The "Eurydice" Squall

THE loss of H.M.S. *Eurydice* on the 24th ult. may perhaps give a melancholy interest to a plain statement of the facts connected with the meteorology of that day.

The squall in which she capsized was one of a common class which occur when, after a long steady fall of the barometer, the mercury pauses for a few hours before commencing to rise. These squalls differ considerably from simple squalls, and are frequently complicated, as in this case, with small secondary cyclones.

Since the 20th inst. the general type of weather over our islands had been very uniform, an area of high pressure being constantly found over the west of Ireland, with a constantly low pressure near Stockholm giving cold north-west winds, conditions which are very common in the month of March. But while the general shape of the isobaric lines remained constant, the absolute pressure over the whole area had been diminishing rapidly till the 24th inst. On the morning of that day, the centre of a cyclone was near Stockholm, while no less than three secondary depressions were influencing Great Britain, and by 6 P.M. the whole system had gathered itself into two small cyclones whose centres were near Yarmouth and Bergen.

Such a development of secondaries with a north-west wind is not common, and is always associated with exceptionally wild and broken weather, of the kind which gives heavy local rainfall, with squalls, or violent cold thunderstorms, but not widespread or destructive gales.

In London the changes above described were well shown by a steady fall of the barometer from the 21st inst., which amounted to an inch at 3.45 P.M. on the 24th. As a heavy squall came on then, the barometer jumped up suddenly two-hundredths of an inch, as is often the case in squalls, and then fell slowly in about a quarter of an hour to its former level, where it remained stationary till about 9 P.M., after which it rose steadily. The squall, which lasted about twenty minutes, was followed by very threatening-looking weather, during which the wind perhaps backed a little to west-north-west, but at 4.40 P.M. it shifted to north-north-east and became strong, with heavy snow, till 5.20, when the weather moderated, the whole being evidently due to the complicated action of one of the secondary depressions before mentioned.

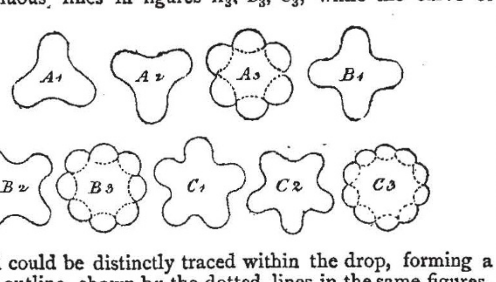
Materials are still wanting for tracing the connection between the squall in London at 3.45 P.M., and that at Ventnor at the same hour, but squalls often do occur simultaneously at distant places in connection with the trough of great non-cyclonic barometric depressions. The question of any such relation has not yet been worked out, and its solution presents great difficulties.

On the whole, then, the squall in which the *Eurydice* was lost, though of a common type, was somewhat exceptional in suddenness and violence. RALPH ABERCROMBY

21, Chapel Street, S.W., April 3

Leidenfrost's Phenomenon

A FEW days ago I was examining the "rosette" formed by a spheroid of water in a hot platinum capsule, and noticed that the outline was not a continuous curve, as is generally represented in books, but was "beaded" with re-entering angles as shown by the continuous lines in figures A_3, B_3, C_3, while the curve of



each bead could be distinctly traced within the drop, forming a "fluted" outline, shown by the dotted lines in the same figures. It was at once manifest that both the "beaded" and "fluted" figures were produced by the superposition of the retinal images of the drop in two extreme conditions of vibration; that, in the case represented by A_3, the drop was really vibrating like a bell which is sounding its first harmonic above its fundamental note, and therefore possesses six ventral segments, the extreme forms assumed being represented by A_1 and A_2 respectively, and that B_3 and C_3 represent the appearance of the drop when vibrating like a bell which is sounding its second and third harmonic respectively. To verify this a spheroid of about five-eighths of an inch in diameter was produced; and as soon as the beaded decagon, C_3, was steadily maintained, the room was darkened, and the spheroid illuminated by sparks from Holtz's machine. Immediately the curvilinear pentagons C_1 and C_2 were apparent, and frequently the vibrations continued perfectly steady for several seconds. When the drop had diminished in size the mode of vibration changed, and the crosses represented by B_1 and B_2 appeared when the sparks passed; on opening the shutters the beaded octagon B_3 appeared almost perfectly steady in the capsule. The figures A_1, A_2, and A_3 were obtained in the same manner, and with a larger spheroid twelve and sixteen beads were obtained, presenting respectively curvilinear hexagons and octagons when illuminated by the sparks. In one case a small spheroid presented a very large number of beads in its outline; but on examining it with sparks it was found to be produced by the crosses B_1 and B_2 rotating very rapidly about a vertical axis. Two or three particles of carbon introduced into a spheroid remained for a long time close to the surface of one "ventral segment," like lycopodium powder on a Chladni's plate, and when they escaped from it were ensnared by the next segment. The figures observed when the spheroids were illuminated by sparks were fully as exorbitant as those shown at A_1, A_2, B_1, B_2, C_1, and C_2.

If the spheroidal form be due to the combined action of gravity and surface tension, it is obviously to the latter force that we must look for the production of vibrations when, by any accident, the spheroid is disturbed. The amount of steam produced from the under-side of any "ventral segment" will, of course, be greater the greater the surface exposed; and when this is a fresh surface, will increase as the surface becomes heated by exposure. Hence the amount of steam escaping from beneath a "ventral segment" will be greater as it is contracting towards, than when it is moving from, the centre of the spheroid, thus supplying, on the whole, during each vibration an impulse in the direction of motion. It seems unnecessary to look farther for a supply of energy. WM. GARNETT

Cavendish Laboratory, Cambridge, March 15

Trajectories of Shot

HAVING observed a letter in NATURE, vol. xvii. p. 401, in which extracts from a paper of mine are commented upon by the Rev. F. Bashforth, I trust you will let me make a few remarks by way of explanation.

In the paper referred to I was trying to weigh against one another the merits of different methods of finding the trajectories of shot, the calculations being, of course, based upon Mr. Bashforth's tables; and the method which I liked the best did not contain the equation (a), which is the text of Mr. Bashforth's letter. Now without doubt the method I preferred had faults of its own, but it was a sort of argument in its favour if I could show that the other methods were not faultless, and in particular if I could show that the equation (a), which is the key of those other methods, had no merits of severe accuracy to set off against certain defects which I thought it might fairly be charged with.

The objections I had to the equation (a) are partly set forth in the first extract quoted by Mr. Bashforth; but one great objection to it is the tediousness of its application in practice. Mr. Bashforth appears to be greatly offended with my description of the way the equation is used, viz., that it is a process of guessing. But he cannot pretend that he has solved the equation according to any strict method; he has only guessed at a solution which falls in more or less with his tables. It seems to me he is here quarrelling about a mere name, because the process he describes and indeed illustrates is practically the process I describe, and it is idle on his part to give me the information contained in his letter, because I am very well aware that the second guess gives a better result than the first. But as regards the amount of accuracy belonging to the equation, I must still hold by the substance and tendency of my remarks on that subject, except in my unfortunate use of the epithet "dangerous," which I admit was extreme. I frankly confess that the force of the argument derived from discussing the values of $\frac{dk}{dv}$ is materially weakened when those values are numerically exhibited and compared with the tables. At the same time, when taken in connection with the peculiar way the equation is used, the numbers,