influence of Eastern and Greek thought on the study of molecular movement, allusion was made to Sir Christopher Wren's model representing the effects of all sorts of impulses that result from the impact of hard globulous bodies, which, according to Dr. Sprat, historian of the Royal Society, he proposed as the principles of all demonstrations in natural philosophy, it being considered "that generation, corruption, and all the vicissitudes of nature are nothing else but the effects arising from the meeting of little bodies, of different figures, magnitudes, and velocities."

Herepath's revival of Bernoulli's view as to the movement of gaseous particles was considered, and Mr. Roberts then described in detail the experiments that enabled Graham to establish the law of the diffusion of gases, and he illustrated experimentally the passages of gases through porous bodies, such as unglazed earthenware and artificial graphite, as well as through a layer of the hard translucent variety of opal known as hydrophane. The mode in which Graham studied the diffusion of the momentum of gases, by observations on viscosity as indicated by rates of flow through capillary tubes, was then described. It was pointed out that his law of diffusion forms the basis of the science of molecular mechanics, and his measurements of the rates of diffusion prove to be the measure of molecular velocities which have been so profoundly investigated mathematically by Clerk-Maxwell, Clausius, and Boltzmann, and experimentally by Loschmidt in developing the dynamical theory of gases. The lecturer then considered the passage of gases through colloid or jelly-like bodies which have no sensible pores, dwelling more especially on the separation of oxygen from air by the transmission of air through a thin film of india-rubber, a circumstance of special interest from a physiological point of view.

The liquefaction of gases formed the subject of one of Graham's earliest papers, in 1826, and it occupied his attention at intervals during his life. He held the view that hydrogen when absorbed by palladium is reduced to the metallic form, a supposition which has received strong confirmation from the success that has attended M. Raoul Pictet's efforts to solidify this gas; and that distinguished physicist stated in a letter to Mr. Roberts that it is probable Graham's indication of the density of solid hydrogen will prove to be nearly correct. Allusion was then made to Graham's opinion that the various kinds of matter now recognised as different elementary substances may possess one and the same ultimate or atomic molecule existing in different conditions of movement, the varying degrees of rapidity of this movement constituting, in fact, the difference between the elementary bodies. In other words, if the molecular energy of a so-called element could be changed, the element would be dissociated, a view of special interest in relation to the researches of Lockyer. The lecture was illustrated by many effective experiments, and concluded with the statement that it had not been instituted from the merely special interest of Graham's researches to the physicist and chemist, but in honour of the labours of a life the memory of which will be as enduring as its work, and to stimulate others to investigate as patiently and earnestly the varied phenomena whose basis is "molecular mobility."

Sir William Thomson, in proposing a vote of thanks to the lecturer, called attention to a diagram on the wall recording the rates of passage of gases by diffusion, effusion, transpiration, and by the peculiar passage through such "colloid septa" as non-crystalline metals or india-rubber; and he stated that before Graham's time these valuable physical constants were absolutely unknown. They had listened with much interest to the connection which had been traced between Graham's law of diffusion and the science of molecular physics, as well as to the account of Graham's work generally, so carefully set before them by Graham's pupil and friend.

PRELIMINARY NOTE ON THE SUBSTANCES WHICH PRODUCE THE CHROMOSPHERIC LINES[1]

HITHERTO, when observations have been made of the lines visible in the sun's chromosphere, by means of the method introduced by Janssen and myself in 1868, the idea has been that we witness in solar storms the ejection of vapours of metallic elements with which we are familiar from the photosphere.

A preliminary discussion of the vast store of observations recorded by the Italian astronomers (chief among them Prof. Tacchini), Prof. Young, and myself, has shown me that this view is in all probability unsound. The lines observed are in almost all cases what I have elsewhere termed and described as *basic lines*; of these I only need for the present refer to the following:—

b_3 ascribed by Ångström and Kirchhoff to iron and nickel.
b_4 ,, Ångström to magnesium and iron.
5268 by Ångström to cobalt and iron.
5269 ,, ,, calcium and iron.
5235 ,, ,, cobalt and iron.
5017 ,, ,, nickel.
4215 ,, ,, calcium, but to strontium by myself.
5416 an unnamed line.

Hence, following out the reasoning employed in my previous paper, the bright lines in the solar chromosphere are chiefly lines due to the not yet isolated bases of the so-called elements, and the solar phenomena in their totality are in all probability due to dissociation at the photospheric level, and association at higher levels. In this way the vertical currents in the solar atmosphere, both ascending and descending, intense absorption in sun-spots, their association with the faculæ, and the apparently continuous spectrum of the corona and its structure, find an easy solution.

We are yet as far as ever from a demonstration of the cause of the variation in the temperature of the sun; but the excess of so-called calcium with minimum sun-spots, and excess of so-called hydrogen with maximum sun-spots follow naturally from the hypothesis, and afford indications that the temperature of the hottest region in the sun closely approximates to that of the reversing layer in stars of the type of Sirius and α Lyræ.

If it be conceded that the existence of these lines in the chromosphere indicates the existence of basic molecules in the sun, it follows that as these lines are also seen generally in the spectra of two different metals in the electric arc, we must be dealing with the bases in the arc also.

[1] Paper read at the Royal Society on January 23, by J. Norman Lockyer, F.R.S.

ON A THEORY OF THE VISCOSITY OF THE EARTH'S MASS[1]

IN these two papers the investigation is continued of the physical results which follow from the theory that the mass of the earth is either viscous or imperfectly elastic. In the first paper of the series (which was read before the Royal Society on May 23, 1878, and of which an account appeared in NATURE, vol. xviii. p. 265) the theory of the bodily tides of such a spheroid was considered. In that paper it was shown that the bodily tides would lag, and that this lagging would produce an acceleration of the time of high water of the oceanic tides relatively to the nucleus. The author's attention was directed to the tidal reports of the British Association by Sir W. Thomson, and he has tried to find whether the tidal observations give any indications of a yielding of the earth's mass. The theory of the semi-diurnal and diurnal oceanic tides is so imperfect that it is impossible to say whether or not high water takes place earlier than it would do on a rigid nucleus; the long-period tides are those from which alone any indications are to be expected.

The fortnightly tide is the most marked of these, but its height is very small, and the results in the tidal observations show so much irregularity that it cannot be asserted with certainty that they represent the true fortnightly tide. Nevertheless, it is interesting to learn that, out of eleven years of observation at Ramsgate, Liverpool, Hartlepool, Brest, and Kurrachee, the fortnightly tide appears to be accelerated in eight cases and only retarded in three. Although the accelerations are exceedingly irregular, it may perhaps be maintained that these observations give some indications of a tidal yielding of the earth's mass.

The first of the two papers of which we are here speaking deals with the effects of the tidal distortion of the spheroid on its rotation, and with the reaction on the tide-raising satellite. An account of some of the results of the investigation was read before the British Association at Dublin, and an abstract appeared in NATURE, vol. xviii. p. 580, and therefore the principal results will be here merely repeated.

For convenience of diction the spheroid is spoken of as the earth and the tide-raising body as the moon.

It was found, then, that the obliquity of the ecliptic, the length of day and of the month, become variable, and that, if we look into the remote past, we find the obliquity less, and the day and month very much shorter than at present. When the changes were traced backwards as far as possible it was found that the whole diminution in the obliquity was about 10°, and that the beginning from which the earth and moon must have started was a state in which they rotated, as though fixed rigidly together, in 5h. 40m., the moon being then only 10,000 miles distant from the earth's centre.

In the second paper (read before the Royal Society on December 19) some other problems were considered. The first of these is concerning the secular distortion of the spheroid. Under the attraction of the moon the earth becomes distorted into an ellipsoidal shape, with the longest axis in the plane of the equator, but, since the tide lags, this longest axis does not point directly towards the moon. The excess of the attraction of the moon on the nearer protuberance above that on the further one gives rise to the tidal frictional couple. This couple tends to retard the earth's rotation; but it is clear that unless the tidal protuberance has some special form

[1] An account of two papers, "On the Precession of a Viscous Spheroid, and on the Remote History of the Earth," and "Problems Connected with the Tides of a Viscous Spheroid," by G. H. Darwin, read before the Royal Society on December 19, 1878.