

lower eyelid produce this effect, whilst it is evident that a prism of the shape taken by the liquid in the angle must produce it.

2. If the bright point be examined in front of a looking-glass, so that the eye, its reflection, and the point are in a straight line, it will be found that (B) does not begin to be visible till the eyelid is just beginning to eclipse the pupil, showing that it is the light which grazes the lid that produces the effect. I have accurately reproduced the phenomenon by fitting a lens of short focus

Fig. 3

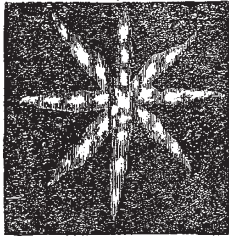
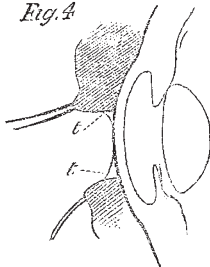


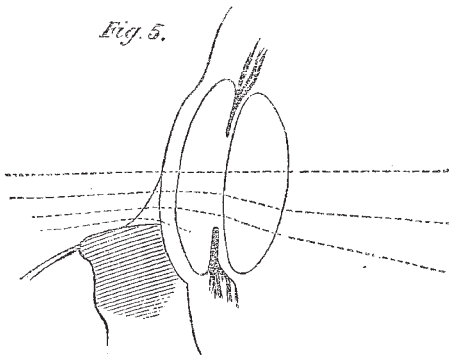
Fig. 4



into a pair of artificial eyelids, moistening the angle between the lens and lid, and photographing a bright point with the combination thus made. The diffraction effect (c) was also reproduced in this manner when the lids were brought close together.

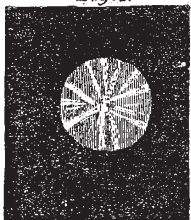
The phenomenon (A) may be studied in the following manner:—Throw into the eye, by means of a lens or mirror, a pencil of light so widely divergent as to form a luminous patch on the retina, whose border is the shadow of the iris. If the pencil

Fig. 5.



proceed from a point, this border is well defined and dust on the cornea and any small irregularities in the distribution of moisture on its surface are rendered clearly visible by the diffraction rings and bands which surround their shadows. But what is most striking is the star-shaped figure (Fig. 6) which occupies the whole lighted area.

Fig. 6.



If now the divergence of the pencil be gradually diminished, which it may be by withdrawing the eye further from the focus of the lens, this area diminishes in size and increases in brightness towards the centre, leaving, however, the rays of the star still bright, and protruding into the region which has now become unilluminated; and when the luminous point is far enough off to enable the eye to focus rays proceeding from it, the phenomenon (A) is seen to be the limiting form of this star-shaped figure. The rays in the figure correspond with the stellate structure of the crystalline lens, to which, therefore, I conclude that (A) is due.

ARNULPH MALLOCK

Antedated Books

As Editor of the Zoological Society's *Transactions*, I must maintain, in direct opposition to "Another F.Z.S.," that we set a good, and not a bad, example in dating our books. The parts of the *Transactions* not being issued at regular dates, I have

adopted the plan of placing the date at which the paper is going finally through the press at the foot of each sheet, for the very purpose of giving its correct date as nearly as possible. The part is always on sale within a month at least, I think I may say, after this date; so that this date and that of publication are to all practical purposes identical.

P. L. SCLATER,
Secretary to the Zoological Society of London

Aug. 22

MR. R. BOWDLER SHARPE makes a singular defence to my comments on his "evil practice" of issuing, in August, 1876, a work dated on the cover May, 1875. He says that if I had looked into the interior I should have found "abundant evidence" to convince me that the date on the cover was a false one. Seeing that when I wrote my former letter I had only just received the number from the publishers, I had no need to search for further evidence of such being the fact. Mr. Sharpe must be aware that the covers of works issued in parts are often bound up for the express purpose of preserving a record of the date of issue. How will this plan operate in the case of the second edition of the "Birds of Africa?"

"Another F.Z.S." states that in his copy the date "May, 1875" has a line drawn through it. This is not the case with my copy, nor is it so in others which I have examined.

F.Z.S.

Kerguelen's Land

If Mr. R. Bowdler Sharpe considers that, having published a description of the new Teal from Kerguelen's Land, he has done all that is necessary in relation to the collection of birds made by Mr. Eaton in that distant island, he will, I fear, find but few persons to agree with him. Most of his brother naturalists will side with me that our American friends have shown much greater energy in getting out a complete account of the ornithology of this interesting island at an early date than Mr. Sharpe in issuing a short notice of the single undescribed species.

THE REVIEWER OF "THE BIRDS OF KERGUELEN'S LAND"

A Large Meteor

I HAVE just seen a large meteor. It fell vertically in a line passing half-way between the pole-star and the nearer pointer, disappearing about 15° above the horizon. Where it came from I did not see. At disappearance it seemed a very elongated pear-shape, and changed colour from red to violet (commencing at the edges). Its horizontal diameter was about 20'. Time 8.10 P.M. about; my point of view, 4 miles due south of the dome of St. Paul's.

I may add, that on the night of Thursday, 10th, between half-past 11 and 1, while on a long drive in the neighbourhood of York, and looking up at the clear sky only as circumstances permitted, I counted twenty, and saw more, the moon shining brightly at the time.

RICHARD VERDON

London, Aug. 21

[Mr. Paul Robin, writing from Sheerness, states that on Monday evening, at 8.10 P.M., he saw a meteor brighter than Jupiter, with a white luminous train of about 5 deg. Its course crossed a line from the pole-star, joining the pointers.]

THE "CHALLENGER" EXPEDITION

WE have already published (vol. xiv. p. 197) the weighty testimony borne to the value of the *Challenger* Expedition by the leaders of science in Vienna. The following no less valuable address to Sir C. Wyville Thomson has been sent us for publication:—

To Prof. Sir C. Wyville Thomson, F.R.S., Director of the Civilian Staff of the "Challenger" Expedition, Edinburgh.

R. Museo di Fisica e Storia Naturale di Firenze, Florence, July 7, 1876

SIR,—The professors of the Natural Science Section of the Royal Institute of Florence have followed with the most intense interest the researches on the deep-sea fauna initiated by you during the *Lightning* and *Porcupine* expeditions, and so splendidly followed up during the voyage round the world of the *Challenger*. With anxious expectation we have followed the

results of your dredgings across the great ocean-basins of both hemispheres, and now that you and your able assistants have completed your great task so satisfactorily and are safely returned, we beg you to accept our most hearty congratulations and the expression of our united sentiments of admiration; for you have, indeed, revealed a New World to Biological Science and opened a new and most important field for physical research.

PH. PARLATORE,
AD. TARGIONI-TOZZETTI, Prof. of
Zool. and Comp. Anat.,
A. GLEGNI,
ENRICO HILLYER GIGLIOLI, Prof.
of Zool. and Comp. Anat. Verte-
brates,
Dr. GUELFO CAVANNA,
MGR. GIUSEPPE GRATTAROLA
(Mineralogy),
Prof. PIETRO MARCHI,
GIOVANNI ARCANGELI (Crypto-
gamie Botany).

The following is Sir C. Wyville Thomson's reply to the above:—

*To the Professors of the Natural Science Section of the Royal
Institute of Florence.*

20, Palmerston Place, Edinburgh, Aug. 12, 1876

GENTLEMEN,—Allow me in my own name and in that of my colleagues on the Civilian Scientific Staff on board the *Challenger* to thank you most cordially for your kind letter of congratulation on our return to England, and on the success of our labours.

Owing chiefly to the manner in which throughout the whole of this undertaking the Admiralty have uniformly accorded the first place to the purely scientific work, and to the heartiness with which the objects of the scientific specialists have been seconded by the naval officers on board, we have certainly been enabled to carry out our investigations almost more fully and completely than we had a right to hope. We are well aware, however, that we have only now entered upon the most difficult if not the most important part of our task, and I can only say that we will do all in our power to justify the liberal encouragement which we have received from Government by working out fully the mass of data and materials which we have accumulated, and publishing our results as soon as possible in an appropriate form.

I need scarcely add how great a gratification it has been to us to receive assurances of sympathy and approval from so many of our most distinguished fellow-workers, but it seems to me that such assurances are more specially welcome from Italy, the wonderful country whose language and modes of thought have been before us as a model from our childhood, and which perhaps above all others commands our interest and regard.

I have the honour to be, Gentlemen,
Yours gratefully and respectfully,
C. WYVILLE THOMSON

A CONTRIBUTION TO THE NATURAL HISTORY OF THE HERRING

THE Meteorological Society of Scotland has made an important contribution to the natural history of the herring (*Clupea harengus*), the capricious movements of which have recently attracted attention and been discussed in the columns of NATURE. It is often asserted by the more observant persons who assist in the capture of the herring, that the *Clupea* family are lovers of very cold water, and it is, doubtless, from a knowledge of this fact, that the story of the herring being a native of the Arctic regions took its rise. Pennant's tale of these fish coming annually in a vast *heer* from the high latitude of the northern seas has been discussed and settled again and again. There need now be no hesitation in saying that Pennant erred; indeed, he only gave literary life to the fables of the fishermen, and, so far as we know, he made no personal effort to determine whether or not the herring was a migratory fish. It has been ascertained beyond doubt that the herring is a local animal, the different varieties of which can readily be identified. Dealers or fishermen are able to distinguish between a

Loch Fyne herring and one captured in the Frith of Forth or in the Bay of Wick, or any other sea or frith. As a matter of fact, the herring is found on British shores all the year round, and there is no authority for supposing that the varieties taken in different localities are members of any great general body of these fish, or that there is one great shoal in existence every year, which, at a certain season divides and then subdivides itself, *à la* Pennant.

To come back, however, to the new discovery. We are indebted to the Meteorological Society of Scotland for some interesting experiments which have been made as to the temperature of the waters in which the herring can live with the greatest amount of comfort to itself, and, when known, with the greatest benefit to its captors. It has been determined by the experiments of the Society that the take of herrings is most abundant where the temperature of the sea is lowest. It was found in 1874 and 1875 that "the temperature of the sea, off the east coast of Scotland, from the middle of August to the close of the fishing season, was continuously and considerably higher in 1875 than in 1874, and that the catch of herrings was continuously and considerably lower during 1875 than during the same period of 1874." As regards the difference between surface and bottom temperature and their relation to the fishery, it has been noted that when the temperature of the surface of the sea is high, the fish are found in the deeper parts of the water. "The fish prefer, apparently, so far as the inquiry has gone, the lower to the higher temperature." When a thunder-storm has prevailed on any of the days devoted to the fishing a good take of herrings may be expected by the fishermen, "but, on the following day, few, if any fish are caught over that part of the coast, *unless at the extreme verge of a deep part of the sea* as if the fish were retreating thither." The Meteorological Society of Scotland are desirous of extending their inquiries and observations, and they wish the fishermen to aid the inquiry by taking the trouble of "observing the temperature of the sea at the surface and also at the depth at which the fish strike the nets." In other countries than ours observations of a relative kind to those prosecuted by the Scottish Meteorological Society of Scotland have been successfully accomplished. The Dutch have ascertained many interesting facts regarding the effects of temperature on fisheries. The Norwegians have also been prosecuting similar inquiries. Herr von Freeden, of Hamburg, Director of the German Seewarte, has also made observations, both as regards temperature and direction of wind. As regards the latter, he has come to the conclusion that north-west winds are the best for large catches, and northerly winds better than southerly, westerly better than easterly; also, that moderately strong winds, sufficient to ruffle the surface of the sea, are better than calm weather, and light winds almost as unfavourable as stiff breezes; a ruffling of the sea being in his opinion of considerable importance to success of fishing.

These are important discoveries, so far as they go, and must ultimately exercise considerable influence on the practice and results of the herring fishery. Hitherto the men have fished as in the dark, so far as regards the kind of knowledge which has just been found for them. That the month of August is a good time to seek the herring is about all that fishermen do know; the most likely part of the water in which to find them, or the depth at which they may be lying, they cannot tell. When the fishermen *shoot* their nets they may not fall in the path of the fish; the herrings they seek may be either above or below the snare which the men have let into the water for their destruction. By a fruitful continuance of the observations we have referred to, we shall be able to conduct the herring fishery with greater exactitude and likewise with more economy of time.