conditions will have a certain similarity to those existing in the atmosphere. The difference in the character of the circulation in the two cases could scarcely fail to give some useful hints.

Another illustration of the kind of flow to be expected near the borders of the Trades may be observed (although the analogy is not so close as in the experiment) whenever a current of water flows into a pond. The central part of the stream continues on its course for some distance unbroken, but the margins are bordered by eddies, which (looking down stream) are right-handed on the right, and left-handed on the left side, and consist of equal volumes of water from the stream and from the pond wrapped together after the fashion of a "roly-poly" pudding. When once formed, they have a certain life of their own, and follow erratic courses, often generating secondary eddies further from the main stream. In general their life is short, but occasionally vertical components in the flow of the main stream give rise to components in the eddies parallel to their axes, and in such cases the vortices may be sustained and intensified.

Much the same sort of action must be going on at the borders of atmospheric currents, and it must happen, especially in the turbulent regions, that either on account of the general circulation or from local causes, warm air will sometimes underlie colder strata, and this is what is required to prolong the life of eddies or vortices with vertical axes.

It may be said with some confidence that tornadoes, sand pillars, and waterspouts are due to local causes of this kind, and it seems highly probable that the deep barometric depressions which accompany the greater storms have a similar origin depending on inversions of level of the general circulation. In referring to warm and cold strata, the temperature must be supposed to be compared at the same altitude since, so far as thermometric readings are concerned, the upper air is always colder than that near the ground.

A. MALLOCK.

9 Baring Crescent, Exeter,
August 10.

The Conditions of Sex-change in the Oyster (*Ostrea edulis*).

IN the issue of NATURE for August 12, p. 212, and in several previous numbers, Dr. Orton has given some interesting information concerning the old question of the breeding habits of oysters, especially sex-change and its conditions. This problem has been discussed in a certain number of ancient treatises (Davaïne, Van Beneden, Lacaze-Duthiers, Hoek, etc.), but has been but little investigated in the course of the last few years. During my work at the Danish Biological Station I have, since 1919, been making experiments and investigations on the biology of the oyster in the Limfjord. As my results in several respects confirm and amplify those of Dr. Orton, I will give here a short account of some of the most important. In the course of the winter a more detailed paper will probably be published in the Report of the Danish Biological Station.

Dr. Orton confirms the observation, made by Möbius, that in European oysters a specimen directly after breeding produces spermatozoa, and I fully agree with him. In several cases I have proved, through experiments with oysters, in the shells of which a little hole had been bored, that an oyster in the course of less than a week changes from a female to a male.

Dr. Orton further mentions the interesting fact that he has been able to state that an oyster born in 1921 was spawning already in 1922; this phenome-

non he ascribes, and very rightly, to the high temperature of the summer 1921. I have investigated several thousand oysters in the Limfjord: the youngest female found by me was at least three years old, which is no doubt due to the lower temperature of the Limfjord. Neither did I ever find that oysters had ripe spermatozoa in the summer in which they were born; in the Limfjord that phenomenon only occurs in the following summer. Formerly the earliest time for an oyster to breed was much discussed. If we examine from where the different authors have obtained their material, it appears that those who advocated early breeding had got theirs from Southern France, while those who advocated two to three years as the age for breeding had had material from the English Channel and the North Sea.

From my experiments, and from the study of previous papers on this subject, I have come to the conclusion that the duration of the male stage depends on temperature, so that the colder it is the longer the stage lasts. At the temperature which ordinarily prevails in the Limfjord (15° - 16° in July), this stage will last three to four years. The oyster, therefore, breeds for the first time (the first stage being the male stage) when it is three to four years old; further, every single oyster individual in ordinary circumstances of temperature breeds only every third or fourth year, in especially cold years still less often, in warm years more often. These phenomena, together with the shorter duration of the female stage, explain the fact that in a certain number of oysters in the Limfjord we always find only a relatively small percentage of females. This likewise explains why the oyster breeds more sparingly the further north it is, and decreases regularly in number without any sharp boundary-line.

The breeding of the oyster is in at least three respects influenced by temperature. A high temperature increases the number of times an oyster may breed in its life, it shortens the time which the breed passes in the mantlecave of the mother animal, and, according to Hagmeier, it shortens the pelagic larva stage.

R. SPÄRCK.

Copenhagen, September 5, 1922.

Rise in Temperature of Living Plant Tissue when infected by Parasitic Fungus.

WHILE engaged on some work connected with the export of citrus fruits from South Africa to England, we have come across a point of interest to plant pathologists and bacteriologists which would seem worth recording at this stage.

In investigating the effects of inoculating oranges and grapefruit with *Penicillium digitatum* we found that a very definite rise of temperature took place in the infected tissue. We are not aware of such an observation having been made before in connexion with the invasion of plant tissue by a parasitic fungus, and it will be interesting to ascertain whether a similar rise of temperature takes place in all cases where living plant tissue is attacked by parasitic fungi or bacteria.

To what extent direct reaction of the host is responsible for the rise of temperature is still to be determined; certainly no rise of temperature was observed when the host tissue was killed prior to inoculation. Mercury-in-glass thermometers were used in making these observations, but the employment of thermo-electric apparatus will naturally be necessary to carry the investigations further.

This observation of ours would seem to open up

an entirely new field for research by botanists, and it is probable that it may have an important bearing on the problem of fruit and vegetable transport and storage.

An account of the experiments undertaken to illustrate the above will be published in due course.

I. B. POLE EVANS.

MARY POLE EVANS.

Office of the High Commissioner for the
Union of South Africa,
Trafalgar Square, London, September 22.

Coral in Medicine.

IN the serious contributions published in recent issues of NATURE on the subject of black coral, no one seems to have remembered that in the "*Médecin malgré lui*" Molière makes Sganarelle offer a medicinal cheese to Perrin for his mother, thus:

P. Du fromage, monsieur?

S. Oui; c'est un fromage préparé, où il entre de l'or, du corail et des perles, et quantité d'autres choses précieuses.

And Sganarelle's last words are, "Si elle meurt, ne manquez pas de la faire enterrer du mieux que vous pourrez."

F. JEFFREY BELL.

September 20.

Biography of Sir Norman Lockyer.

MISS LOCKYER and I are preparing a biography of my husband, Sir Norman Lockyer, in a form which I hope will make it not only of interest to his many friends and admirers, but also a contribution to the scientific literature of the present day. If any readers of NATURE happen to possess letters from my husband, I should be greatly obliged if they would give me the opportunity of seeing them. My object in making this request is that any matters of general interest which thereby come to light might be incorporated in the work.

The letters would not be quoted, except with the permission of their owners, and would be returned as soon as their contents had been noted.

T. MARY LOCKYER.

Salcombe Regis, Sidmouth,
September 22.

Harpoons under Peat at Holderness, Yorks.

AT the recent meeting of the British Association at Hull there was a very lively discussion at Section H about some harpoons said to have been found under peat in Holderness. May I ask you to be so good as to spare a little space, in order that I may say more fully what time prevented me from saying then?

There is a doubt about the authenticity of those harpoons. Mr. T. Sheppard believes them to have been *made* by the supposed finder; Mr. A. L. Armstrong, who introduced them to the meeting, believes them to be genuine. I also believe one of them to be genuine, the smaller of the two; about the other I am not so sure. But I expressed no opinion as to whether, if genuine, they were found locally or not, since I have no means of forming an opinion. It is possible that they—or the smaller of the two—were found in archaeological excavations abroad; and a fictitious site in Yorkshire given to them later to enhance their interest.

Mr. Sheppard quite rightly says that the discovery

of a flint axe of a certain type "in the neighbourhood" proves nothing. But I understood that it was found under a depth of peat. In type it is Campignian, exactly what one would expect to find associated with harpoons of early neolithic type.

There can be little doubt that in Holderness exist remains of the early neolithic age, remains which are older than the Long Barrows. Apart from surface-finds, the pile-dwellings or platforms at Ulrome are evidence of the existence of habitations there which seem to be neolithic; they contained stag's-horn axes of a well-known early neolithic type—though it is true that type survived right through the neolithic period on the continent. There is thus no *a priori* reason for rejecting the harpoons; they are just what I have always expected would be found in Holderness.

However, we cannot use suspect material as evidence, and the best thing to do is to go into the field and test it. If Mr. Armstrong will find a site where flint flakes and implements are to be found under the peat in sufficient numbers to justify digging, I will come and bring a spade with me.

O. G. S. CRAWFORD.

Ordnance Survey Office, Southampton,
September 18.

A Curious Luminous Phenomenon.

I HESITATE to trespass on your space in describing an observation which may be more common than I suppose.

While standing about twenty yards from the sea-shore and looking due south out to sea, the horizon and a region slightly above it (elevation only about 1° or 2°) were lit up by a faint white light which extended laterally over a segment subtending an angle of about 30° .

The conditions under which this light was seen were as follows: Time, 7.15 P.M.; wind strong from the west, bringing up a good deal of low cloud and very fine rain in the air causing bad visibility; sea rather rough with four lines of breakers at the shore. The appearances of the light were not the same to my wife as to myself. Her impression of it was that it was a light which she saw only if her eyes followed it, yet it consisted of a long streak of light parallel to the horizon with a break in it and then another small streak. My impression was that of a light which appeared to flash up over the horizon, subtending the angles already noted, the flashes not succeeding each other regularly. I had the feeling that my eyes had to be just right for getting the impression at all.

As to the cause, I think we can eliminate that of distant lightning; the weather had not been for many days of a thundery type, and it is unlikely that distant flashes would light up a streak of the distant sky embracing such a wide lateral angle and yet be restricted to an elevation of not more than 2° .

The sky above the horizon was darkly and uniformly clouded at the time, so that the horizon was barely visible, but white-capped waves could be seen far out at sea. The brightest objects in the field of view were the lines of breakers at the shore, and it may be that the retinal images of these being very near to that of the horizon were the cause of the phenomenon. Perhaps some readers of NATURE are familiar with this sort of observation and will point to the obvious cause.

S. R.

Aldwick, Sussex,
September 16.