

Unfortunately rare, cyclones or grand rotatory movements of the atmosphere are, at least on certain portions of the earth's surface, of *every-day occurrence*. In Charleston, Savannah, and along the coast of South Carolina generally, the writer knows from experience that very few, if any, changes of wind are to be observed, but such as are due to the cyclone which happens just then to be passing on its northward journey; and even the apparent exceptions are probably not difficult of explanation.

There is in short an atmospheric "Gulf Stream," whose course, beginning somewhere eastward of the Caribbean Sea, is nearly the same as that of the oceanic "Gulf Stream," and this atmospheric stream is composed of an endless succession of cyclones chasing each other ceaselessly up towards the polar regions, along the track recognised as that of great hurricanes. These cyclones vary within very wide limits both as to velocity of rotation and velocity of translation, as well as in diameter, and all the characters usually ascribed to such atmospheric movements. Many of them exhibit no wind stronger than a pleasant breeze in any part of their field; and a few have so gentle a motion, at least in some parts of their circuit, as will not agitate an ordinary vane; a few are almost wholly without clouds, and very many wholly without rain or lightning. Their effect upon the barometer, when appreciable, must generally be very slight; but in temperature they are usually divided into a warm and a cool semicircle by a line which, in Charleston, lies about S. W. and N. E.

Observation of the winds, during a voyage in a sailing vessel from Charleston to Liverpool, along the course of the Gulf Stream, has satisfied the writer that this *stream* continues unbroken between these two points, and this conclusion was strengthened by repeating these observations between Liverpool and New York. In the former voyage, hardly one of the cyclones which passed over gave more than a stiff breeze, while in the latter, from Cape Clear to Sandy Hook, every cyclone was a storm, and one of them was reported by the captain, on his arrival, as a "hurricane."

The causes of this aerial current, and its connection with the circulation of the whole terrestrial atmosphere, it is not the writer's purpose at present to discuss, though he considers the discussion one of almost *cosmical* importance. But the existence of such a stream is a fact of practical commercial value, in fixing the natural highways for sailing vessels between Liverpool and the Atlantic and Gulf ports of the Southern States. Obviously the short route from Northern Europe to those ports will be that southward along the coast of Europe until reaching the trade winds, then westward to strike the cyclonic current in the neighbourhood of the West Indies, and then, if bound to Atlantic ports, northward with that current. When bound, on the contrary, from the Southern ports to Northern Europe, the short route is obviously that along the Gulf Stream, which is also that with the current of the atmospheric stream. To reverse this practice, either way, is deliberately to sail "against wind and tide," if such a stream exist.

The flow of atmospheric *waves* which, in a recent work, has been described as setting from the coast of America towards Europe, though the writer has not seen that work, he believes cannot be other than the flow of cyclones in that portion of the atmospheric stream lying between the vicinity of New York and the English Channel. The cyclonic character is not always distinct, and sometimes is completely masked by the great distance of the observer from the centre, and the consequent apparently rectilinear course of the wind; and the chances of mistake are still further increased when the observer is moving in a course parallel to the path of the centre of the cyclone.

These observations have already been brought to the notice of the Smithsonian Institution, and the writer hopes that something will be done in America towards the comprehensive, precise, and detailed inquiry which the subject demands. But unless attention of the same kind be given in Great Britain, and in the voyages of the Atlantic steamships, the resulting information will remain incomplete.

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### Singing of Swans

In times ancient and modern "singing of swans" has been reckoned by naturalists among "vulgar errors" and groundless superstitions. It may therefore be interesting to your readers to hear that swans actually do sing, which I can testify by my own personal experience.

From my ninth to my eighteenth year I lived at a place in the west of Iceland, called Gufufjörður. It is situated at the end of a small firth, called Gufufjörður, which is so shallow that by low water it is almost dry: the bottom of the firth is covered with sea-grass (*marhálmur*). In this firth hundreds of swans gather together all the year round, except during the winter months, when the firth is covered with ice; and in the month of August, which is their moulting season, when all of them leave this firth and go to another not far off, called Gilsfjörður. There is no apparent reason for this migration, as Gufufjörður seems in every way as safe and convenient for them during this season as Gilsfjörður. Tradition therefore accounts for this migration in the following manner:—Once upon a time two widows lived one on each side of Gufufjörður. At that time the swans did not go away during the moulting season, and the widows used to gather great quantities of swans' feathers, which are sold in Iceland at the present day at a halfpenny a piece. Thus the swans' feathers formed a considerable item in the income of the two widows. Once, however, one of the widows gathered feathers on a piece of land belonging to the other. A quarrel arose, and one of the widows uttered a spell to the effect that henceforth all the swans should leave Gufufjörður during the moulting season. I will not vouch for the correctness of this tradition, but the fact remains that this migration takes place annually during the above-mentioned season.

During nine years I have heard the singing of the hundreds of swans which gather together in Gufufjörður. In the morning and evening their singing is so loud that it can be heard miles away, and the mountains on both sides ring with the echo of it, for at that time every individual swan seems to join in the chorus. This is, indeed, a wonderful concert. The singing of the swan has not the least resemblance to the cackling of geese or the quacking of ducks. In fact, its voice is unlike the voice of any other bird that I have heard; it seems so clear and full, and has, as it were, a metallic ring in it. When it is calm and clear in the morning or the evening, the swans fly along the valley towards the mountains in parties of seven or nine, sometimes only three; as far as I can remember they are always in odd numbers. During their flight, they either keep in a straight line, one after another, or they form a triangle, leaving an open space in the middle: the foremost swan sometimes emitting single sounds at short intervals. The tradition of the singing of the swan being sweetest just before its death is well known in Iceland; but I am unable either to deny or to confirm this tradition, because I have never been present at the death of a swan.

The swans of Gufufjörður do not lay eggs there, and I am inclined to think that the most of them do not lay eggs at all, for their number in this firth does not seem to be less from the middle of May to the end of July, which is the season during which swans in Iceland lay eggs and bring up their young ones. On the mountains round Gufufjörður there are many small lakes or tarns, and on the banks of those lakes I have seen swans build nests and lay eggs; as a rule there is only one pair on each lake, and, strange to say, these swans sing but very seldom.

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### State Aid to Science

I REGRET that I should have worded my lecture on *Cosmical Physics* in such a way as to leave it doubtful how the central establishment I spoke of was to be supported.

Unable myself to conceive the possibility of such an institution being properly supported otherwise than by State aid, I fear I did not sufficiently realise that others might not be of the same opinion. At the time of the establishment of the present Meteorological Office, it was acknowledged that private scientific enterprise cannot be expected to furnish the money requisite to carry on an extensive system of meteorological observations, and the same conclusion equally applies to the other branches of cosmical inquiry.

The most convincing proof of the justice of this conclusion lies in the fact that the British Association, who have hitherto contributed a large portion of their income to advance terrestrial magnetism, find that they cannot do so much longer without detriment to other subjects which have an equal claim upon their liberality. They have therefore resolved to give up their connection with the Kew Observatory after the autumn of 1872. Further proof is surely needless.

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