am anxious to state it, in order to clear myself of any suspicion of having borrowed from that distinguished writer without acknowledgment. W. OGLE

April 2

Rime Cloud observed in a Balloon

In his letter, inserted in NATURE, vol. xxv. p. 507, Dr. Hermann Kopp says that "when Kratzenstein (1744) advocated the opinion anticipated by Halley (1686), that water-vapour may be condensed in a vesicular state, he availed himself of the *observation that in clouds and mists and condensed steam over boiling water, a rainbow is not to be observed in reflected light*." I have good grounds to suppose these negative observations were made only because the intensity of reflected light was not sufficient, as a white rainbow is produced under these circumstances. In support of these assumptions, I may be allowed to quote an observation published by M. Faye in vol. xxviii. of the *Comptes rendus*, 1849, p. 244, where the celebrated astronomer says :—

"J'ai observé cette nuit un phénomène que je signale aux personnes qui l'occupent d'optique météorologique. En sortant d'une salle de travail qui donne sur le parc de l'observatoire, j'ai remarqué que la lumière d'un bec de gaz en arrière produisait en face de moi par la porte entrouverte un arc-en-ciel blanc semblable à un halo lunaire . . . Cet arc-en-ciel blanc doit être aisement reproduit par les temps de brouillards ; ou pourrait le faire naître a la lumière électrique . . . et l'étudier plus complétement que je ne l'ai fait."

It is to be regretted that the suggestion of the illustrious astronomer has not been taken into account by the physicists in an age when the electric light is so frequently in their hands. I believe that this kind of experimentation will elucidate the controversy, and afford some new ideas on the constitution of clouds under several circumstances, as artificial clouds may be produced by using jets of steam or condensing steam over a boiler. I believe a white rainbow, which is really the corona of the aëronauts, would appear under these circumstances, and the phenomenon would take another aspect when electric light falls on solid snow. The electric lighthouses now building will afford to the keepers many opportunities of making this observation. I take advantage of this opportunity to ask M. Hermann Kopp if he will obligingly suggest some observations to be made in a balloon for examining whether the minute particles of water are liquid or solid. By doing so, he will confer a great benefit on aëronauts next winter. W. DE FONVIELLE

The Kunnungs

HAVING just returned from an exploring expedition east of Asam, where I met a number of "Kunnungs," I may report that they appear distinct, both in language and physique, to the Naga groups south of Asam, and, in language, have affinities with Singphos. Those I saw, were with one exception, much more prepossessing in appearance than the other hill-savages, and in colour very pale, *i.e.* 33 and 45 of Broca's scale. I have got a limited vocabulary. They are great iron and steel workers, and extend from the Mîi-kha to what they call the boundary of China, living on pile platform dwellings, raiding like all the hill-men about, having "morongs," or separate houses for the unmarried ; like others, also, their "morals" (as we should say) begin with marriage.

I am now preparing some notes of my trip, and send this as I am writing, as it may interest some to know whom these people seem like. S. E. PEAL

Subsagar, Asam

Burrowing Larvæ

IN his letter *ante* p. 265, Dr. Hagen states that he had "been informed by M. Lesquereux that a large number of magnolia leaves, from the Tertiary of Alaska, show serpentine trails not larger than a thread, running all over the leaves, apparently under the epithelium," and Dr. Hagen evidently believes them to be the mines or burrows of some Tineid larvæ. Precisely such mines are now made in this country, in the leaves of magnolias, by a larva of the genus *Phyllocnistis*, Zell. The moth has not been bred from the larvæ, but the mine and larvæ are indistinguishable from those made by *Phyllocnistis liriodendronella*, Clem., in leaves of *Liriodendron tulipifera*, and doubtless it is the same species in both of these allied trees. "What is a species ?" however, is a doubtful question in *Phyllocnistis*, at least in our American species. No species of this or any other genus is known to burrow in the leaves of any of the other genera of plants named in Dr. Hagen's letter besides Magnolia, Liquidambar, and Sassifras. Another *Phyllocnistis* mines the leaves of Liquidambar, and has been described by me under the name of *P. liquidambar-isella*, but it is probably identical with *P. vitifoliella*, Cham. The mine is similar to, but distinct from, that of *P. liriodendronella*. The larva which mines Sassafras leaves is that of *Gracilaria sassafracella*, Cham., but it leaves the mine at a very early stage of larval life, when the mine is too small to be recognised in a fossil leaf, unless it has been unusually well preserved. In this connection I will add that I distinctly remember having *somewhere* seen a figure, by Lesquereux I think, of a fossil leaf of a species of *Acer*, on which there were several blotches, one of which bore a strong resemblance to the mine of *Lithocolletis acerifella*, now made in leaves of *Acer saccharinum ;* but as I saw only the figure, and not the fossil, I cannot be certain that it was a mine of that larva.

Covington, Ky., U.S.A., March 10 V. T. CHAMBERS

Vignettes from Nature

WILL Dr. W. B. Carpenter kindly tell us where in "South America" are the "coprolite diggings" from which he had "just seen a collection of sharks' teeth"? I am aware that at Bull River, South Carolina, North America, are vast deposits of "coprolites" (almost identical in character with those of our Suffolk Cray), which are largely imported into England from the United States. Of these Bull River sharks' teeth, &c., I have had many specimens. W. BUDDEN

Ipswich, March 23

Red Flints in the Chalk

AT one part of Caterham Valley, Surrey, there is an example of an abundance of red flints similar to that mentioned by W. Fream (NATURE, vol. xxv. p. 437). The colour is, doubtless, due to the presence of oxide of iron, but I have not tested it. I find that the red flints invariably contain the remains of sponges, the network of spiculæ of which, being coated with the oxide of iron, show up in crimson or orange on a ground of black flint, and are very beautiful objects under a lens. Thus it appears to me that the redness observable in these flints is mostly due to the inclosure of sponges which contain either oxide of iron or iron which afterwards became oxidised. The yellow oxide of iron is disseminated throughout the *chalk* itself, some strata being very much stained by it. JOHN BADCOCK, Jun.

270, Victoria Park Road, E.

ON THE DISPERSAL OF FRESHWATER BIVALVES

THE wide distribution of the same species, and of closely-allied species of freshwater shells must have surprised every one who has attended to this subject. A naturalist, when he collects for the first time freshwater animals in a distant region, is astonished at their general similarity to those of his native European home, in comparison with the surrounding terrestrial animals and plants. Hence I was led to publish in NATURE (vol. xviii. p. 120) a letter to me from Mr. A. H. Gray, of Danversport, Massachusetts, in which he gives a drawing of a living shell of *Unio complanatus*, attached to the tip of the middle toe of a duck (*Querquedula discors*) shot on the wing. The toe had been pinched so hard by the shell that it was indented and abraded. If the bird had not been killed, it would have alighted on some pool, and the Unio would no doubt sooner or later have relaxed its hold and dropped off. It is not likely that such cases should often be observed, for a bird when shot would generally fall on the ground so heavily that an attached shell would be shaken off and overlooked.

I am now able to add, through the kindness of Mr. W. D. Crick, of Northampton, another and different case. On February 18 of the present year, he caught a female *Dytiscus marginalis*, with a shell of *Cyclas cornea* clinging to the tarsus of its middle leg. The shell was ·45 of an inch from end to end, ·3 in depth, and weighed (as Mr. Crick informs me) ·39 grams, or 6 grains. The valves

clipped only the extremity of the tarsus for a length of 1/1 of an inch. Nevertheless, the shell did not drop off, on the beetle when caught shaking its leg violently. The specimen was brought home in a handkerchief, and placed after about three hours in water; and the shell remained attached from February 18 to 23, when it dropped off, being still alive, and so remained for about a fortnight while in my possession. Shortly after the shell had detached itself, the beetle dived to the bottom of the vessel in which it had been placed, and having inserted its antennæ between the valves, was again caught for a few minutes. The species of Dytiscus often fly at night, and no doubt they generally alight on any pool of water which they may see; and I have several times heard of their having dashed down on glass cucumber frames, no doubt mistaking the glittering surface for water. I do not suppose that the above weight of 6 grains would prevent so powerful an insect as a Dytiscus from taking flight. Anyhow this beetle could transport smaller individuals; and a single one would stock any isolated pond, as the species is an hermaphrodite form. Mr. Crick tells me that a shell of the same kind, and of about the same size, which he kept in water "extruded two young ones, which seemed very active and able to take care of themselves." How far a Dytiscus could fly is not known; but during the voyage of the *Beagle* a closely-allied form, namely, a Colymbetes, flew on board when the nearest point of land was forty-five miles distant; and it is an improbable chance that it had flown from the nearest point.

Mr. Crick visited the same pond a fortnight afterwards, and found on the bank a frog which appeared to have been lately killed; and to the outer toe of one of its hind legs a living shell of the same species was attached. The shell was rather smaller than in the previous case. The leg was cut off and kept in water for two days, during which time the shell remained attached. The leg was then left in the air, but soon became shrivelled; and now the shell being still alive detached itself.

Mr. F. Norgate, of Sparham, near Norwich, in a letter dated March 8, 1881, informs me that the larger water-beetles and newts in his aquarium "frequently have one foot caught by a small freshwater bivalve (*Cyclas cornea?*), and this makes them swim about in a very restless state, day and night, for several days, until the foot or toe is completely severed." He adds that newts migrate at night from pond to pond, and can cross over obstacles which would be thought to be considerable. Lastly, my son Francis, while fishing in the sea off the shores of North Wales, noticed that mussels were several times brought up by the point of the hook; and though he did not particularly attend to the subject, he and his companion thought that the shells had not been mechanically torn from the bottom, but that they had seized the point of the hook. A friend also of Mr. Crick's tells him that while fishing in rapid streams he has often thus caught small Unios. From the several cases now given, there can, I think, be no doubt that living bivalve shells must often be carried from pond to pond, and by the aid of birds occasionally even to great distances. I have also suggested in the "Origin of Species" means by which freshwater univalve shells might be far transported. We may therefore demur to the belief doubtfully expressed by Mr. Gwyn Jeffreys in his "British Conchology," namely, that the diffusion of freshwater shells "had a different and very remote origin, and that it took place before the present distribution of land and water."

CHARLES DARWIN

THE FISHERY EXHIBITION AT EDINBURGH

IT has now been placed beyond doubt that this exhibition will prove successful, so far as a great show of interesting exhibits is concerned. Such exhibitions, of course, partake in some degree of the nature of a commercial adventure—the projectors being dependent on the gate money to pay the expenses incurred, which are naturally heavy—although the prize list has been largely contributed to by private individuals and public bodies. Such an exhibition being a novelty will no doubt attract, from day to day, a considerable body of spectators, although it is deprived of many attractive features by reason of the place of exhibition not being fixed on the immediate sea-coast. It would have proved interesting, could the spectators have been shown the beam trawl at work, or have had displayed before them a suite of herring nets, or other items of the machinery of fish capture. Such apparatus will be largely displayed in the place of exhibition, but their effects cannot so well be judged as when they are seen in action. Upwards of seventy prizes are offered for "exhibits" and "essays"; the latter, indeed, seem to be a chief feature of the exhibition, and if they can be utilised for behoof of the public and the fisher people, some good may result. But, although a large number of prizes were given for essays at the Norwich Fishery Exhibition of last year, the public have not been made any the wiser in consequence. A very handsome surplus resulted from the Norwich exhibition—nearly a thousand pounds it is said. Why, then, has not a portion of that sum been devoted to the dissemination of the knowledge contained in the prize essays? As regards the "exhibits," they can always be seen and understood by those who please to look at them, and if there are half a dozen of the same sort, they can be compared one with the other, and the decisions of the judges can be criticised, so that persons in search of new boats or other fishing gear, can give their orders for the same in the direction they think most suitable. But with respect to the essays the knowledge contained in these productions—judging from what took place at Norwich—will remain buried in the brains of the committee! Of what possible use is it to bestow a prize on the writer of an essay, "On the Fish Supplies of Great Cities, with special reference to the best Methods of Catching and Packing," if the knowledge thus obtained is never to become public? The prize list of the Edinburgh Exhibition is rich in material for the essayist, many subjects of interest in the fishery world being selected for illustration, such as the salmon disease, oyster culture, the migrations and spawning of sea fish, the utilisation of fish offal, the best methods of preserving fish alive for markets, the pollution of rivers, the natural history of the herring, and twenty other subjects. In view of the still larger international fishery exhibition, which will take place in London next year, it is time this question of "what ought to be done with the prize essays," should be ventilated and settled. Up till this moment it remains a blot on the Norwich exhibition that none of the prize essays sent there have been made public. So far as we know, only one of the essays has become accessible; that is the essay, on the salmon disease, by Sir James Gibson Maitland, which, however, was printed at the baronet's own expense. The exhibition at Edinburgh will be very much on the lines of those which took place some years ago at the Hague and Arcachon, except that the most attractive feature of the latter exhibition will be wanting in the well-arranged aquarium. Neither in Edinburgh nor in London can we hope to compete with the great fishery show of Berlin, which was undoubtedly very complete, the American national exhibits being of much interest. At home we have no fishery collection of a national kind, if we except Buckland's Museum of Economic Fish Culture; and, so far, we are at a disadvantage with the United States, which possesses a very complete collection of fishery apparatus of all kinds. It is to be hoped, in the circumstances, that America will do for this country what it did for Germany, give us an opportunity of seeing and judging for ourselves how far