

the mere conversion of fuel energy into mechanical work is not the most important function, and the machine is very complex. Still, in it we have no heat engine, but the sort of thing we are looking for. I do not wish to set capitalists and patent lawyers against me, and so I will not give my reasons for saying that there is no sufficient temptation for any scientific man to take up the quest. Unless it is taken up as a matter generally recognised to be of national or world-wide importance, there is no more use in tackling the problem than in hunting De Wet with a small army. Many scientific men must combine their efforts in an organised way, freely communicating their ideas to one another and consulting each other as to their experiments. They must be made free from pecuniary cares and assured of great rewards in case of success. I feel sure that if one or two chiefs like Lord Kelvin or Lord Rayleigh were entrusted with the expenditure of a million a year for two or three years by the English nation for the benefit of the world, with power to impress the services of all scientific workers likely to be of use, to make their operations as extended as they pleased, they would bring the invention within reach of the ordinary engineer.

JOHN PERRY.

#### Birds attacking Butterflies and Moths.

It was inevitable that the question of birds attacking butterflies would lead to some account of their attacks upon moths. Although I do not believe that any doubt has been thrown upon the keenness and frequency of the pursuit of moths by birds, a few examples of unusual interest deserve permanent record.

About the year 1887 I saw a fine specimen of the Lobster Moth (*Stauropus fagi*) at rest on the lamp-post at the entrance to Norham Gardens, Oxford. So far as I was aware, it was the first specimen which had been noticed in Oxford, and I was anxious to secure it. The moth was gently touched by a stick tied to an umbrella and came fluttering down feebly towards the ground, when, as I ran to catch it, a sparrow dashed across and seized it before it had reached the ground. I chased the sparrow, encumbered with the heavy moth, for some distance, and at first thought it would relinquish the prize. But it soon flew up to the roof of a house and ate the moth in the rain-water gutter.

I am indebted for the second and very remarkable example to Mr. W. Eagle Clarke, of the Edinburgh Museum of Science and Art. He writes, March 1:—"I send you an account of what I think is a somewhat unusual instance.

"In June last, as I was walking at midday along the road which runs close to the shore of Loch Assynt, in north-west Sutherland, a male Oak Eggar Moth (*L. quercus*) dashed past me with the swift irregular flight characteristic of that species. Suddenly a wheatear, a male, gave chase and, after several failures at capture, succeeded, after a clever but trying pursuit, in securing its prey. The body, &c., of the moth was eaten on the road, where I found the wings, the only remains.

"If I had not seen this 'flight' from start to finish, I should not have thought it possible that a wheatear could have been so swift and smart on the wing, for, as you know, an Oak Eggar is not an easy quarry to secure when in flight.

"I have seen a great titmouse capture the white butterfly—*Pieris rapae*—on the wing."

I am sure that any naturalist who is familiar with the flight of the male Oak Eggar will feel all the astonishment which Mr. Clarke expresses at the success of the bird.

The two remaining examples deal with attacks upon the pupæ of moths.

In July, 1900, Mr. A. H. Hamm, of the Hope Department, showed me a number of cocoons of the Lackey Moth (*C. Neustria*), which had just been opened, probably by sparrows, and the pupæ extracted.

The cocoon is tolerably dense, and is probably still further protected by an abundant sulphur-coloured powder which consists of minute crystals of aragonite (calcium carbonate), secreted by the malpighian tubercles of the larva and extruded from the anus before pupation. The cocoons were spun upon the under sides of leaves of black currant and apple, and it was of the highest interest to observe that every one had been opened by the bird pecking a hole in the leaf from the upper side

and thus making an aperture in by far the thinnest part of the cocoon. The observation was made in Mr. Hamm's garden in St. Mary's Road, Cowley Road, Oxford.

The last example is equally interesting, but does not deal with the attacks of birds.

Colonel J. W. Yerbury informs me that when collecting on Beown Mountain, Macgillicuddy Reeks, Kerry, on July 21–22, 1901, he found under a stone, at the height of more than 2000 feet, the old winter store of a mouse or possibly a shrew, consisting of eight to ten cocoons of the Emperor Moth (*Saturnia carpinis*). Every cocoon had been gnawed through at the base, viz. the end opposite to that from which the moth emerges, and the pupa extracted.

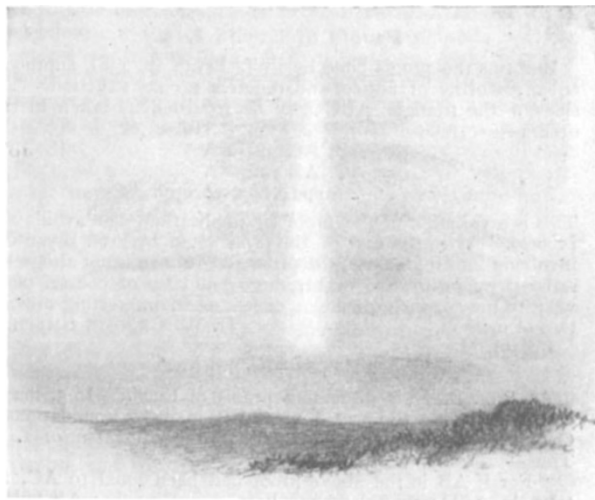
EDWARD B. POULTON.

Oxford, March 6.

#### Sun Pillars.

ON Thursday the 6th inst. a very fine display of this phenomenon was observed over a considerable area in the west of England, and having regard to Prof. Herschel's interesting letter on the same subject published in NATURE on July 4 last (No. 1653, vol. lxiv. p. 232), perhaps the few facts I have been able to collect may be of interest to some of your readers.

For several days the weather had been exceedingly fine and dry, with hot sunshine and a wind following the sun. The wind on the evening in question had almost died away at sunset; the latter was at 5h. 46m. Greenwich time, and would be about 6h. 5m. here. Close upon 5h. 30m. the light-beam first appeared rising vertically from the sun, which was still visible above a violet-coloured bank of haze; its base did not extend below the sun.



The beam had the appearance of a tall column of very beautiful orange-coloured light brighter in the centre than at the edges; its top must have been quite 20° above the horizon. The sun sank into the haze about 5h. 45m.; the column remained just as bright though reddening gradually until 6h. 20m., and was still distinctly visible at 6h. 40m. It had faded away by 6h. 50m. Faint bands of cloud were visible round the sun, and these sloped from the top of the light-column obliquely downwards in a northerly direction; I also noticed a repetition of the beam on either side of it, though this may have been purely an optical illusion.

I have ascertained that the effect was seen over the whole of Cornwall and Devon, as far east as Salisbury and Taunton, and north as far as Pendine in Carmarthen Bay. Snow has not fallen here for several weeks.

Fowey, March 11.

W. H. GRAHAM.

IN reply to Mr. Knight's inquiry in last week's NATURE (p. 439), he may be referred to many old books, as, for instance, to Moigno's "Répertoire d'Optique Moderne," published in 1847, in the first volume of which he will find a whole section devoted to meteorological optics. The explanation of most of