the streams, where they exist, run in different directions. M. Flammarion thinks the westward movement is caused by the direction of sunset, towards which people feel disposed to form their gardens, build their houses, and in that direction most inclined to walk; the evening and not the morning being their usual time of recreation. Is not a more probable explanation to be found in the general dislike of an easterly wind? And, moreover, it has been pointed out that a westerly wind usually causes the greatest fall in the barometer, and thus the eastern portion of a town becomes inundated with the effluvia which arises on such occasions. Another and perhaps more potent cause may be the prevalence in Europe of south-westerly winds during the greater part of the year, whereby the smoke and vitiated air of a town are carried to the north-east more frequently than elsewhere; so that it is notorious the west end of a city is freer from smoke than the east end. Possibly all these causes may combine to produce this curious occidental march of the fashionable quarter.

W. F. BARRETT

Etymology of Aphis

WITH regard to the etymology of Aphis, I find the following in Lenné's "Synopsis der Natur-geschichte des Thier-reichs," p. 578:—

"Aphis, Blattlaus, nach Fabricius von ἀφίστημι trennen, abstehehen; richtiger vielleicht ἐφύσσα von ἀφίω schöpfen; musste dann aber Aphis heissen."

The second explanation is ingenious; but neither seems to my mind satisfactory.

W. W. SPICER

Itchen Abbas Rectory, Alresford, May 14

Phosphorescence in Wood

ONE wet evening last autumn some pieces of phosphorescent wood were brought to me, which had formed part of a dead beech-tree that had been cut down during the day. They shone brightly that evening. The next night they were dark until dipped in water, when the light revived but was much fainter than before. On the third night they seemed to have lost the phosphorescence entirely, for water produced no visible effect on them.

Your correspondent, Mr. W. G. Smith, states that the luminosity of decaying wood is due to the presence of various kinds of fungus, but does not say what is the cause of it either in fungi or glow-worms. There is something so striking in the light unaccompanied by sensible heat, that an unlearned person's curiosity is roused to know whether phosphorescence is akin to burning or not. Where can one learn what is known about it?

C. A. M.

Tears and Care of Monkeys for their Dead

WE have heard much of late about the emotions of animals, and might have heard it sooner had Charles Bell's profound work on the "Anatomy and Expression," received due attention. The moral or psychical emotions of the brutes most resembling man in structure are peculiarly interesting, and sufficient observations as to this point on the monkeys seem to be yet wanting. Before I saw a picture of a weeping monkey, by Edwin Landseer, I always thought that this animal could be moved neither to tears nor laughter; and I still think that more observations, by persons most familiar with monkeys, are required on this subject, and hope to elicit them by this note in NATURE. But an affectionate care of brutes for their dead has been considered either very rare or inexistent, though it would seem to have been shown by monkeys. At least, we have evidence to this effect in the "Oriental Memoirs," 4 vols. 4to, London, 1813, by James Forbes, F.R.S., and indeed, very likely, there may be still better observations, with which I am unacquainted, on the subject. Here is an extract thereon from Mr. Forbes's book:—"One of a shooting party, under a banyan tree, killed a female monkey and carried it to his tent, which was soon surrounded by forty or fifty of the tribe, who made a great noise and seemed disposed to attack their aggressor. They retreated when he presented his fowling-piece, the dreadful effect of which they had witnessed and appeared perfectly to understand. The head of the troop, however, stood his ground, chattering furiously;

the sportsman, who perhaps felt some little degree of compunction for having killed one of the family, did not like to fire at the creature, and nothing short of firing would suffice to drive him off. At length he came to the door of the tent, and finding threats of no avail, began a lamentable moaning, and by the most expressive gesture seemed to beg for the dead body. It was given him; he took it sorrowfully in his arms, and bore it away to his expecting companions: they who were witnesses of this extraordinary scene, resolved never again to fire at one of the monkey race."

GEORGE GULLIVER

Canterbury, May 24

RECENT WORKS ON ECHINODERMS

AMONG the most important of recent works on Echinoderms may be mentioned "The Revision of the Echini," by Alex. Agassiz. Of this work, which will be completed in four parts, Parts 1 and 2 were published early in this year, Part 3 is going through the press and may possibly be published in August next; it will contain the description of species not included in Part 2. Part 4 may be published this year; it will contain a review of the anatomy and classification of the order. This part will not be so well illustrated as the author had intended, for six plates of anatomy, the results of many years' labour, with all Mr. Agassiz's drawings, were lost in the great conflagration of November 9, and it will be impossible to supply their places. The present parts are accompanied by an atlas of forty-nine plates. Part 1 contains, in addition to an introductory chapter, the bibliography of the subject, a chapter on Nomenclature, a Chronological List of Names used from 1554, a Synonymic Index, and a chapter on Geographical Distribution. Part 2 contains Description of the Echini of the Eastern Coast of the United States, together with a report on the deep sea Echini collected in the Straits of Florida, by Count Pourtalès, Assistant United States' Coast Survey in the years 1867—1869.

The synonymic index will be simply invaluable to the investigator of the Echini. He who investigates the life-history of a species must surely know the name of the species he is investigating. It is therefore, even from this point of view, by no means an unimportant task to unravel the complicated and tangled network of synonyms; themselves an evidence of lack of knowledge on the part of many. Agassiz regards—and very correctly so—synonymy as the *History of the Species*, not its natural history. His opportunities for examining the types of those authors who have written on the subject were immense, and he has thoroughly availed himself of them. The great Museums of London, Paris, Copenhagen, Vienna, Stockholm, and elsewhere, were all visited by Agassiz; while the original specimens described by Klein, Gray, Desor, Michelin, and others were most carefully examined, and it must not be forgotten that in addition the Harvard College Museum contains one of the most perfect collections of Echini in the world.

It would serve no useful purpose if in this place we examined in any detail the catalogue of species of Echini given on pp. 88, 203 of this memoir; for convenience of reference the genera and the species in their respective genera are arranged alphabetically, but there is added a list of all known species arranged in their natural order, with the name adopted by Agassiz, the original name and the principal localities.

In treating of the geographical distribution of the Echini, Agassiz remarks that it was a matter of great surprise to him to find how few species, hitherto not noticed, were to be found in the European collections. Everywhere, although from different localities, were found repetitions of species already well known—so that in making a map of the littoral regions, but short stretches of shore were left out as unexplored. Though therefore new species may and will undoubtedly turn up, even in

well explored localities, we probably have even now a very fair representation of the littoral Echini of the world. It would of course be rash to make any predictions as to the number of new forms that will doubtless be brought to light by the researches of Wyville Thomson—but these will probably be deep-sea forms. Did space allow we would gladly have dwelt longer on this most interesting portion of Agassiz's memoir.

The total number of genera adopted is 90, with 207 species. The atlas accompanying these parts contains 49 plates—the first seven are devoted to charts, representing the distribution of the Echini throughout the old and new worlds, and the remaining portion to figures of some of the new or little known species. Some of the plates are photographs—and very excellent ones—others are photo-printed by the albert type process, and while these have scarcely the brilliancy or evenness of detail as such engravings as those of Echini in the expedition to Egypt, yet when the enormous difference in cost is taken into account, these photo-printed plates must be a subject of congratulation to the working and not over-rich naturalist. Some others of the plates are lithographed from Agassiz's drawings, and these we would select as being the most useful in this atlas.

Next we would mention a very important paper by Prof. Lovén, published in "Öfversigt af Kongl. Vetenskaps-Akademiens Förhandlingar," 1871, No. 8. This paper was read on June 14, 1871, but was not, we think, published until the summer of 1872, and as a translation of it in full by Mr. Dallas has been published in the "Annals and Magazine of Natural History," vol. x., 4th series, October to December 1872, we will but very briefly allude to it here. Prof. Lovén describes some very small spheroidal button-like bodies furnished with a short stalk, which is normally attached to a small, slightly projecting tubercle, which he calls *Spheridia*; these occur apparently in all Echinoidea except *Cidaris*; they are fully described as they occur in the different families. Lovén next describes the order which prevails in the disposition of the ambulacral plates throughout the whole class, for which he even gives a formula.

Passing from the sea urchins to the Brittle stars, we have also, from the Proceedings of the Royal Academy of Stockholm, a paper by Ljungman describing the collection of Ophiuroids made by Dr. Goës in the West Indies, in the Josephine Expedition. Fifty-seven species are enumerated, of which fifteen are described as new. Many of these latter were dredged from very considerable depths. The author adds to his paper a conspectus of the genera of Ophiidermatidæ and a conspectus of the Atlantic species of the genera *Amphiura* and *Amphipholis*.

Lütken, in an important memoir published in the Proceedings of the Royal Academy of Copenhagen, Part 2, 1872, entitled "Ophiuridarum novarum vel minus cognitatarum descriptiones nonnullæ," describes a number of new species from different parts of the world, as well as gives some details of little known species. To this memoir there is appended a chapter "On Spontaneous Division in the Star Fishes," at the conclusion of which the author sums up with the following general propositions:—(1), The most energetic manifestations of the faculty of regeneration in animals is the power of divisibility; (2), In certain forms of Radiates, in which the faculty of regeneration is very highly developed, spontaneous division takes place alone, as in Ophiuroids and Asteroids, or together with gemmation, as in Actinia; (3), Actual spontaneous division or "Schizogony," in the Actinia, Medusa, Asteroids, and Ophiuroids (which must not be confounded with the disguised forms of gemmation met with in Infusoria and certain Chetopods) may be regarded as a peculiar form of Agamic reproduction such as Blastogony, Sporogony, and Parthenogony.

Lastly we have to mention the appearance of a modest

catalogue of Echinodermata of New Zealand, with diagnosis of the species, by Capt. F. W. Hutton, F.G.S., Assistant Geologist, Colonial Department. In it thirty-four species are described, eighteen of them being described as probably new to science.

E. PERCEVAL WRIGHT

ON THE SPECTROSCOPE AND ITS APPLICATIONS

X.

I HAVE not yet done with the spot-spectrum referred to in last article. Not only is there general absorption, but there are indications of increased selective absorption in the case of the line D, as I could also show if I were dealing with the iron lines, the magnesium lines, or the other well-known lines of the solar spectrum. Not only, then, have we a general absorption, increasing as the middle of the sunspot is approached, but this sodium line D is also thickened, so that we have, as a result of a single examination of a single sunspot, the fact that a sunspot is due to general absorption, *plus* special absorption in some particular lines.

Now, in what I said some time since on the radiation of hydrogen, I pointed out to you that the F line of hydrogen was different from the C line—in fact, I showed that it widened out towards the sun—and I also told you that Dr. Frankland and myself have asserted that that widening out is due to pressure, and we have been able artificially to widen out this F line of hydrogen by increasing the pressure. Now it struck us that possibly we might find some connection between that widening out of the F line of hydrogen and the widening out of the sodium line in the spot which I have just shown you. There is an experiment by which it is perfectly easy for us to reproduce this artificially, so that you see we can begin at the very outside of the sun by means of hydrogen, and see the widening of the hydrogen lines as the sun is approached; and then we can take the very sun itself to pieces, and, by examining the pieces, see that the sodium lines vary in thickness in different parts of the spot, as the hydrogen does outside the spot region altogether: in fact, the pressure is continually increasing down in the spot exactly in the same way as it increases in the hydrogen envelope towards the sun.

If we take a tube containing some metallic sodium sealed up in hydrogen, and pass a beam of light from the electric lamp through it, by decomposing this beam with our prisms we shall obtain an ordinary continuous spectrum without either bright or dark lines, but by heating the metallic sodium in the tube which is placed in front of the slit, we really fill that tube with the vapour of sodium; and as the heating will be slow, the sodium vapour will rise very gently from the metal at the bottom, so that we shall get layers of different densities of sodium vapour filling the tube. Immediately the sodium begins to rise in vapour, a black absorption line shows itself in our spectrum in precisely the same position as the yellow line of sodium, and you will find that the thickness of the sodium absorption line will vary with the density of the stratum of vapour through which the light passes. Thus from the upper part of the tube we obtain a fine delicate line, which gradually thickens as we approach the bottom; and thus we reproduce the appearance in the spectrum of the spot where the layers of sodium vapour are very dense, and the very fine delicate line of the sodium vapour when thrown up into the sun's chromosphere.

We must next speak of what happens in the case of the magnesium lines. A very obvious magnesium line is lettered *b* in the solar spectrum. It is a triple line, separated by different intervals. There is a very impor-