

appeared to be black, and the motion either corkscrew like or snake-like, with vertical undulations. Three of the observers have since made sketches from memory, quite independently of the impression left on their minds, and on comparing these sketches, which slightly varied, they have agreed to sanction the accompanying outline as representing as nearly as possible the object which they saw. The party consisted of W. Barfoot, J.P. of Leicester, F. J. Marlow, solicitor, of Manchester, Mrs. Marlow, and several others. They discard the theories of birds or porpoises as not accounting for this particular phenomenon.

F. T. MOTT

Birstal Hill, Leicester, January 16

A Novel Experiment in Complementary Colours

THE old maxim of an *adjacent gray* in order to give visibility to a complementary colour seems to hold its ground. Mr. Charles T. Whitmell puts it very clearly when he alludes to "the advantage of a reduction of brightness to a level comparable with that of the existing colour."

Mr. Whitmell will find, I think, that this brightness may be still further reduced below the level of the existing colour. This may be shown by one or two remarkable experiments with light admitted through a small needle hole the one-fiftieth of an inch in diameter, made through the bottom of a half ounce pill-box painted inside with lampblack. On placing a sheet of white paper on the table at night in a room lighted with ordinary gas, and looking through the small hole with one eye, *both eyes being open*, he will see on the paper a disc of a beautiful cobalt blue colour, evidently the complementary of the yellow light of the gas. On examining the sky in the same way in the morning, there will be seen, especially if the weather is dull and hazy, as it has been of late, a disc of a *primrose yellow* colour, the complementary of the blue sky, which, although invisible, is still making its impression on the sensitive retina. Later on in the day, between five and six o'clock, when the weather is murky, the disc has a well-marked *pink* colour, the atmosphere being evidently tinged with dark green. The several results I have witnessed from day to day for the last fortnight, and they have been verified by others to whom I have shown them. But when the sky is very blue and clear, there is seen, for obvious reasons, a blue disc only.

In the above experiments there is the curious anomaly of having one eye impressed with the exciting colour, the other with its complementary.

JOHN GORHAM

Bordyke Lodge, Tunbridge, January 20

The Projection of the Nasal Bones in Man and the Ape

IN my letter in the last number of NATURE (p. 266) the walls of the human nose were carelessly ascribed to the elevation of the *pre-maxillary* bones. This is not the case. It is only in the ape and lower animals that the ascending processes of the *pre-maxillary* assist in forming the external nose-case, or muzzle, above the nostrils. The frame-work of the nose in the lower types of the negro seems, therefore, in this respect, to differ more from the nose-case of the ape, than it does owing to any great development of the nasal bones.

I take this opportunity to mention that the woodcut of the embryo, which I referred to, appeared first in Quain's "Anatomy." Also, the quotation about the nasal bones of the orang, I have since found from my notes, to have been derived from Prof. Mivart's "Man and the Ape."

January 22

J. PARK HARRISON

HOVERING OF BIRDS

THIS problem, to account for the phenomenon of the motionless hovering of hawks and other birds in mid-air, was the subject of correspondence in NATURE, vol. viii. pp. 86, 324, 362; vol. ix. p. 5; vol. x. pp. 147, 262; vol. xi. p. 364. The only plausible explanation advanced (by Joseph Le Conte, vol. ix. p. 5, and previously by the present writer, vol. viii. p. 362) was that the birds take advantage of slant upward currents of wind sufficiently strong to neutralise the force of gravity. But the arguments brought forward in support of this explanation were perhaps not quite conclusive, for lack of a sufficient series of observations.

During the past six years I have noted such instances as I have chanced to witness in the course of a wandering occupation, and now offer the results as a further contribution towards the solution of the question.

I may state at once that in every case where I have seen a bird hovering, the following three conditions have obtained:—

- (1) There was a fresh wind blowing.
- (2) The bird was facing the wind.
- (3) Beneath the bird there was a steep slope of ground facing the wind.

The particular localities in which I have observed the phenomenon are the following:—

(1) 1877, *September 17*.—Driving from Aberayron to Llanrhystyd (Cardiganshire). Wind W.N.W., moderate. Cliffs facing N.W. Gulls under cliff top, below road, in poise. Hawk under hill top, above road, in perfect poise.

(2) 1877, *October 13*.—Approaching Llantrisant town (Glamorganshire) from Llantrisant Junction. Wind S.W., moderate. Hawk over S.W. slope, barely poising, partly fluttering, tail plainly brushed up.

(3) 1877, *October 14*.—Llantrisant (Glamorganshire). Wind S.S.W. Rooks upborne, above S.S.W. slopes of hill with entrenched fort (Caerau).

(4) 1877, *October 20*.—Cliff facing S. between Longland and Caswell Bays, Gower (Glamorganshire). Gull and crows upborne. Wind moderate, S.S.W.

(5) 1877, *October 21*.—Cefn Bryn, Gower (Glamorganshire), facing S.S.W., climbing from Reynoldston. Rooks upborne. Wind strong, S. by W.

(6) 1879, *October 17*.—On road from Llantrisant to Pontypridd (Glamorganshire). Wind W. Rooks upborne over slopes facing W.

(7) *October 28*.—Killay, near Swansea (Glamorganshire). Hawk poised above hill-side facing N.E., to the west of Killay railway station. Wind N.E. I was almost under the bird, and could see the conduct of wings and tail suiting the ripples of wind.

(8) 1879, *November 5*.—Near Merthyr Tydfil (Glamorganshire). Hawk poised over N. slope of hill above (to S. of) tunnel on Merthyr-Abernant Railway. Wind N.

(9) 1880, *March 13*.—Near Penally (Pembrokeshire). Sea-gulls, rooks, and jackdaws upborne and floating with wings outstretched all along cliff line facing S., between Penally and Lydstep. Wind S., full on cliff from the sea. Gulls up to 200 feet above cliff edge. At greater height and inland, they were flapping. Different behaviour of rooks over inland northern slope.

Further on, over caves at north end of Lydstep Sands, hawk poised for 1 min. and 1½ min. at a time, just over cliff line, in teeth of wind off sea.

(10) 1880, *March 17*.—Near Cardiff (Glamorganshire). Hawk poised about 10 or 12 feet above railway embankment facing E.N.E. (20 or 25 feet high) of Llandaff and Penarth line, near Ely Station. Wind E.

(11) 1880, *March 27*.—Gulls uplifted over E. scarp of Beachy Head Down (Sussex). Wind E.N.E.

(Same day).—Over N.E. slope of Lighthouse Down. Bevy of eight gulls, all in perfect poise, immediately over edge of cliff.

(12) 1880, *August 8*.—Wells next-the-sea (Norfolk). Wind N.W. Hawks poising over W. slope of sea-wall, and over N.W. slope of sand-hills (projecting from the main line of dunes that runs east and west), and trying unsuccessfully over railway embankment which runs N.W. and S.E.

In several of the instances here recorded I was near enough to see that the bird was delicately adapting the slope and spread of its wings to the momentarily varying inclination and force of the wind. Among the sand-hillocks near Wells, on the Norfolk coast, I succeeded in approaching, under cover of ridges and long grass, within about ten yards of a hovering hawk, and saw the