Sand-Dunes

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in the latter of which years he obtained his commission as lieutenant. He subsequently took part in the naval operations on the coast of Borneo and in the Canton river, as well as in various other surveys. In 1845 he had received a commission under Sir John Franklin for the expedition in the *Erebus* and *Terror*, and it was only owing to an accident that he did not join his ship. Retiring with the rank of commander in 1866, he spent the latter years of his life in Australia, and was one of the founders (and subsequently Member of Council) of the Victorian Branch of the Geographical Society of Australasia. He entered warmly into the scheme of antarctic exploration set on foot in Australia in 1886, and presided over the joint committee of the Royal Society of Victoria and the Victorian Branch of the Geographical Society, appointed in furtherance of the scheme. In 1897 Commander Pasco published a work entitled 'A Roving Commission—Naval Reminiscences.' He became a member of our Society in 1873.

CORRESPONDENCE.

SAND-DUNES.

My friend Mr. E. A. Floyer, writing from Cairo, December 11, 1897, has sent me the accompanying notes on sand-dunes, which he kindly placed at my disposal. I have added a few notes, in square brackets. I think Mr. Floyer's observations cannot fail to be of interest.

VAUGHAN CORNISH.

Branksome Cliff, Branksome Park, Bournemouth, March 14, 1898.

NOTES ON MR. VAUGHAN CORNISH'S PAPER ON "THE FORMATION OF SAND-DUNES." (*Geogr. Jour.*, March, 1897.)

By E. A. FLOYER, F.G.S.

From observations on the dunes between Kuntara and El Arish of six consecutive waves measuring from east to west:—

			Height.		Length.		Length. Height.
First wave	...	...	6.0 inches	...	118 inches	...	19.6
Second "	...	...	6.0 "	...	118 "	...	19.6
Third "	...	...	6.0 "	...	118 "	...	19.6
Fourth "	...	...	10.6 "	...	145 "	...	13.7
Fifth "	...	...	7.8 "	...	135.8 "	...	17.4
Sixth "	...	...	7.4 "	...	118 "	...	16.0

[The following are the measurements of ripples of blown sand at Branksome, Derser, which were published in my paper. The agreement in the ratio $\frac{\text{length}}{\text{height}}$ is particularly interesting, in view of the different nature of the sand.]

Height.			Length.			Ratio.
$\frac{1}{16}$ inches	...	...	$1\frac{1}{4}$	...	...	20
$\frac{1}{10}$ "	...	...	$1\frac{3}{4}$	...	...	17
$\frac{1}{8}$ "	...	...	$2\frac{1}{8}$	...	...	17
$\frac{1}{6}$ "	...	...	$2\frac{1}{2}$	...	...	20
$\frac{1}{4}$ "	...	...	$4\frac{1}{4}$	...	...	17
$\frac{5}{16}$ "	...	...	6	...	...	16
$\frac{1}{2}$ "	...	...	7	...	...	14

The windward slope was mosaiced, if the word be allowed, with the coarse sand

in bottle No. 1. [The samples of sand will be placed for inspection in the Map-room at the Society's House.]

The dominant wind is, at El Arish west, and at Kuntara west-south-west. It appears to curve from west-south-west to west. It is markedly dominant, and would appear, at the first glance, to have brought the sand from the deserts west

of the Nile and to be pouring it into the Mediterranean. The sand is moving over a flat hard surface, a vast sandy plain.

The district may be divided into half by a well called Bir el Abd. There are in the western half isolated dunes and masses of dunes. There are no fulges. There are no accurately shaped barchanes. One characteristic of a dune is that it holds

the water like a sponge. The steep leeward cliff often shelters a clump of date trees, some of which, but rarely, are smothered.

Sketch 1. We are looking west. The band of almost perpendicular sand, which is a characteristic of all these dunes, gives an appearance of a cowl. I think the suggestion would occur to others besides myself that these dunes resemble great sphinxes, over whose features a veil of sand is poured.

Sketches 2 and 3 are an approximate section of the dune and a plan of the date grove.

Sketch 4 emphasizes the cowl-like appearance. We were riding over a mass of dunes and looking north-west.

Sketch 5 shows the cowl-like appearance, and also that, west of Bir el Abd, the wind is west-south-west. We are looking west. We were standing at Katia and beholding, at a distance of 4 or 5 miles, the mass of dunes which we were about to cross, and which are shown in Sketch 4.

Sketch 6 shows a typical small cluster of dunes.

Sketch 7 is a theoretical, roughly sketched, ground plan of the dune shown in Sketch 6.

Sketch 8 is a view to our right as we march west. I have made no observations as to the strength of the wind, but I have often been surprised to find the sand motionless in a wind that seemed very high. Often the sand will be moving on one dune, and quiet on all the neighbouring dunes. [Dr. Blandford has pointed out that electrification is probably an important factor in the mobility of sand.] It

may be true that a small stream may arrest a moving dune. At El Arish, the west of the valley, which carries water for a few days yearly, is dune, while the east is friable yellow mud. Most of the dunes got where they are before the Suez Canal was dug. But I have seen sandstorms which, though the wind has not been excessive, have carried a great deal of very coarse sand across the canal.

Between Halfa and Assuan a violent west wind is common. While it blows,
No. V.—MAY, 1898.]

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the golden sand may be seen pouring into the Nile. But at low Nile much of this resumes its journey eastward. The Egyptians have a rhyme saying, "We suffer, on the west, from the sand encroachments; on the east, from the marauders."

Starting from Kuntara, you march over a salt plain sprinkled with sand and studded with bushes, striated west-south-west and east-south-east. You then cross a large mass of dunes, and regain similar plains at Katia. Thence the dunes

are lower, and generally fixed. They run in broad east-and-west ridge and furrow. When fixed by bushes, the steep leeward cliff becomes less steep. Grazing camels tread it down, and it is ploughed and sown with barley. Marching east, the dunes get nearer the coast. At El Arish they are near the sea, and beyond El Arish they form, on the edge of the sea, a long east-and-west range, with a copious supply of fresh water on the north, and on the south are large and fertile plains sown with

barley. Some 20 miles to the south are apparently other dunes, too distant for any characteristics to be observed.

I do not find myself able to imagine any obstacle being permanent in the desert. Stones, trees, everything becomes sand.

When approaching from the east, and about 2 miles from the dunes, I collected some sand. The upper layer, rather coarse, is bottle No. 2. The under layer is bottle No. 3. The sand from the leeward side of the dune is bottle No. 4.

[Mr. Floyer's *sand-cowl* I take to be a form imparted by erosion. Since receiving the above notes, I have seen in operation the process by which, I think, it is produced. This was at the sandhills at the entrance to Poole Haven. A cowl, which culminated in a slightly overhanging cornice, was being carved by

the sweep of the wind from a small dune of unbound but compacted sand. The dune had then been built about twelve months, and pressure, moisture, and so forth, had given coherence to the mass, whilst leaving the sand-grains discreet. When in such condition, sand-structures are readily modelled to the swirling eddies of the wind.]

Mrs. Bishop's 'Korea.'

April 17, 1898.

From Mr. Chisholm's statement in his review of 'Korea and her Neighbours,' corroborated by a communication from the Rev. L. O. Warner, formerly of "Bishop Corfe's Mission," in answer to a question which I addressed to him with regard to his Korean journeys, I learn with much regret and vexation that, owing to a mistake, which had a very simple origin, I have unwittingly deprived him of the distinction of being the first European to get up the south branch of the Han, as far as Tan Yang. On learning this fact, I am anxious that the missionary traveller should receive full credit for his journey.

I. L. BISHOP.

**MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY,
SESSION 1897-98.**

Special Meeting, March 23, 1898.—Sir CLEMENTS MARKHAM, K.C.B.,
President, in the Chair.

The Paper read was:—

"The Geography and Resources of the Klondike Region." By William Ogilvie,
of the Canadian Geological Survey.