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THE SCOTTISH GEOGRAPHICAL MAGAZINE.

CAPE JUBY.

By FRED. S. ZAYTOUN, M.B., C.M. (Ed.)

(Read before the Society at Edinburgh, in January.)

WHEN, at the suggestion of a Member of the Society, I was invited to give a lecture on Cape Juby, I felt somewhat reluctant to accept the honour, as I have made no surveys on the coast of the Sahara or carried out any strictly scientific work. However, I spent five years at Cape Juby, having gone out with Mr. Donald Mackenzie, founder of the North-West African Company, at first in the capacity of interpreter, and subsequently as medical officer of the Company, and I sojourned for a time amongst the Kabyles of Algeria, and have therefore acquired some knowledge of the Sahara and its inhabitants, which may be interesting to a geographical society.

Though the Dark Continent has during the last fifty years been the scene of the labours of many noted explorers, the Sahara, the largest desert in the world, still remains one of the least-known regions of Africa. The first to cross the desert was the German, F. C. Hornemann, who travelled in 1800 from Tripoli to the Niger, and he was followed in 1822 by Denham and Clapperton, who made their well-known journey from Tripoli to Sokoto and back. On the Western Sahara our chief authority is Dr. Lenz, who in 1880 travelled in the disguise of a Mohammedan from Morocco to Timbuktu, and published a book, which has been translated into English and French. France has for several years been endeavouring to penetrate into the Sahara from the north, with the object of ultimately uniting Algeria with Senegambia by a trans-Saharan railway. The enterprise is one attended with great difficulties, arising both from the physical condition of the country and from the hostility of the inhabitants, especially the Tuaregs.

By ancient geographers the Sahara, which covers an area of 3,000,000 square miles between the Nile and the Atlas mountains, was supposed to be a vast plain of moving sand more terrible to encounter than the waves of the ocean, on which oases were scattered here and there like islands. It is now, however, becoming generally known that the Sahara is not entirely a desert, or everywhere flat. It is, on the contrary, traversed by mountain ranges, reaching at Asben a height of 5000 feet above sea-level (Timge). It contains verdant valleys in many of which there are groves of trees, and it is inhabited by a large population divided into several tribes or confederations, who have erected towns and engage in various branches of industry.

The country which we are now concerned with is the Western Sahara, stretching from the Ahaggar mountains and Adrar on the east to the Atlantic, and from the Atlas down to the Senegal. It is divided into several districts, each governed by an independent chief, the most important being Azawad, Adrar, El Haha and El Hodh. Its population is estimated at over two millions. Opposite the Canary Islands, in lat. $27^{\circ} 56' 41''$ N. and long. $12^{\circ} 56' 10''$ W. is situated Cape Juby, and from this point the coast trends north-westward up to the Wad Draa, while to Cape Bojador it follows a nearly southerly direction.

The littoral between the Wad Draa, the boundary of Morocco, and Cape Bojador, the northern limit of the Spanish territory of the Rio de Oro, is called Tekna, and is for the most part independent. Towards the north-east, however, it extends inland towards the Wad Nun, including the town of Glimim, which is subject to Morocco, the inhabitants paying tribute to the Sultan.

The Wad Draa, the largest river of North-West Africa, is formed by the union of the Idermi and Dads, two small streams which rise in the Atlas mountains to the north of Tafilet. It flows southward into the Sahara and then makes a bend to the west, entering the Atlantic about 100 miles to the north of Cape Juby. Its valley is very fertile and the inhabitants grow large quantities of barley and other cereals, dates, vegetables and fruits.

From the Wad Draa southwards there is no natural feature of any interest until the Boca Grande is reached, where the Shebika enters the sea, a river about 1000 feet broad. About 80 miles farther is Porto Cansado, formerly occupied by the Spaniards. Here is an old castle, with loopholed walls six feet thick. The mouth of the harbour is silted up and a tremendous surf breaks upon the shore. Porto Cansado is about forty miles from Cape Juby.

About fifty miles south of Cape Juby is situated the Sakiet el Hamra, or Red Channel. During ten months in the year its delta is shut off from the sea by sand-dunes, but in the rainy season the water finds its way through the sand by numerous runnels. By some the Sakiet is said to rise in the Hamada, or high tableland, while others affirm that it is an arm of the Draa. It runs in a bed sixty or seventy feet wide through a valley two or three miles in breadth. Here the tribes find good pasturage for their flocks and cultivate a few fields of barley. Some palm-trees are visible in the background.

The Río de Oro, which I once visited in a schooner with a party of three, is situated above 300 miles south of Cape Juby. The intervening coast is alternately rocky and sandy. The mouth of the river, or, rather, creek, is generally one mile broad, with a maximum of two miles, and the creek extends about ten miles inland, flanked on both sides with cliffs twenty to forty feet high. On the north side of the mouth is a peninsula of considerable area, where the Spaniards established themselves in 1883. A detachment of forty soldiers now occupies the peninsula, being quartered in barracks surrounded by a wall. A Spanish trading company has also a factory here, but the business done is of little importance, as the natives are unfriendly.

The climate of Cape Juby is salubrious. On the north-west coast of Africa the excessive heat of the Sahara is modified by the cool north-north-east trade winds, which prevail during eight months out of the twelve. The air is pure, dry and clear, and the weather is not subject to sudden changes. The soil being dry, vegetable fermentation proceeds less rapidly than in many other places in the same latitude. Hence the diseases of hot and malarious districts, such as dysentery, intermittent and black-water fevers, are unknown, and during the twelve years Cape Juby was occupied by Europeans no case of fever occurred.

These favourable conditions of atmosphere and soil render Cape Juby a beneficial resort for patients suffering from lung diseases and rheumatic complaints. The climate is, indeed, very similar to that of the Canary Islands. The shade temperature rises above 80° F. only when the *Harmattan*, the hot wind from the desert, is blowing. This wind blows from the south-east between the months of October and February for two or three days at a time, and makes the atmosphere hazy. Meteorological observations taken at the castle, in connection with the Royal Meteorological Society, show that the difference between the summer and winter temperatures is small, and in this respect Cape Juby compares favourably with Madeira and the Canary Islands.

The dew at night is heavy, and at dawn the country is as wet as though a shower of rain had fallen. The rainy quarter is the south-west, and though rain sometimes falls when the wind near the earth blows from the north-east, the clouds are even then seen to be moving from the former direction. The mean range of atmospheric pressure is 0.694 inch. The barometer falls for south-east and south-west winds, and rises for west, north and north-west winds. For eight months in the year the wind blows from the north-north-east. In November and February it is more variable, but even then the north-east and north-east by north are the prevailing directions. Fogs and mists are rare and not of long duration, generally occurring in the morning and vanishing in the afternoon. Thunderstorms are also rare, but sheet lightning is seen from October to April.

The temperature of the sea is equable almost throughout the year, the mean being 63.4° F. The currents vary with the state of the tide and the direction of the wind; about one and a half to four knots an hour is their usual velocity.

In the interior, some four or five miles east of Cape Juby, is a plateau

called Aftut (red earth) by the natives, to which we often resorted for sport. If two guns went out they generally brought in about six brace of red-legged partridges and a few hares. To get a shot at a gazelle was a more difficult matter. The natives used to lie down behind bushes, wearing a headdress of the colour of the yellow sand, and send out men on camels to drive the gazelles towards them. Our excursions to Aftut were generally made on horseback, and sometimes we took a tent and spent the whole day in the country. When Baron Lahure, a Belgian official, was with us, he examined the plateau, and described it as a slightly undulating plain lying 200 to 300 feet above sea-level. Vegetable soil is abundant, and resembles both in composition and colour; which is due to the presence of iron oxide, that of Morocco and Andalusia. It rests on limestone rock, which in some places crops out above the surface. The admixture of lime adds to the natural fertility of the soil.

The vegetation consists of clumps of large, compact bushes, cactus, and other thorny succulent plants, which serve as forage for camels. Here also grow *Anafis*, the bark of which is used for tanning; henna, the shrub which yields the dye used by the native women to colour their foreheads, noses, and finger-nails; and orchilla, a parasitic plant, which also furnishes a beautiful dye. Some of these bushes grow as high as six to ten feet.

The district of Aftut extends for about twelve miles, with a breadth of five towards the sea, north of Cape Juby, and south-eastwards to the plains of Durah. The latter are about thirty miles in extent, and have a soil similar to that of Aftut. The inhabitants of these plains are mostly of the Azzerguin tribe; besides their tents, they have two large buildings built of earth and clay, which are styled forts. Barley and corn are cultivated here. Mr. Mackenzie visited the country, and described it in an article in *Blackwood's Magazine*; it is about fifty miles from Cape Juby.

The rainfall in the Sahara is very small and irregularly distributed. I measured the fall at Cape Juby in 1894, and found it to be only three inches for the whole year. The supply of water is supplemented by the *wadis* or rivers flowing down from the mountains, which furrow the surface in many directions. Though none of them now contains water all the year round, their beds rival in breadth the great rivers of Europe, thus indicating, as Mr. Silva White remarks in his *Development of Africa*, that in former times more favourable climatic conditions produced magnificent waterways.

The subsoil water is still remarkably abundant, and, especially near high land, is easily reached by sinking wells. The depth at which it is found varies according as the nature of the soil is favourable to infiltration or not. In the neighbourhood of Cape Juby it lay from three to ten feet below the surface. It was brackish, but the natives drank it freely, and the flocks of sheep and the camels were supplied from wells. We built the natives a substantial well of stone and lime. Those the natives dig are frequently choked up by the drifting sand. In the Sahara they are of the first importance. Caravan routes are determined by them, and

robbers lie in wait beside them to surprise travellers, but the wary Arab traders are usually prepared for their attacks. Oases are always found where the water reaches the surface, other conditions being favourable. It is not the composition of the soil which renders the desert barren, for sand, lime and gypsum, such as cover the Algerian Sahara, occur in the most fertile plains in the world; the presence or absence of water alone determines the condition of the country. In the desert of Gabes, writes Pryeweski, as soon as rain has fallen vegetation germinates under the influence of the sun's rays with extraordinary rapidity, and the arid plain is transformed into a smiling oasis. Then the antelopes flock to it to slake their thirst, and birds begin to sing; the nomads lead their flocks to pasture, and thus the oasis becomes animated.

Even the sand is not absolutely destitute of fertility. In Arabia I cultivated cucumbers on a plot of sandy soil with most satisfactory results; these plants subsist, of course, to a large extent on water, and mine were watered four times a day. Thus water is the great essential to fertility; reduce the rainfall by a few inches and the country becomes a steppe; which by the loss of a few inches more is transformed into a desert.

All around Cape Juby are what are called *sebekh* (plural of *sebkha*), which are depressions containing crystallised salt. To the south-east, 15 miles from Cape Juby, lies one called Sebka el Hamra about 400 yards long by 200 broad. On a journey to this *sebkha* we experienced the well-known illusion called mirage, imagining we saw a lake of bluish water. Wild boars were seen crossing the *sebkha*, and on our return journey we fell in with a herd of gazelles, and one of our party, going in pursuit of them, was lost and did not turn up again till the following day.

The salt pans of Taudeni and El Juf are very extensive, and have been worked for the last five hundred years. The salt is deposited in five different layers, of which the uppermost is almost worthless, while the fourth is the most valuable; the lowest is steeped in brine. It is quarried out in slabs, some as much as 3 feet long, 13 inches broad, and 3 inches thick, weighing about 65 lbs. each. They are sold in Timbuktu at the rate of £1 sterling per cwt. In El Juf there is a whole series of salt pans, one of which is about 30 miles long by 12 broad; 20,000 camel-loads of salt are extracted from it annually.

In 1876 Mr. Donald Mackenzie examined the north-west littoral, of which he writes as follows: "The most remarkable feature in the physical character of the Western Sahara is the vast plain or hollow called El Juf, which is said to extend from within twelve miles of the shore as far south as the region of Azawad and Walate, north of Timbuktu. The greatest length of the depression is given at about 500 miles, and the greatest breadth at 120 miles, the area being about 60,000 square miles. The breadth of El Juf is much greater in the south, but towards the north it contracts, terminating in the great channel called Sakiet el Hamra, which formerly connected it with the Atlantic Ocean. It is evident from investigation into the physical character of the region that the water was in course of time cut off from El Juf through the gradual accumulation of sand across the mouth of the

channel, and then the burning rays of the sun descending vertically on to the country converted the region into a salt desert."

Mr. Mackenzie proposed to admit the water of the Atlantic into the interior by making a navigable channel through the Sakiet el Hamra, and thus open up the region to commerce and civilisation, but his scheme found no support, and was never put into execution.

The domestic animals of the Western Sahara are camels, sheep, goats, horses, donkeys, and cattle; gazelles, antelopes, wolves, hyænas, ostriches, foxes, fennecs, jackals, wild boars, and leopards are the game. Here, as elsewhere, a harmony exists between the fauna and the soil. The camels, sheep, and reptiles have the yellowish hue of the sand—the result of natural selection. Again, the necessity of covering long distances in search of pasture has produced great length of limb; even the sheep have longer legs than those in this country. Perhaps the most distinctive feature is the ability to go a long time without water, which all the animals possess, and the camel in a marked degree. He can travel six to ten days without water, feeding on the acacia and other thorny bushes, and at the end of this time can drink more than one hundred pints of water. The camel of the Sahara is the dromedary, with one hump. To the natives this animal is indispensable; it carries them from place to place and supplies them with meat and milk. Many natives live upon camels' milk alone for nine months out of the twelve. A she-camel yields milk for ten months, supporting one person besides her own foal. Thus, if a man owns, say, three she-camels, he can wander about at will without the necessity of seeking food for his family. The ostrich also is peculiarly adapted for the desert; it feeds on the tops of certain shrubs and can live a long time without drinking. The gazelle is valued for its flesh, and its skin is tanned and manufactured into various useful articles.

The population of Tekna, within a radius of seventy or eighty miles from Cape Juby, may be estimated at 50,000. The people are Arabs and Berbers and their slaves. The inhabitants of Tekna are known collectively as the Ait el Jamal, and are divided into several small tribes, as the Ait el Hasan, and Ait Musa Wa-ali at Wad Nun to the north of Cape Juby, and the Azzerguiin, Yaggut, and Argibat between the Wad Draa and Sakiet el Hamra. The former two live in houses of clay and sun-dried bricks, while the others are nomads. Other tribes again occupy the Sakiet el Hamra. Some of these tribes are warrior or *Hassani*, others are peaceful, and others again *Zewaya* or neutral. The peaceful tribes pay blackmail to the *Hassani*. Commerce is the pursuit of all, and the peaceful tribes also engage in agriculture. The diet of the people is very simple, consisting chiefly of barley, dates, and milk, and their dress is a piece of blue cloth.

The men average 5 feet 10 inches in height. They are somewhat slender but have well-developed muscles. Their complexion is dark brown, and their hair strong, black, and curly. Their faces are in general pleasing, though they can on occasion assume a forbidding expression. They are strong and active men and possess astonishing powers of endurance and abstinence, being able to travel two days

without water. Their sight is excellent, and their faculty of observation is sharpened by travelling in a country where landmarks are scarce. The warriors, both young and old, wear their hair long, but young boys have the head shaved, except a long lock on the crown, left for Mohammed to pull them up to heaven by. The women have also dark complexions, oval faces, well-shaped foreheads, black eyes, and thick eyebrows. The mouth is small and the chin rather square. The lips are not over thick; the teeth are small and pearly white. The hands are small but hardened by work.

These Arabs and Berbers are hospitable, and pay great respect to the aged. On the other hand, they are treacherous, revengeful and cruel, and their word is not to be relied on. They understand very well what virtues are, but do not practise them. As to food, they must be called abstemious, though they can take sufficient food at one meal to last them more than twenty-four hours. As true followers of Mohammed, they are total abstainers. Being cut off from intercourse with the outer world, they have adhered to the most primitive forms of society and culture. We find them in three stages: the dwellers on the coast are fishermen; then come herdsmen; and, lastly, agriculturists.

A regular trade in slaves is carried on among the tribes of the Sahara, and with Morocco. Every man that has the means keeps one or more slaves; some own as many as fifty or sixty of both sexes. They are employed as household servants and concubines. A good slave looks after the sheep and camels, keeps order in the camp during his master's absence, and protects his master's property and person, being frequently more trusted than sons or wives. A profit is also obtained by the sale of the children of slaves.

Slaves are kidnapped in the Sudan, and, with other Sudanese products—ivory, gold-dust, and gum—are obtained by the Arab dealers in exchange for cloth, sugar, tea, beads, and salt. Their price ranges from a camel's load of salt to a few pieces of blue cloth. These slaves are then brought on camels or on foot for a distance of 800 or 1200 miles to the fairs held in Tinduf, Shingiti, Wad Nun, and Morocco, many perishing on the way from fatigue and want of water. At the fairs they fetch 80 to 100 dollars per head, according to their age and sex, female slaves commanding a higher price than male. The Arabs believe that God created the black men for their use, as set forth in the Koran. Owing to the energetic action of the British and Foreign Anti-Slavery Society, the slave-markets in the sea-ports of Morocco have been closed, but the trade is still carried on privately. It is to be hoped that the British Government will make an effort for the suppression of slavery in Morocco, and put an end to the abominable traffic in human beings, so repulsive to the best feelings of humanity.

Four routes cross the Sahara from the north of Africa to Timbuktu, starting from Tripoli, Tunis, Algiers, and Morocco. From Morocco the route runs through Tinduf, Taudeni, and Arauan; from Algiers traders pass through Insalah, Tuat, and Mabruk; and from Tripoli *via* Ghadames, Insalah, and Tuat. From Tripoli to Sokoto the stages are Ghadames, Ghat, Aïr, and Agades.

Her Majesty's Consul at Mogador writes in his report: "The *akabar*, or caravan from Morocco, is the largest that crosses the desert to Timbuktu. It starts once a year, about the month of October, from Tinduf on the confines of the desert, and amounts to over 10,000 camels. Only 20 per cent. leave that station laden with goods; the others proceed to Taudeni, in the centre of the desert, where they are laden with salt for the Sudan. There are, besides, many small *akabars* which cross the desert during the year, averaging 100 camels each. The merchandise carried by these caravans consists of the following goods: blue cloth, American cloth, long cloth, sugar, tea, glass beads, amber beads, shells, and silk, from Fez and Morocco; gold, ostrich feathers, Senegal gum, gum-Arabic, frankincense, blankets, and slaves from the Sudan.

"The average value of the merchandise carried by each camel is £50. The approximate value, therefore, of the goods conveyed by the great *akabar* is £100,000; add to this sum £30,000, the value of the small caravans, and the total value of the merchandise sent yearly from Morocco to Timbuktu is £130,000. Upon this sum a profit of 75 per cent. is made by the traders, besides the gains on the salt carried from Taudeni to Timbuktu. 60 per cent. of the camels are sold at that place, as comparatively few are required for the returning with the light Sudan goods. At Timbuktu the great caravan is broken up, and the traders return in small parties to their respective homes by different routes."

The journey from Wad Nun to Timbuktu occupies twenty-eight days with dromedaries, and sixty days with ordinary camels.

The trade at Cape Juby consisted chiefly in the barter of blue and white cotton cloth, etc., for the wool yielded by the large flocks of sheep that pasture in the vicinity.

BALFOUR SHOAL:

A SUBMARINE ELEVATION IN THE CORAL SEA.

By JOHN MURRAY, F.R.S., of the *Challenger* Expedition.

DURING the past few years Her Majesty's surveying ships have been carrying out, under the directions of Admiral Wharton, C.B., F.R.S., Hydrographer of the Admiralty, some most important surveys in the South-Western Pacific, particularly in the region lying between the latitude of New Guinea and the Solomon Islands in the north and the latitude of New Zealand in the south, extending across from the east coast of Australia eastward to beyond the Samoa, Friendly, and Kermadec groups of islands. These observations have a special interest for all who are engaged in the study of oceanographical problems.

In this region of the ocean over two thousand trustworthy soundings have now been recorded in depths exceeding 100 fathoms, nearly one-half of which have been taken in depths exceeding 1000 fathoms. These numerous deep-sea soundings have very much increased our knowledge of the bathymetrical contours of the sea-bed in this part of the ocean,