

**Medical history of the expedition to the Niger during the years 1841-2 :
comprising an account of the fever which led to its abrupt termination.**

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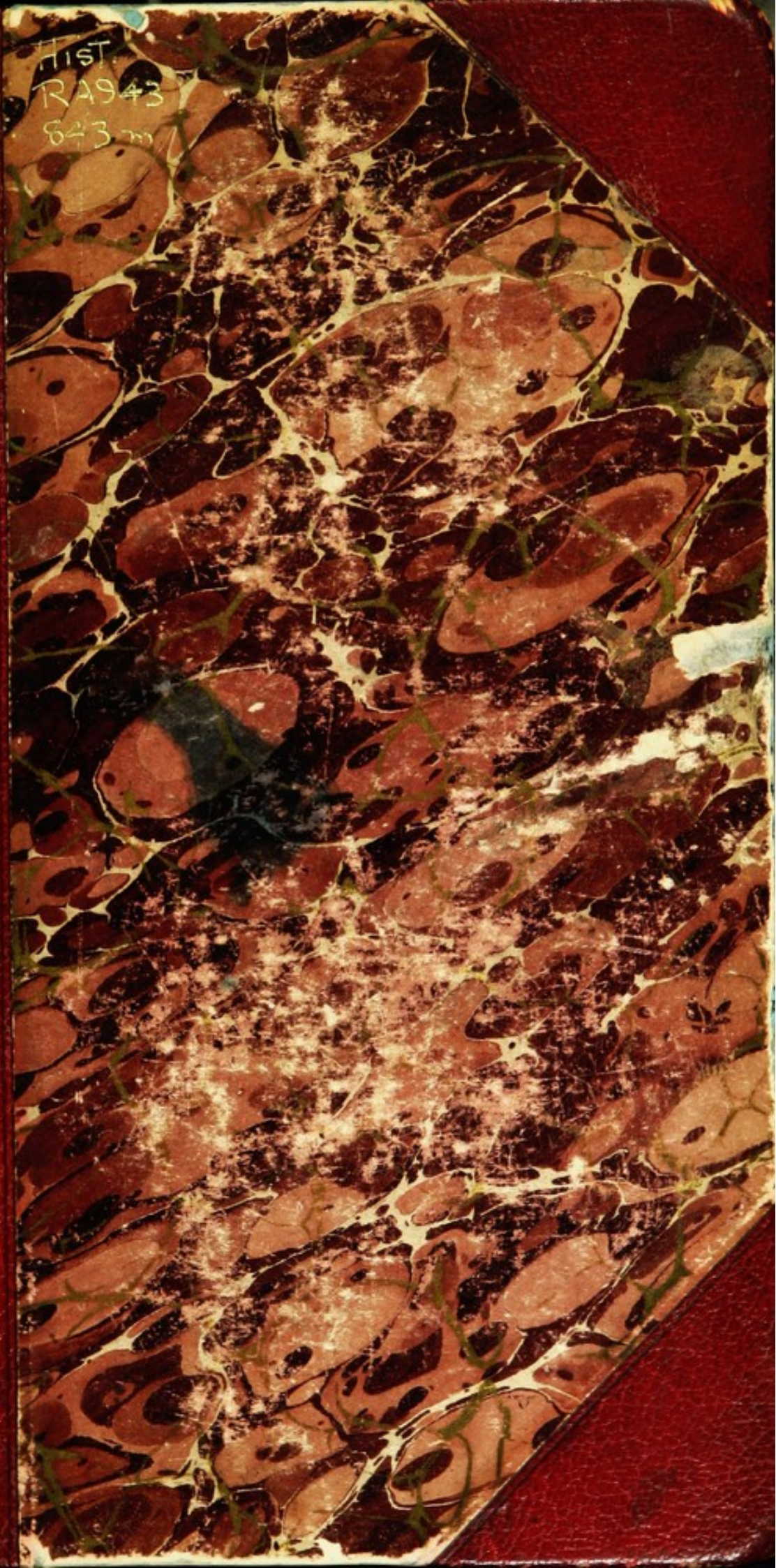
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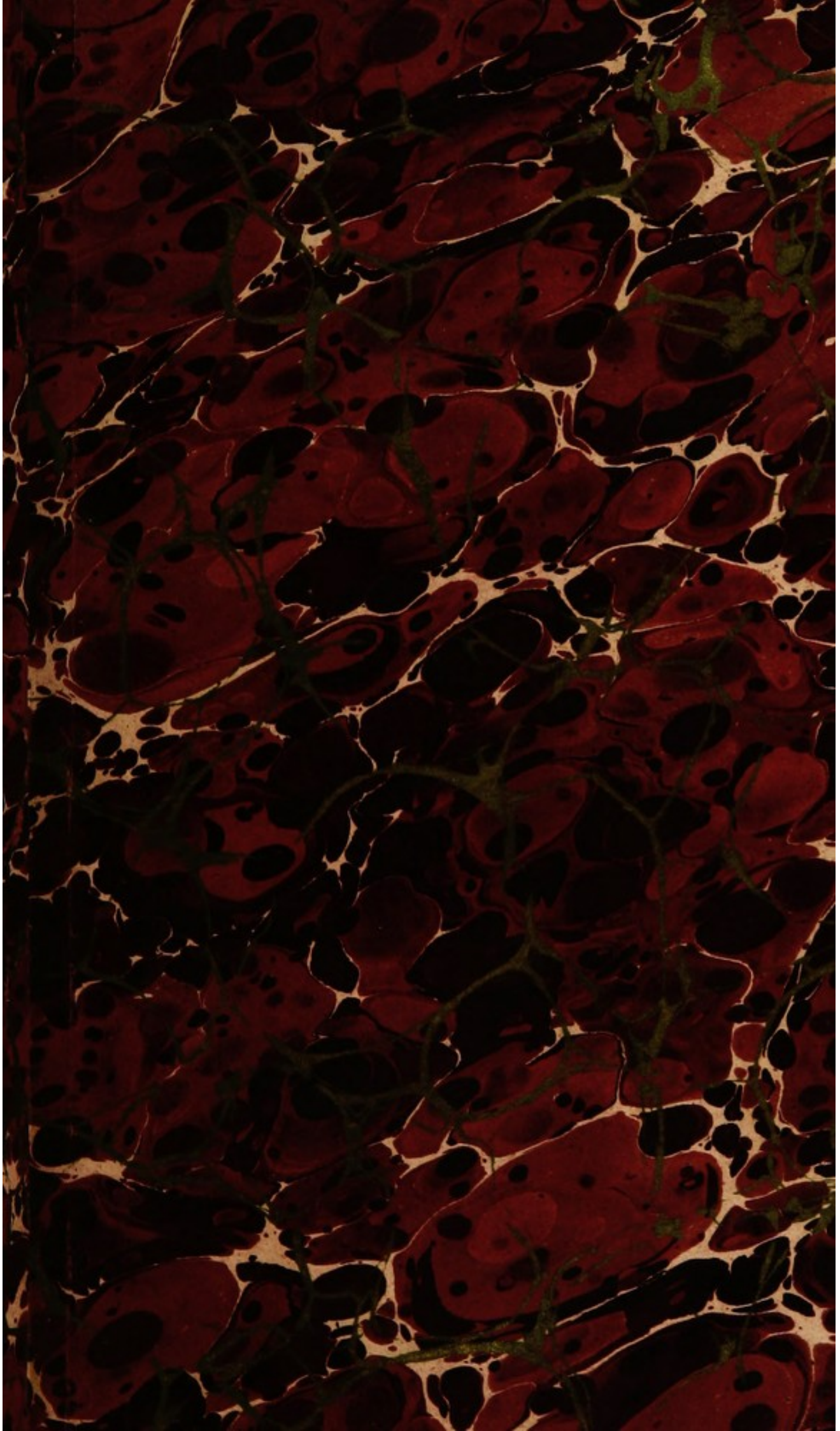
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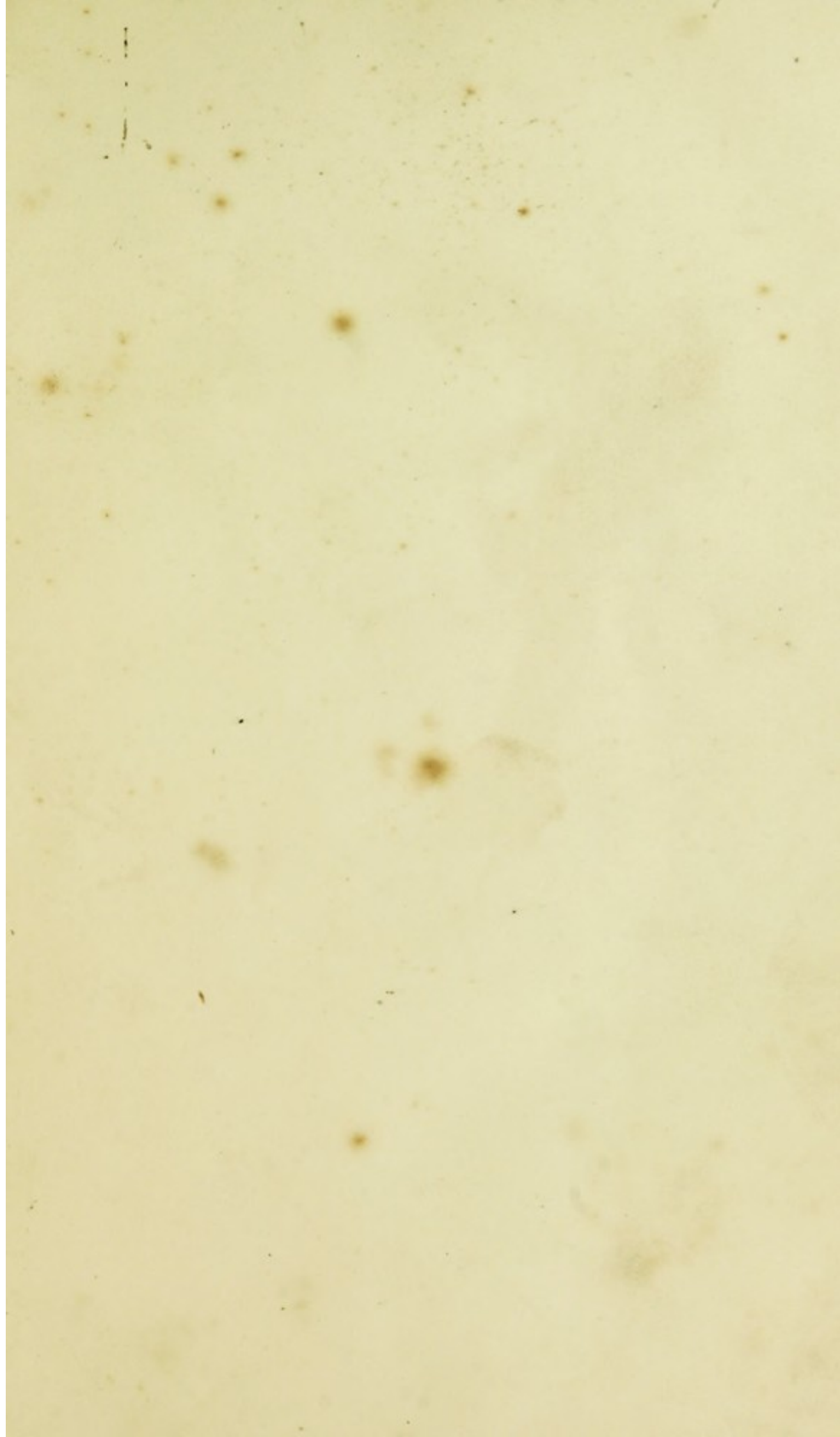
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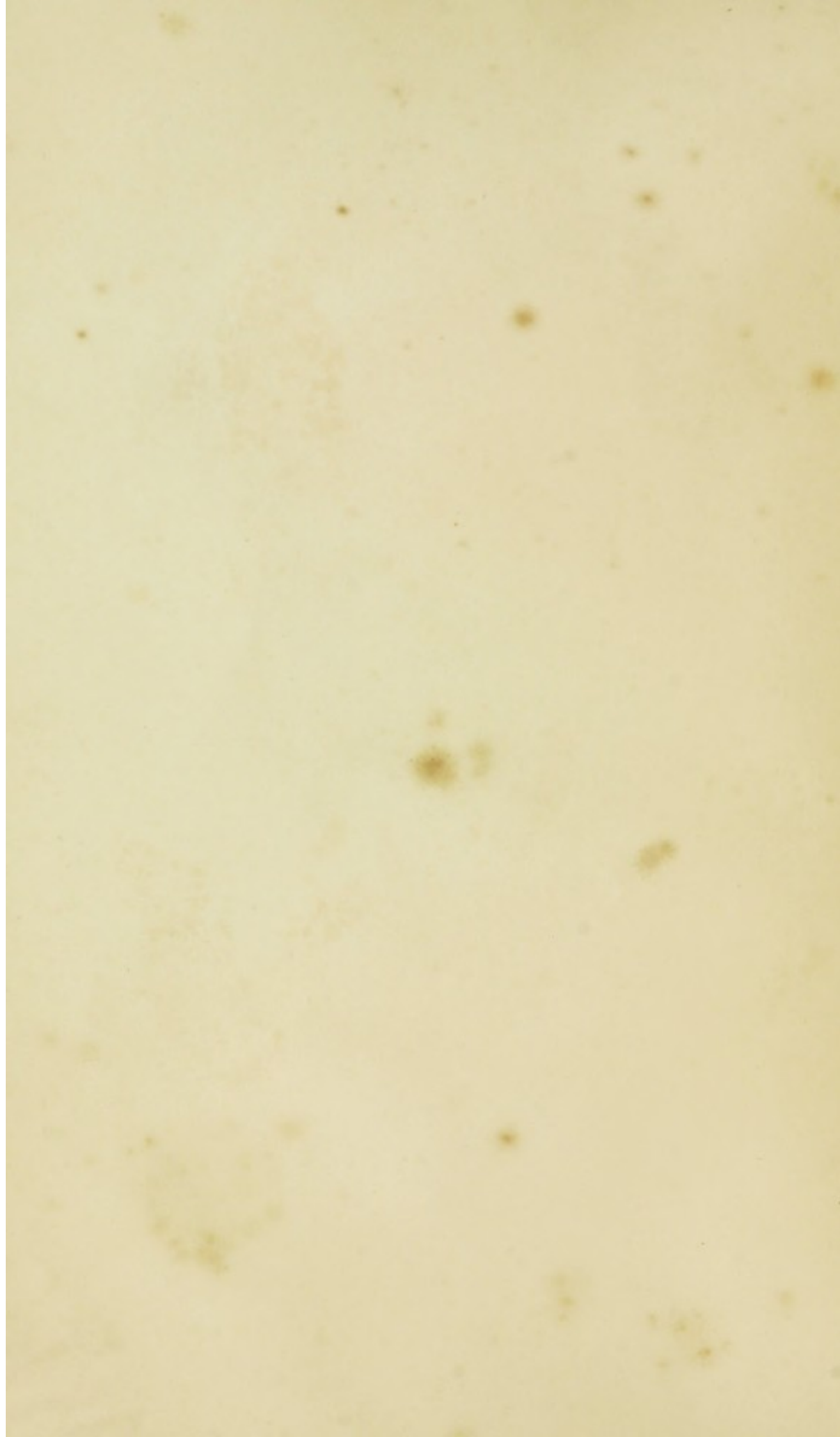


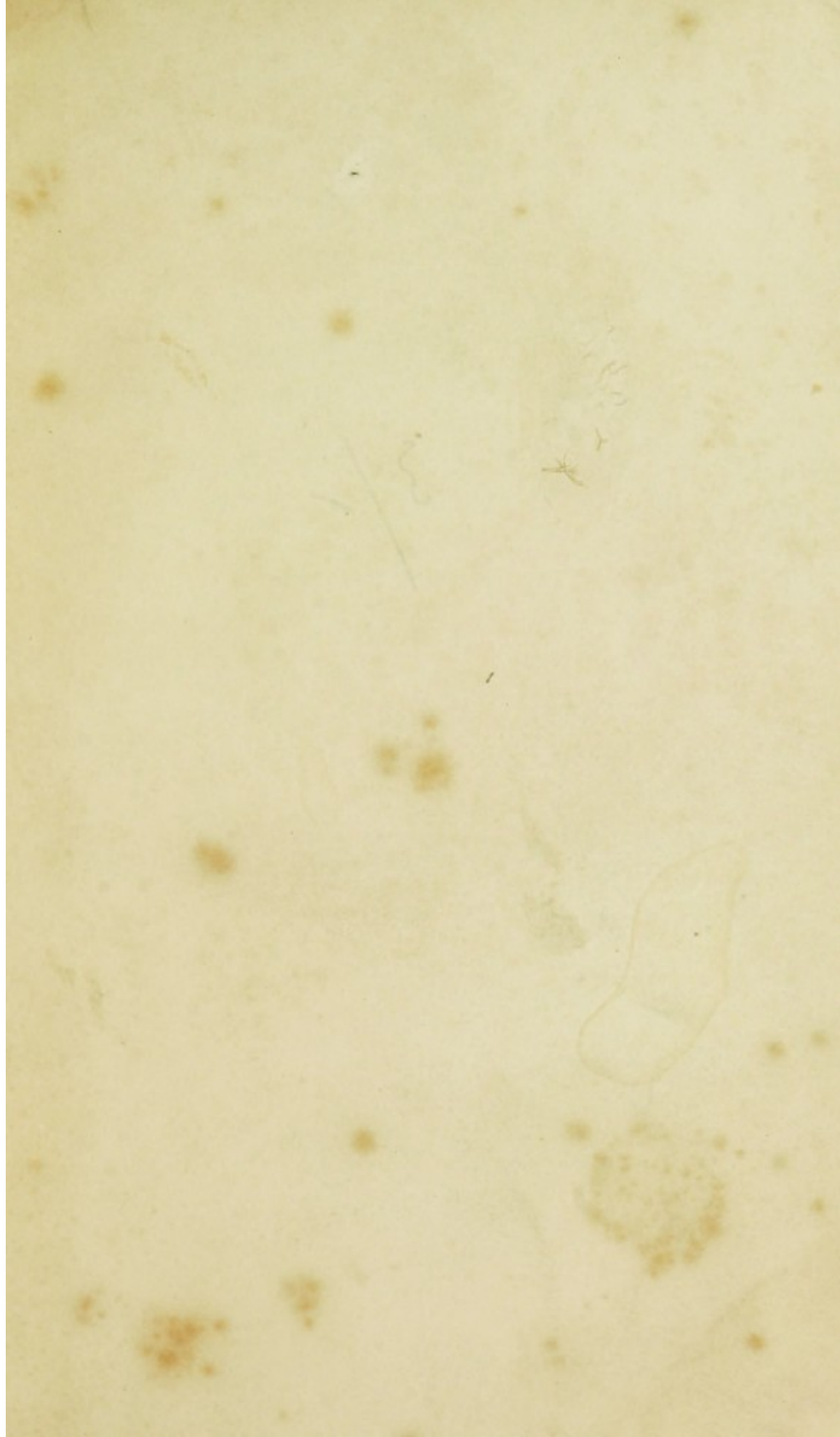
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NUHI MAN, A NATIVE OF EGGA, RIVER NIGER.

MEDICAL HISTORY
OF THE
EXPEDITION TO THE NIGER

DURING THE YEARS 1841-2

COMPRISING
AN ACCOUNT OF THE FEVER
WHICH LED TO ITS ABRUPT TERMINATION

BY

JAMES ORMISTON M'WILLIAM, M.D.

SURGEON OF H.M.S. ALBERT AND SENIOR MEDICAL OFFICER OF THE EXPEDITION

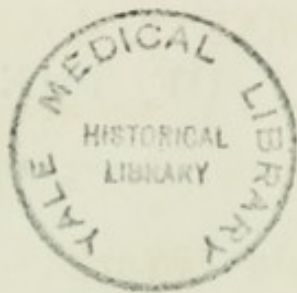
WITH PLATES



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JOHN CHURCHILL PRINCES STREET SOHO

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TO

SIR WILLIAM BURNETT, M.D. K.C.H. F.R.S. . . .

INSPECTOR-GENERAL OF NAVAL HOSPITALS AND FLEETS,

This Work

IS MOST RESPECTFULLY DEDICATED

BY

THE AUTHOR.

THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT

PHYSICS 311

LECTURE 1

MECHANICS

LECTURE 2

LECTURE 3

LECTURE 4

LECTURE 5

LECTURE 6

LECTURE 7

LECTURE 8

LECTURE 9

PREFACE.

ON my return from the west coast of Africa, in November, 1839, in H.M.S. Scout, I learnt that it was the intention of Her Majesty's Government to send out an Expedition to the river Niger, and at once volunteered to accompany it.

In September, 1840, I was appointed Surgeon of H.M.S. Albert, and Senior-Surgeon to the Expedition.

The Expedition left England on the 12th of May, 1841, and entered the Niger on the 13th of August. Three weeks from this period fever broke out among the crews, and soon produced effects so disastrous that two of the three steam-vessels composing the Expedition were obliged to return to the sea, and the other was compelled to follow a few weeks after.

From the peculiar and distressing situation in which I was so soon placed, it was impossible for me to make copious notes of incidents as they occurred, or to direct that attention to many important particulars which were deeply interesting. However, I consider it to be my duty to give a permanent record of such facts and observations as I did collect; and, without encroaching on the province of other parties, to delineate the leading features of our progress in the River, as far as they may refer to or may be considered necessary to elucidate the history of my own department, and thus enable me to produce "A Medical History of the Expedition."

For this purpose the work is divided into three parts:

The First comprises as much general description as is

necessary to put the reader in possession of those circumstances of position and climate which could produce or modify disease.

The Second contains an account of the fever as it occurred on board the *Albert*, embracing its main features and treatment.

In the Third Part will be found a few facts relating to the state of medicine in the Niger, and to vaccination among the Blacks; a brief description of the system of ventilation adopted in the ships, with some remarks on its employment on the coast and in the river; an abstract of the meteorological observations which were made after the plan recommended by the Royal Society; and lastly, a brief account of the geology of the Niger.

If the Expedition had terminated as could have been desired, and if sickness had not made such frightful ravages on our strength and numbers, it would have been in my power to obtain information on many other subjects which I had intended to investigate.

I trust a perusal of the latter part of the narrative, and a consideration of the peculiar position in which I was placed, will furnish an excuse for many imperfections.

I cannot terminate this notice without gratefully acknowledging my great obligations to Dr. W. STANGER, the geologist of the Expedition, for the valuable information which he at all times most liberally afforded me: and to Mr. T. R. H. THOMSON, surgeon of the Soudan, for the manner in which he conducted and recorded the cases in the hospital, during my sickness at Fernando Po.

J. O. M'W.

ORMONDE COTTAGE, SOUTHSEA;

May 1, 1843.

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MEDICAL HISTORY
OF THE
EXPEDITION TO THE RIVER NIGER.

CHAPTER I.
HISTORY OF THE EXPEDITION.

SECTION I.
Preliminary History.

THE 'Extinction of the Slave Trade' was the grand object contemplated by Her Majesty's Government in sending out an Expedition to the Niger. It was hoped that by obtaining more accurate information as to the moral and physical condition of the countries bordering on this great river, commercial relations might be established with the native chiefs: and the efforts of Europe generally would be better directed, to strike at the root of the internal as well as the external slave traffic, and to the means for the extension of Christianity throughout Africa.

With this view Her Majesty's iron steam-vessels Albert, Wilberforce, and Soudan were commissioned at Liverpool in September and October, 1840; the former by Captain Henry Dundas Trotter, who had the entire command of the expedition, and the two latter by Commanders William Allen and Bird Allen. The ships were built by Mr. Laird, of Liverpool, and their dimensions were as follows :

Decks, Engines, Holds, &c.	H.M.S. Albert and Wilberforce.	H.M.S. Soudan.
Length on deck	139 ft. 4½ in.	113 ft. 4 in.
Breadth between paddles	27 ft. 2 in.	22 ft. 2 in.
Depth of hold	11 ft. 0 in.	8 ft. 8 in.
Builder's tonnage	459 $\frac{2}{3}$ $\frac{1}{4}$ tons.	250 $\frac{5}{9}$ $\frac{8}{4}$ tons.
Separate water-tight compartments	5 in No.	5 in No.
Power of engines	70 horses.	35 horses.
Diameter of cylinder	{ 2 engines, each 34 inches.	1 engine, 34 inches.
Length of stroke	3 ft. 6 in.	3 ft. 6 in.
Diameter of paddle-wheels	15 ft.	12 ft. 6 in.
Draught of water, loaded	5 ft. 9 in.	4 ft.
Ditto ditto, light	3 ft. 3 in.	2 ft. 9 in.

The vessels were each divided by water-tight bulk-heads (partitions) into 5 compartments. The accommodation for officers was good; and the lower deck, which was exclusively allotted to the ship's company,

was proportionally larger than in other vessels of the royal navy.

The whole of the decks below, with the exception of the engine-room, were covered with patent oil-cloth; and the vessels being constructed of iron, rendered it necessary to have their sides lined nearly throughout with wood, in order to modify the effects of extremes of heat or cold.

Each compartment was furnished with a stove.

A ventilating apparatus* was fitted up in each of the ships under the superintendence of Dr. Reid, (whose reputation in ventilation had been fully established, by the success of the system he adopted in the houses of Parliament,) by means of which a constant supply of fresh air could be kept up between decks, or the external atmosphere, by being passed through a large iron chamber on the upper deck, might be submitted to the action of chemical and other purifying agents previous to its diffusion below.

The provisions were of excellent quality, including, in addition to those usually supplied to vessels of war, preserved meats and vegetables of various kinds, pickled cabbage, cranberries, wines, beer, and spruce. In short, whatever was considered necessary to conduce to the health and comfort of the

* For a particular description, see Chapter iii. Section 2.

crews, was most liberally provided by the government.

For the purpose of affording the medical officers of the expedition the means of extending their services to the natives on the banks of the Niger, an extra supply of medicines and medical stores was furnished; and with the same view, vaccine lymph was obtained from the National Institution, and from various other sources.

Considerable pains were taken in the selection of the crews. They were, generally speaking, in the prime of life; a great proportion of them had already served in warm climates, and on every occasion, before a man was entered, he was made fully aware of the peculiar and dangerous nature of the service for which he was volunteering.

The Soudan was in a sufficient state of forwardness to leave Liverpool on the 26th of December, 1840. She was obliged from stress of weather to put into St. Mary's, Scilly, and having afterwards called at Plymouth and Portsmouth, arrived at Deptford on the 9th of January, 1841.

The Albert left Liverpool on the 12th of January, and anchored in Kingstown Harbour, Dublin Bay, the next morning. Leaving Kingstown on the 17th, she did not, by reason of strong south-west gales, reach Plymouth until the 20th. On her way up, she remained a few hours at Portsmouth, was

detained by foul winds thirty-six hours at Sheerness, and reached Deptford on the 25th of the same month.

The Wilberforce was not ready before the 17th of February. She then proceeded to Dublin, Plymouth and Portsmouth, and got to Woolwich on the 5th of March.

The completion of the equipments was now proceeded with. Some additions were made to the ventilating tubes, and the medicating chambers were fixed on the decks. Experiments were frequently made to ascertain the power of the ventilating apparatus, to the admiration of all who witnessed them, among whom were many individuals distinguished in science. Indeed, it may be safely said, that no former expedition had excited so much interest. Thousands of all ranks flocked on board while the vessels were at Deptford and Woolwich.

The Soudan, and Harriott transport, the latter laden with stores for the expedition, sailed from Plymouth for the Cape de Verds on the 17th of April. The Albert and Wilberforce left Woolwich on the 21st of April, and reached Plymouth on the 28th, but, owing to the long continuance of south-west winds, did not take their departure from England until the 12th of May.

At this period the crews in the respective vessels were as follows :

H. M. Ships.	Officers including Civilians and Engineers.	No. of white Seamen.	No. of Marines.	No. of Sappers and Miners.	No. of men of colour of various Nations.	Total.
Albert . . .	20	24	9	4	14*	71
Wilberforce . .	22	26	9	4	10†	71
Soudan . . .	11	17	4		4‡	36
Total of each class and of whole	53	67	22	8	28	178

In addition to the above there were in the gun-room of the *Albert* the Ashanti Princes, John Ansah, and William Quantamissah, who were returning to Kumasi, the capital of Ashanti, after having received their education in England.

* *Albert*. Africans 7, East Indians 2, West Indians 4, Nova Scotian 1.

† *Wilberforce*. Africans 3, West Indians 4, St. John's American 1, uncertain 2.

‡ *Soudan*. Africans 2, West Indians 2.

SECTION II.

Journal of the voyage to the Nun branch of the Niger. State of health on entering the river.

THE morning after leaving Plymouth, the land was no longer visible, the day was fine, and the sky unclouded; and throughout the voyage to Madeira the weather was remarkably beautiful. The crews were arranged in regular watches: they were in excellent health and spirits, and looked cheerfully forward to the scene of their labours. Fencing, and other wholesome exercises, were permitted in the evening. The ventilation was performed every day, both by the plenum and the vacuum impulse,* chiefly for the sake of experiment. When in the latitude of Oporto, the action of the former was suspended for some time, and then put on, with the valves fitted for exhaustion, leaving the gunwale tubes open, and drawing out from all parts of the ship, including the cabins and holds. The temperature on deck throughout the day was 63° Fahr. During the suspension of the action of the ventilating apparatus the thermometer rose in the captain's cabin 2°, in the gun-room 3°, in the lower deck 2·5°, and nearly

* See Chap. iii. Sect. 2, Ventilation.

the same in the engine-room and midshipmen's berth. On reconnecting the fanners with the engines, and leaving the adjustment as before (exhaustion) the thermometer fell to its former standard. It was thus evident that we possessed a means at command by which a uniform supply of fresh air was afforded to the five sections of the ship. On the 19th, the sea and sky seemed to rival each other in cerulean hue, the ship was under sails only, the steam having been "down" since the previous day; the thermometer at mid-day was 67° ; temperature of the sea 63° ; and there were 6° of difference betwixt the dry and wet bulbs of Mason's hygrometer. At night the luminous appearance of the sea was splendid. The outline of the island of Madeira was indistinctly seen on the evening of the 20th of May, and next morning we were close in with the shore in the neighbourhood of Funchal, where the land is high, consisting of ranges of volcanic cones. During our stay at Madeira the ships were completed with coals, and the ships' companies were supplied with fresh meat, vegetables, and fruit.

On the evening of the 25th May, the steam was up, and we left Funchal about eight o'clock. Next morning a thick haze bounded the horizon all round, which was not dissipated until mid-day. The temperature of the air was gradually increasing, as also

that of the sea ; an immense number of birds were flying about the ship.

The high land of Teneriffe was in sight on the morning of the 27th May, with the peak towering over all. The ship was under sail only, but the north-east trade blew strong all day, and at five in the afternoon we were close to the south-east side of the island, which is here rugged and irregular in form. Masses of pumice-stone were seen here and there on the angular projections ; and running up through the bold precipices were dykes of basalt in the lava. At seven we came to anchor about half a mile from the mole of Santa Cruz ; the Wilberforce having preceded us by a quarter of an hour.

At Santa Cruz we were detained "coaling" about twenty-four hours, during which the English consul and various parties visited the ship. We were informed that a cavern had of late been discovered, about two days' journey from Santa Cruz, containing several mummified bodies of the Guanchios, the brave aboriginal tenants of the islands, who for fifty years obstinately resisted the Spaniards.

At 10 P.M., on the 28th, the steam was up, and both ships weighed ; at 11, we were slipping through the water with a light breeze. About three miles to the southward we had a beautiful moonlight

view of the town which, from this position seemed completely surrounded by mountains, the dark sombre bases of which looked as if dotted with stars; an appearance produced by the lights in the fishermen's boats along the shore.

On the 30th and 31st, part of the ship's company were employed clearing the holds of the lower deck, and midshipmen's berth. Among my suggestions to the commander of the expedition, for the establishment of "Rules for the Vessels of the Niger Expedition," this very necessary measure is thus alluded to: "When the hold of each compartment has been completely cleared, the bottom seen thoroughly and properly dried, it may then be restowed, in such a manner that any of its contents may be instantly removed in the event of disease breaking out, for which a local cause is suspected. In drying the holds the process will be much aided by throwing the whole force of the plenum impulse upon one compartment at a time."

On the 31st, at noon, the latitude was 24° north, longitude $20^{\circ}10'$ west, maximum of thermometer during the day 76° Fahr., minimum 68° Fahr. In the evening crossed the tropic of Cancer. The trade-breeze blew strong on the 3d of June, and the atmosphere was foggy, the hygrometer at 9 A.M. indicated a difference of 7° between the dew point and temperature of the air. In the forenoon

the heights of the island of Saint Antonio, in the Cape de Verds, were seen indistinctly through the haze; about one it cleared away, and we saw St. Vincent, right-a-head; about two, rounded the northern point of the bay, where were waiting our arrival, H.M.S. Soudan, and the Harriott transport, the latter loaded with stores for the expedition.

At Porto Grande, island of St. Vincent. Porto Grande, said to be the finest harbour of the Cape de Verds, is situated on the north-west side of St. Vincent. Its form is nearly circular, containing an area of about sixteen square miles. Near the outer limit of the bay there is a pyramidal rock, called "Bird Island." Nova Mendillo is the name given to the wretched town, which consists of about fifty rude huts, lying at the entrance of a valley, which may be said to intersect the northern part of the island, from Porto Grande to the sea on the opposite side. We found the governor, Leon John Bands, a very obliging and rather intelligent man; he is an officer in the Portuguese service, under the immediate command of the Governor-general of the Cape de Verds, who usually resides at St. Jago. The population of St. Vincent is about 590, enjoying excellent health, and, according to the governor's account, there are some remarkable instances of longevity among them. During the previous year the deaths were a woman about a

hundred years old, and three young children. The inhabitants are chiefly Portuguese Creoles, and Negroes, with an intermixture of the two, who seem to drag out a miserable existence. Their principal employments are fishing, burning shells for lime, and collecting the "lichen orchella," a dye of some value, which is sent to Lisbon. A small quantity of cotton is grown on the island. In the interior some goats are seen among the rocks; they afford but little milk, are lean and ill conditioned, their means of subsistence being very scanty. The whole island presents a nearly uniform, arid, and desolate aspect. Dr. Vogel, the botanist of the expedition, after great perseverance, found from twenty-five to thirty species of plants among the mountains. The north-east trade constantly blows over the island, and often with great violence. This circumstance, added to the long absence of rain during the year, is fatal to the cultivation of a soil, which, in some of the valleys, is, in other respects, favorable to it.

The rainy season sets in about the middle of July, and ends about the same time in October. The governor informed me that vegetation sprung up rapidly in many of the valleys, but that it was arrested immediately upon the cessation of the rains.

Salt is found on the rocks, and sometimes at a considerable height above the sea, produced by the

evaporation of the spray thrown up by the waves. It is gathered by the natives.

Water is by no means abundant, and the quality is indifferent. It drips down the sides of the rocks and is received into what accidental cavities may be formed. On the north-east side of the town there are two wells, which, while we were there, contained but little water. But it is to be observed that this was towards the end of the dry season.

Live stock is to be obtained ; consisting of goats and fowls. Beef and vegetables are readily sent from the adjoining island, Saint Antonio.

About forty-five children were vaccinated at St. Vincent ; thirty in the town by Mr. Marshall, acting-surgeon of the Soudan, and fifteen in the country by myself.

The island may be said to resemble an irregular rhomboid. Its longest diameter extends from north-east to south-west. It contains three principal mountain ranges, and is intersected by two great valleys ; the one running from north-west to east-north-east, and the other from east to west. Dr. Stanger found the altitude of the highest mountain to be 2465 feet by accurate barometric measurement.

The formation of the island is chiefly of the older lavas, traversed in all directions by basaltic dykes. The summits of the mountain are nearly all capped with basalt.

Round the bases of the volcanic cones, at the south-east extremity of the island, the lava is in many places upheaved, as if by a force insufficient to effect complete disruption of the surface, but is raised here and there, forming caverns underneath with small external apertures. In one of these a human skeleton was found, which, from the shape of the skull we concluded to be African. From the north-east to the south-east point there are eight craters, all of comparatively recent origin.

Shells are found in a thin bed of limestone at the south side of the bay. The limestone bed is upraised by a hill of tufa, which is cut through by basalt. At some distance from the hill, on the sea shore, the bed lies horizontally six feet above the level of the sea, and gradually rises, in the direction of the "Fort Hill," to the height of forty feet on every side.

At Porto Grande, arrangements were made for some of the future operations of the squadron; many of the stores were removed from the Harriott transport to the ships of the Expedition. The holds of the vessels were cleared, the bottoms swept thoroughly and dried.

It would be beneficial to the cruisers on the west coast, were they to call at Porto Grande, which offers every safety and convenience for this purpose, on their way out, and have their holds cleared and cleansed. It is well known to most officers, that

from the hurried manner in which ships often leave England, a quantity of shavings, pitch, and other filth, is not unfrequently left in the holds. This, from want of opportunity, may not be got rid of for twelve or eighteen months, and is thus left to pass through the various grades of decomposition in the bottom of the vessel. Moral impressions are intimately connected with the maintenance of health, as well as with the production of disease; a conviction that the ship herself is "sweet," that there is nothing in her to generate disease, will, I am persuaded, go far to fortify men against the evils of the coast climate.

One man belonging the Soudan was invalided for ulcer at this place. A melancholy accident happened in the Wilberforce. I had been on board the Wilberforce for some time in the morning making some experiments on ventilation with Dr. Pritchett. Some alterations that we resolved upon making, in the arrangement of the valves, were pointed out to a man named Morley. He was young, healthy, and remarkably intelligent. I had just returned on board the Albert when my attention was called, by a movement on deck, to the Wilberforce. Morley and another man had just fallen from a stage alongside; Morley at once sunk, and the other man was with difficulty dragged on board. All attempts to raise the body of poor Morley were unsuccessful, until James Haughton,

seaman, heroically dived to the bottom, (a depth of seven fathoms,) and hooking on the body to a grapnel brought it up.

The usual means for resuscitation, including electricity, were employed in vain. The body had been in the water about twenty minutes.

The following are extracts from the general orders which were issued at St. Vincent, by Captain Trotter, "for the information and guidance of the commanders and other officers of the Expedition."

1st. The Admiralty having spared no expense in providing the vessels of the Expedition with an expensive ventilating apparatus, it becomes the duty of all to make themselves acquainted with the system, as fully explained in Dr. Reid's paper, and to use their utmost endeavours to carry the plan fully into operation, in order to make it as extensively useful as possible for the health and comfort of the crews.

2d. The principal arrangement is to be placed under the charge of the surgeon of each vessel, who is to follow the rules and suggestions contained in Dr. Reid's valuable paper, and is to apply to the commander to appoint a competent individual to instruct, under his directions, a sufficient number of persons for the management of the various valves and slides of the ventilating tubes. These should be numbered to ensure an effective and easy adjustment. Odd numbers on the starboard, and

even numbers on the port side, beginning from aft, is the plan adopted in the *Albert*. The persons having charge of the different sections of the vessel should be fully instructed to report any apparent increase or diminution in the ventilation of the compartments under their charge.

3d. The ventilation should be practised frequently, even when its beneficial effect is not required, and as many persons as possible should be encouraged to learn the principle upon which it acts, by putting into operation the various movements.

4th. The powers of the fanners ought to be tested: 1. In producing a circulation of air introduced into the vessel, directly from the external atmosphere. 2. In propelling the heated air of the engine-room into the hold and various compartments, as first practised in the *Wilberforce*. 3. As connected with the medicator or purificator. 4. In connexion with the tubular heating apparatus attached to the purificator, or simply connected with the external tube leading to the fanner.

5th. The commanders are to direct the surgeons to send reports to them in writing from time to time, showing the results of the trials of the ventilation, and these reports are to be carefully preserved.

6th. 1. Dr. Reid's general rule, No. 2, is not only to be strictly attended to every day, but one hold is also to be examined daily by the surgeon, (excepting on Sunday,) and the state of the air

reported to the commander, in order that every compartment may come under particular inspection during the week.

7th. 1. To avoid as much as possible any unnecessary exposure to the night air, the white men are all to sleep below, when on the coast or up the river, and are on no account to be permitted to lie about the upper deck. 2. The Kroomen alone are to sleep on deck, to whom every facility should be given to protect them from the rain. It might be advisable, when practicable, to fit up a canoe or boat, moored alongside, or astern of the ship, for the accommodation of the Kroomen, when the vessels are at anchor, and much crowded on deck. 3. As few white men as the performance of the duty will admit of, are to remain on deck during the night, particularly when rain or much dew is falling. Those who are obliged to be on deck on duty, will be supplied, when in unhealthy localities, with respirators, and a fire is then to be kept all night in the cook-house for their benefit.

8th. As the hottest hours of the day are comprehended between eleven and three o'clock, the white men should be exposed to the sun as little as possible during that period.

9th. 1. Exposure on shore in Africa to the morning and evening dews, and the night air having proved even more prejudicial to health than the intense action of the sun's rays, no white person

belonging to the expedition, after arrival on the coast, is to be on shore between sunset, and an hour after sunrise, unless with my permission, or that of the senior officer present, who is not to grant it, unless when duties are unattainable at other times, and care must be taken by the respective commanding officers that the unavoidable exposure of white men on shore at night be reduced to the least possible amount. 2. The above precautions are considered necessary on the coast generally, but more especially in the Delta of the Niger, where the exciting causes of disease are to be regarded as acting with increased energy, and all possible means are to be used for obviating their injurious effects. It is to be hoped the climate above the Delta will be found to be such as will admit of this restriction being modified.

10th. Boats or canoes going alongside their own or other vessels, are to be directed to take the shady side, in order to avoid, as much as possible, the exposure of the boats and crews to the rays of the sun.

11th. *Dress.* The commanders may give permission to the officers of the ships under their command to wear uniform jackets, and white hats or caps on shore or on board.

12th. *Dress.* 1. Duck frocks and trousers are to be worn by the white men during the day in fine weather, with flannel next to the skin. Each man

must also be provided with two broad flannel waist-belts, so that he may be enabled to have a dry one continually round his body. 2. The men's hats are to be of white straw, with a packing, or defence of some sort, under the crown, to prevent the injurious action of the sun's rays upon the head. The white men are not allowed to go aloft without the officer of the watch seeing that they have attended to this necessary regulation.

13th. The crews are to be mustered before sunset, when the white men are to be clothed in their blanket dresses for the night, in addition to flannel clothing underneath.

14th. In cases of any of the men getting wet, the officer under whose charge they have been employed is particularly charged to muster and report them in dry clothing, before they are allowed to go below. If the weather is not suitable for the clothes being hung in the rigging, a place on deck must be pointed out where they may be deposited.

15th. As all surfaces giving out moisture by evaporation are injurious to health, open vessels of of water, wet clothing, officer's towels, &c., should never be allowed to remain below, nor the crew permitted to wash themselves on the lower deck.

16th. While the steam-vessels of the expedition are at an anchor on the coast of Africa, and in the Niger, and more especially in the Delta, and other unhealthy places, a cup of warm coffee is to be

given in the morning to each European, whenever the surgeon thinks it advisable, and also to such of the black men as the surgeon may think require it ; to make which, one third of an ounce of coffee and one third of an ounce of sugar are to be issued as an extra allowance.

17th. And as it is most desirable to encourage temperate habits on board the steam-vessels of the expedition, more especially with a view to the preservation of health, it is my direction that such individuals as do not take up spirits, be supplied daily with the established allowance of lemon-juice and sugar, except when their allowance of grog shall be stopped for punishment.

18th. The Kroomen are allowed only two-thirds proportion of spirits, which is always to be mixed with at least three waters, but as an encouragement to them also, not to take up their allowance, they are to be paid for any such savings, at the rate of six shillings per gallon ; thus making their savings at two thirds allowance of all spirits, calculated at this rate, equal to full allowance, at four shillings per gallon. This order is not to apply to savings payable to the sick mess.

19th. It is my direction that the issues of the following species of provisions on salt-meat days be regulated from the time of arrival on the coast of Africa by the following scale, observing that cranberries and pickled cabbage (which are to be considered as an extra allowance) are to be issued

only in proportion to the salt meat actually taken up, and that the pickles are not to be served with pork, unless when salt meat shall have been issued the day before.

Days.	Salt Beef.	Salt Pork.	Flour, &c.	Peas.	Pickled Cabbage.	Cranberries.	Sugar for Cranberries.	Mornings.	
								Coffee.	Sugar.
	lb.	lb.	lb.	pints.	oz.	ozs.	oz.	oz.	oz.
1. Salt Meat day.	$\frac{3}{4}$	..	$\frac{3}{4}$	..	1	2	$\frac{3}{4}$	$\frac{1}{3}$	$\frac{1}{3}$
2. . . . .	..	$\frac{3}{4}$	..	$\frac{1}{2}$	1	..	..	$\frac{1}{3}$	$\frac{1}{3}$
3. . . . .	..	$\frac{3}{4}$	$\frac{3}{4}$	..	1	2	$\frac{3}{4}$	$\frac{1}{3}$	$\frac{1}{3}$
4. . . . .	..	$\frac{3}{4}$	..	$\frac{1}{2}$	1	..	..	$\frac{1}{3}$	$\frac{1}{3}$
5.	$\frac{3}{4}$	..	$\frac{3}{4}$	..	1	2	$\frac{3}{4}$	$\frac{1}{3}$	$\frac{1}{3}$

20th. Preserved meats are to be issued to the companies of Her Majesty's steam-vessels of the Niger expedition on Sundays and Thursdays whenever the crews shall have been two days previously on salt meat, or if more palatable to the crew, it may be divided into halves, and served in four days of the week, mixed with salt meat, without interfering with the scale in the last order regulating the issues of pickles and cranberries.

21st. Wine and quinine may be given to the men occasionally in lieu of wine and bark, and its issue may be extended to the whole crew when thought desirable by the surgeon.

June 16th. Sailed in the evening from Porto Grande, with a strong north-east trade-wind, the *Albert* rolling heavily all night. Next day at two P.M. we were under the lee of the island of Fogo*, near the town, which is built on a precipitous bank of lava. At five we were quite close to the land, which still preserved the same character as that near the town, when a cloud of a dirty brownish colour was seen at some distance ahead of the ship. The temperature of the atmosphere was at once sensibly increased, and in a few minutes it became oppressively hot. We were, in short, in a cloud of dust which had been projected from an active volcano on the island. The average heat as indicated by a series of thermometers in various parts of the ship's deck was as follows :

	Temperature.	Dry Bulb.	Wet Bulb.
First observation	95.5	95.0	67.0
Second ditto, three minutes afterwards	96.0	96.5	66.5
Third ditto, 4 minutes after second observation . .	96	96.0	66.0

* Fogo, or Fuego. Dampier says, "that the volcano on the Pico of Fogo burns continually, flames of fire issuing out of the top, which are only to be seen at night, and then a great way off at sea." "It is most horrible to behold," says Beeckman, "what prodigious flames, and vast clouds of smoke it vomits up continually, which we could perceive afterwards in a clear day, though we were above sixty miles distant."

Temperature at the bottom (five fathoms deep) 78° Fahr. When in the cloud, solutions of sulphate of copper, nitrate of silver, and nitrate of baryta were exposed in flat plates. Distinct white pelli- cles were formed upon the surface of the barytic solution, but on the other plates no change was observed.* Every one being on deck, the barometer was not watched, but the state of the sky two hours before drew attention to the sympiesometer when the readings were, at 2h. 30m. P.M. 29.86in.; at 2h. 50, 29.80in.; at 3h., 29.78in.; at 3h. 20, 29.74in.

At seven, P.M. we were clear of the island, when the thermometer stood at 76° Fahr. wet bulb, 70° . It blew hard all night, and the next day was hazy throughout. A very heavy squall was experienced during the night of the 19th. During the storm, the thermometer fell to 55° Fahr. and the weather on the succeeding day was extremely disagreeable, with very heavy rains.

At ten in the morning of the 22d June, sound- ings were obtained at the depth of 55 fathoms. The temperature of the sea, 17 fathoms deep, was 83°

* Produced probably by the action of carbonate of ammonia or sulphurous acid. It is obvious that the formation of the pellicle upon the surface of the baryta was not caused by pure carbonic acid, as this alone gives no precipitate with the nitrate of baryta. Nor could it have been a mere mechanical deposition, as the other solutions would have presented a similar film.

Fahr.; at the surface, $83^{\circ}5$ Fahr. At one P.M. bottom was found at 68 fathoms. At seven P.M. shoaling to 33 fathoms, the temperature at the bottom, as shown by a register-thermometer, and by a sounding tube for bringing up water at great depths, containing a common thermometer, was 82° , surface $82^{\circ}5$.

During the 23d, the water from various depths was tested, with the view of ascertaining the presence of sulphuretted hydrogen, but no evidence of the existence of that gas was afforded; it was rather squally in the evening, and heavy clouds bounded the horizon. The next morning was fine. At day-break, the summits of the undulating mountain range of Sierra Leone, were indistinctly apparent through the haze. As the sun rose, we were gradually approaching the "beautifully diversified" Sierra Leone. Rounding the Cape, the villages Wilberforce, Aberdeen, and Murray were passed in succession, and each seemed to vie with the other in beauty and variety of feature, and in luxuriance of vegetation. In a short time we were off Freetown, the capital. To the voyager who has been for weeks traversing the wilderness of the ocean, the scene here is of the most pleasing and captivating kind. The spacious river, with its numerous creeks and islets; the town more immediately surrounded by richly-cultivated patches,

the streets running upwards in regular lines, crossed by others at right angles ; the fine white-looking buildings connected with the government offices ; the military hospital and barracks higher up : the whole inclosed, as it were, behind, by a semicircle of mountains clothed in perpetual verdure, forms a portrait in nature, that contrasts strongly with the low, unvaried, dark, and uncheerful looking shore of Bullom on the opposite side.

The death of Sir John Jeremie, the governor, was the first news we heard from the black pilot. He died on the 23d of April, on the 21st day from being taken ill. His disease was fever, contracted while at Port Lokko, in the Timneh country.

June 26th. The greater part of this day I was occupied with Captain Trotter examining volunteers for the expedition. Mr. Schön was also present, and acted as interpreter. It was a most interesting and unusual sight. There seemed assembled all languages, all shades of the dark race, marked and tatoood after the mode of their various countries. Among the sable candidates to join the expedition, that day, were Kroomen, Fishmen, and Timnehmen, many of whom were selected for the duties of the ship. As interpreters, there were chosen people of the following nations : Ibu, Kakanda, Haussa, Yaruba, Bornou, Laruba, Eggarra, and Filatah.

June 28th. Sierra Leone was visited by a tornado of unusual duration, and attended with more than ordinarily fearful effects. A few minutes before eight P.M., a black ring encircled the horizon, and the whole arch of heaven seemed enveloped in gloom. A few drops of rain fell, vivid flashes of forked lightning followed, the thunder pealed over our heads, the wind blew with violence, and the rain then poured in torrents. What made most impression upon me, during this fearful war of the elements, was the frequent transition from pitchy darkness to broad glaring light. At one moment nothing in nature was visible, and in another the whole atmosphere would be suddenly illumined by lightning, so as to make objects on the streets ashore distinctly perceptible. The commissariat house was damaged in three places. Solid masses of wood that formed the angular supports of the building were shivered, one of them throughout a length of six feet, the boards that had been nailed to it were torn and destroyed. The attracting points seemed to have been the iron fastenings of the water spouts, which descend from the roof at each corner of the building. In a small village behind the barrack hill an Akou man and his wife were killed. During the tornado they had been engaged in worshipping the thunder, with the usual accompaniment of beating "tom-toms," halloing, and other noises. The hut was struck with light-

ning, burnt, and with it the votaries of the fearful element. Accompanied by Dr. Stanger, I visited the place next day, and the sight that presented itself was at once humiliating and appalling. The track of the lightning was apparent across the little inclosure surrounding the hut. The hut was levelled with the ground. Near it lay the dismal remnants of mortality, partly reduced to cinder. All of the muscular substance which had not been consumed by fire was like dry shrivelled fibre. The viscera protruded, were covered with flies, and in the last stage of decomposition. The bones of the head were white, as if they had been bleached for years, those of the legs were partly calcined.

The rainy season was at its height, but the place was comparatively "quite healthy." I saw a few cases of fever with my friend Mr. Fergusson, staff-surgeon. They were all captains or mates of merchant ships in the river, and were mostly convalescent. There were very few patients in the military hospital, and there was not a man sick in the squadron while we were at Sierra Leone.

At Kiskey town, about four miles to the westward of Freetown, there are two hospitals for liberated Africans. Mr. Clarke, the assistant-surgeon, was kind enough to show Dr. Stanger and myself round the wards. The patients, male and female, seemed to labour chiefly under yaws, lepra, and syphilis.

One portion of the establishment was set apart for mental diseases.

The rocks of Sierra Leone are of highly ferruginous sandstone and hypersthene, which latter has been described as granite. The hill on which the barracks are built consists of hypersthene, as pointed out by Dr. Stanger, who also by a barometric measurement ascertained its height to be 393 feet above the level of the sea. Magnetic iron ore is found: it is abundant on each side of the road, on the hill near to Kiskey town; the soil there is also highly ferruginous, and the water courses are black with iron, in the state of powder.

The *Amelia*, a brigantine, condemned for having been employed in the slave trade, had been purchased for the service of the expedition some months previous to our arrival. She was in a very foul state below. On removing the limber boards, a quantity of filth was found underneath. Kroomen were for some days employed in baling out the dirty water from the hold, and in scrubbing and washing her bottom. The hatches were closely shut for about twelve hours, while chlorine was being largely disengaged below from the chloride of lime, by means of sulphuric acid.

Lieut. Harston, 2d of the *Albert*, was placed in the command of the *Amelia*, with Mr. Fairholme as mate. The house for the model farm, and various agricultural implements and provisions, were put

on board of her. The ship's company consisted almost wholly of blacks; and the greater part of the model-farm mechanics and labourers (all blacks) embarked in her.

On the 1st July the *Amelia* weighed, and shortly afterwards anchored off Cape Point, the *Wilberforce* and *Soudan* left the next morning, as did also the *Albert*, in a few hours afterwards. In the afternoon the squadron was making all speed for Cape Mesurado.

July 3d. In the afternoon met H.M.S. *Ferret*, with the commander and many of her crew laid up with fever. Mr. Mottley, the assistant-surgeon, had died the day before.

On the night of the 3d July a melancholy accident occurred. Samuel Johnson, a fine active young seaman, fell from the fore-yardarm to the deck, while furling the sail. When taken below he was in a state of total insensibility, the pupils were dilated, and could not be excited to contraction. There was copious bleeding from the nose, the breathing was stertorous, and the feet were cold. The pulse was small and indistinct. No fracture of the cranium was detected. The olecranon of the right ulna was broken off. He died in an hour and a half, with all the symptoms of compression of the brain.

On the morning of the 5th July we anchored near Cape Mesurado, about a mile from the bar of the river.

Dr. Stanger and I, after getting thoroughly wet in crossing the bar, landed at Monrovia about twelve o'clock, where we were kindly received by Governor Buchanan, and Dr. Day, the medical officer of the establishment. The latter was suffering from intermittent fever, but he introduced me to a gentleman of colour, who conducted us through the settlement. Fourteen children were vaccinated, and Dr. Day was good enough to say he would look after them.

The colony of Liberia, of which Monrovia is the capital, originated in the American Civilization Society, which was founded at Washington in 1816. The objects of the philanthropic individuals composing the society were to afford the free people of colour in the States, by this time amounting to about two hundred thousand, fair scope for the exercise of their industry and talents, in the prosecution of agricultural and commercial pursuits. Cape Mesurado, on the peninsula of which Monrovia stands, was not occupied until 1822. The town is built within two miles of the Cape, (which is about eighty feet above the level of the sea,) at the mouth of the river Mesurado, where it is joined by the Stockton branch of the Saint Paul's. It contains eight hundred inhabitants. The exuberance of vegetation is such, that the citizens are

required by law to have a general weeding of the streets once in three weeks. There are three places of worship, one Presbyterian, one Baptist, and the other Wesleyan : there are also two public schools. Two newspapers are published here : the *Liberia Herald* is edited monthly by Dr. Day, and *Africa's Luminary* once a fortnight by Dr. Goheen.

Remittent and intermittent fevers are endemic here. I must not omit to mention, that we met with a missionary at the governor's who was proceeding from Cape Palmas to *Sierra Leone* for the benefit of his health !

The exports are palm oil, camwood, and ivory. Coffee is also being extensively cultivated.

The peninsula of the cape is about thirty-six miles long, and from one and a half to three miles in breadth. The rocks are of highly ferruginous sandstone, (similar to that of *Sierra Leone*,) which appears to have been cut through by greenstone. At the landing-place near the town, the rock is weathered to a great depth, and presents a curiously grooved appearance, evidently the result of aqueous action.

It rained almost incessantly while we were at *Monrovia*, so that we were not induced to go on shore more than once, although we did not leave until the evening of July 6th, having previously engaged a cotton planter for the model farm to be

established at the confluence of the Niger and Tchadda.

We arrived off the river Sinoe on the afternoon of July 10th, after a wet and disagreeable passage. The Wilberforce was towed by the Albert until the evening of the 8th, when we cast her off.

Viewed from the sea, this place presents a densely-wooded plain; the back ground is nearly of the same character. The termination of the river is exceedingly beautiful, being upwards of half a mile broad, and dotted with richly-clad islets. The mangrove flourishes on the banks, sending downwards its manifold shoots, which form a thicket of lattice-work between the river and the shore. The inhabitants of Sinoe are Bluebarra people, who are said to have migrated from a tribe in the interior, Fishmen, and a few Kroomen. There is also an American settlement called Greenwell, situated on a tongue of land, running betwixt the river and the sea, occupied by colonists from Mississippi, who emigrated thither about five years since.

According to information which Mr. Lewis, one of the settlers, has obtained from an old and very intelligent native, who has been further up the river than any other person at Sinoe, it would appear that about eighteen or twenty miles from the mouth there is a "fall;" that the river is navigable for a long way in the interior; and that in its course it

traverses rich districts, which are peopled by powerful tribes. The villages on each side of the river have, according to the same authority, been inhabited by the Bluebarra people and Fishmen, who have intermarried, for the last sixty years.

The huts are of a quadrangular form, the roofs tapering to a point, on which there are fishes carved in wood, and other articles of "Gree Gree" worship. The walls of the hut are made of bamboo, neatly interlaced with palm leaves, of which the roof is entirely composed; the floor, which is also formed of bamboo, is raised three feet from the ground; and above this the hut is usually divided into compartments. They are all more or less furnished: in some there is a fair assortment of European dishes, looking-glasses, &c., but all are provided with a fireplace, and mats, earthen pots and calabashes, with the trunk of a tree hollowed out for grinding corn. The women are generally seen lolling at the door and other apertures of the hut, with their faces besmeared with a yellowish powder, which gives them a most unseemly look. A piece of cotton cloth passing round the loins and reaching to the knee, completes their dress; and the neck and the middle are occasionally ornamented with strings of beads.

The Fishmen and Kroomen are tattooed alike. A broad blueish line passes from the roots of the hair over the forehead, terminating at the tip of

the nose. Sometimes there is a circle with a star in the centre at the outer angle of each eye, in place of this there are occasionally a few crescentic lines, concave, and having a dart pointed towards the eye. The body is covered with all sorts of figures, comprehending human heads, fish, ships, arrows, tobacco pipes, &c. An ivory wristlet, and a leopard's tooth, or a piece of fish skin, are especial articles of "Gree Gree." Their general form and physiognomy are the same, but the Kroomen say no, and the Fishmen point to a swelling on the inside of the outer ankle, as a "true Fishman mark." This assumed mark of distinction is not invariably present, but I have certainly observed it in a great number of Fishmen. It consists of a protrusion of the tendons of the extensor muscle of the toes, through a rupture of the sheath, which is induced by the continued strain exerted upon it, from the attitude of the Fishman in his canoe, where he rests nearly altogether on the upper part of the foot, bent under the ankle.

The Kroomen and Fishmen speak the same language, and originally belonged to the same tribe: yet they not unfrequently make war against each other. On our first arrival at Sinoe there was a rumour of "war palaver," owing, as a Fishman admitted to me, to one of his countrymen having stolen a Krooman's wife. Tom Bull, our head Krooman, would not trust himself on shore at

Sinoe, until fully assured by his friends that the "palaver" was over.

The Kroomen and Fishmen, according to their means, have an indefinite number of wives : both of them worship the devil. "God," they say, "does nothing but good : * he can do no evil. The devil can do evil only, and is therefore to be feared." On this account they propitiate the devil by votive offerings of various kinds. Such is also the worship of the Sherbro, and several other tribes on the west coast. The Kroo doctors are believed to be inspired : they give drink to the sick, but their principal mode of cure is by the influence of "Fetishes."

The American settlers describe Sinoe as healthy, with the exception of occasional visitations of fever, which occur during February, March, and April (in the dry season). The vapours from the mangrove swamps can only be wafted to the village by a south-east wind, which fortunately seldom takes place.

The native population is about five hundred, and that of the colonists seventy-two.

Rocks, &c. On the south-east side of the Sinoe river there is a hill of gneiss, through which veins

* Oldendorp says, "No African nation makes the malevolent demon an object of worship, or calls upon him for assistance ; but they are universally afraid of this powerful agent, and seek to appease him with favours." (See *Researches into the Physical History of Mankind*, by Prichard, vol. i. p. 202.)

of granite cut. On the north side the land is low; and the rocks are also of gneiss. A short way up the river there is a hilly mass of gneiss cut through by greenstone.

July 15th. Having obtained a good supply of firewood the *Albert* weighed at nine in the morning. In the course of the day we passed part of the Kroo country, which seems to be less wooded than other parts of the coast; the land is however higher: we observed one tree of remarkable height. A long scattered line of lights was seen in the evening on the shore.

Next morning we were off Cape Palmas; at noon in shoal-water; the temperature of the sea was $75^{\circ}5$ Fahr.; of the air 82° Fahr.: the day previous, the thermometer in the air was also 82° ; and in the water of the sea, 81° Fahr., showing the difference of $5^{\circ}5$ in the temperature of deep and shallow water. The weather was beautiful, and the current favorable, during the passage to Cape Coast Castle, where we arrived on the morning of the 19th of July, having been for the latter twenty-four hours under sail only.

Cape Coast Castle. At this place the Ashanti princes, John Ansah and William Quantamissah, took up their abode with the governor, Mr. M'Lean, until the King of Ashanti should be informed of

their arrival, and enabled to make the necessary arrangements for their journey to Kumasi, the capital of the kingdom. The town of Cape Coast is built on an acclivity, and is said to contain upwards of five thousand inhabitants. The houses, with the exception of those belonging to the merchants, are constructed of mud: some of the better sort are two stories high. The streets are cut up by deep water-courses, formed by the rivulets rushing down from the high land behind, during the rainy season. To the eastward, in the direction of Annamaboo, the land is undulating and hilly. There is also high land to the westward of the town, but there also is a greater extent of flat ground, which is in many places overflowed during the rains. While we were there the road, at a distance of two miles from the town, was almost impassable.

At the distance of nine miles there is an estate, which for some years has been in the hands of Mr. Swanzey, a merchant at Cape Coast. During the Ashanti war in 1823, this place, which is named Napoleon, was completely destroyed. Part of the ground was afterwards converted into a garden by Governor White, and now there are about one hundred acres under cultivation: the soil is gravelly, with good loam. The coffee-trees, of which there are four thousand, promise well. There are also oranges, plantains, bananas, limes, citrons, vines, cassada, Barbadoes cherry, soursop, sweet-apple,

custard-apple, pine-apple, figs, bread-fruit, nut, and other fruits. About eight acres are occupied by corn alone.

The weather was in general fine during the day, but there were heavy fogs in the mornings and evenings. The rains were gradually abating. The Governor, with his usual kindness, allowed me to copy twelve months of the meteorological record, kept at the castle.

The rains commence in April, and are particularly heavy, accompanied with tornadoes in May and June. About the end of July the rains begin to subside, and the weather becomes hazy, until about the end of October when the dry season sets in.

The climate here proved extremely fatal to the white troops, who were for some years employed in the garrison.

The rock, upon which the Castle is built, and upon which the sea constantly dashes, is granite; graphic granite, the felspar of a beautifully opalescent character, is found in the streets. Gold is brought from the interior, generally in a minute granular form: it is occasionally washed out from the mud of the small rivulets in the streets.

In the Cape Coast government are included the settlements of Dixcove, nearly sixty miles to the westward, and those of Annamaboo and Accra, the one ten miles and the other about sixty miles to the eastward of the Castle: but the influence of

Governor M'Lean, among the natives extends far beyond those limits. Tribes, a long way in the interior, voluntarily pay deference to his authority, and come to him to reconcile discords, which would otherwise terminate in an appeal to the war-club. While we were at Cape Coast two Akim chiefs arrived at the Castle to have a palaver settled. The one was accused by the other of having killed some of his people, merely to avenge a supposed invasion of territory. Each chief was attended by his sword-bearer, his cane-bearer, and tail-bearer, and about two hundred other followers of various ages. Aggry, the old caboocer of Cape Coast, was also present: he had endeavoured to act as mediator, but in vain. Each chief stated his case, through an interpreter, to the governor. Perfect silence was maintained all the while, by both parties, who patiently awaited the governor's judgment. The old men, in whom the fire of youth was in a measure extinguished, looked reserved and stern; but the keen black eyes of the younger warriors were rivetted upon the governor, as if their lives depended upon the issue. The governor's decision, by which both parties were punished, and bound to keep peace, was received without a murmur. They then withdrew, with loud plaudits, and beating of drums, each party bearing their chief in a kind of palanquin, placed on their shoulders.

Governor M'Lean has established in the Castle an observatory, a printing-office, and a school, where upwards of one hundred and fifty negro children are daily taught reading, writing, and arithmetic.*

On the 24th of July, Thomas Kemp, a private marine, who had been for some time complaining of phthisical symptoms, was invalided.

Some Kroomen were here added to the expedition, and an intelligent native, named Brown, who had been up the Niger with Lander. The Wilberforce arrived on the 26th July. There were several cases of fever on board, of which disorder they had lost one man of colour, entered in England; one man had also died of apoplexy: the cases occurred almost entirely among the blacks, who had been a good deal exposed during rough weather, while wooding and watering at Grand Bassa.

* On a marble slab, in the Castle-yard, there is the following epitaph to the memory of L. E. L., Mrs. M'Lean:

Hic jacet sepultum,
omne quod mortale fuit
LETITIÆ ELIZABETHÆ M'LEAN,
Quam egregia ornatam indole, Musis
unice amatam, Omniumque amores
secum trahentem: in ipso ætatis flore,
mors immatura rapuit.

Die Octobris XV, MDCCCXXXVIII. Ætatis XXXVI^{mo}.

Quod spectas viator marmor vanum heu doloris monumentum
Conjux mœrens erexit.

July 30th. Sailed in the evening, in company with the Soudan, and the following day anchored at Accra.

The country round Accra is an extensive plain, which is nearly clear of bush: it cannot be said to be much cultivated; but it produces abundance of excellent yams, Indian corn, ground-nuts; pine-apples and other fruits are also yielded in considerable quantities. On the flat ground betwixt English and Danish Accra, the most remarkable features are the ant-hills, which are seen in great numbers: they are of an irregular pyramidal form, varying in height from four to twelve feet. The whole plain is dry and sandy, with a thin layer of vegetable soil.

Half a mile to the westward of the English fort there is a salt lake, about a mile in extent, running inland from within a short distance of the sea.

Accra, in common with the rest of the Gold Coast, has been said to enjoy a comparative degree of immunity from fever and other diseases, so inimical to Europeans on other stations of the west coast of Africa. But in the Statistical Report of Major Tulloch we find that "so fatal did the station prove, that in 1827 it became necessary to withdraw the troops, and leave it in possession of one of the resident merchants, with local military rank, who now hires a few natives for its defence."

The rocks near the town consist of beds of sand-

stone, lying horizontally. In the higher land in the interior, Dr. Stanger found granite and quartz rocks.

On the 4th of August we left Accra, and on the 10th all the vessels, including the *Amelia* schooner, and *Harriott* transport, were anchored within five miles of the mouth of the Nun branch of the Niger. The weather was rainy, and there was a heavy swell of sea, causing the ships to roll much, and thereby retarding the transference of the various stores from the transport to the steam-vessels.

At this period there were none on the sick lists of the *Albert*, *Soudan*, and *Amelia*; and the cases of fever on board the *Wilberforce*, contracted when wooding and watering at Grand Bassa, were all, with one exception, convalescent.

The following is a list of officers, seamen, and marines, of men of colour, of various nations, who joined the expedition in England; and of Kroomen and liberated African boys entered on the Coast, who were on board H.M.S. *Albert*, *Wilberforce*, *Soudan*, and *Amelia*, on their entrance into the Nun branch of the river Niger.

H. M. Ships.	Officers, including Civilians and Engineers.	Number of white Seamen.	Number of Marines and Sappers.	Total Number of Whites.	Men of colour entered in England.	Kroomen and liberated Africans entered on the Coast.	Blacks for Model Farm.	Total Blacks.	Grand Total.
Albert . .	18	23	10	51	14	44	..	58	109
Amelia tender	3	2	2	7	..	9	21	30	37
Wilberforce .	21	23	13	57	8	39	2	49	106
Soudan . .	11	15	4	30	3	18	..	21	51
Total of each class	53	63	29	145	25	110	23	158	303

Albert. Two officers, two seamen, and two marines were discharged into the *Amelia*, one marine was invalided at Cape Coast, and one seaman was killed by a fall; two seamen were entered on the Coast.

Wilberforce. One officer was discharged into the *Amelia*, two seamen were discharged on the Coast, and one was drowned at St. Vincent; two coloured men died on the Coast, one from fever, and the other from apoplexy.

Soudan. Had one seaman invalided at St. Vincent, one coloured man drowned, and one seaman was discharged.

SECTION III.

Journal of proceedings in the river until the arrival at Iddah, in the kingdom of Eggarra, that is, until the invasion of the fever.

Nun branch of the Niger.—August 13th, 1841. At 7·30 A.M. the Albert's steam was up, and in a short time she was rolling heavily over the bar of the Nun, followed by the Soudan and Amelia. Viewed about a mile from the mouth, the Nun presents a noble broad stream, flowing smoothly until lost in the turbulent sea outside. Each point of the entrance is bordered by a white sandy beach of considerable extent. A little way up the vegetation is so dense and luxuriant as to represent a dark and uniformly level mass resting upon the ground. As we approach nearer, its character becomes more distinct, especially on the left bank, where the palms, in graceful magnificence, skirt the shore, and form a sort of fringework to the unvarying and somewhat dismal aspect of the wilderness behind. We anchored at a little after nine, in the middle of the stream, in six and a half fathom water, an old tree on east point, bearing south by east, and the extreme of the western point west-

north-west. Next morning the ship was "kedged" in shore, and afterwards grounded on a sand bank in six fathom water, for the purpose of repairing the rudder-tails which had suffered some injury. Advantage was taken of the opportunity to scrub the ship's bottom, and the damage being repaired we again got into mid channel on the forenoon of the 17th. The breadth of the river at the entrance is about three quarters of a mile.

On the 15th, William Bach, mathematical instrument maker, died of fever with tremors, supervening upon a dyspeptic attack. This man was a native of Germany, of somewhat irregular habits, and had been complaining for some days before we entered the river. Further than the general enervating influence of a hot climate there was no reason to believe that his disease was of endemic origin; possessing none of the characteristics of the fever that subsequently proved so fatal to the Expedition.

On the forenoon of our arrival in the river the Soudan steamed up towards Alburkah island, for the purpose of exploring a creek, in which she grounded and remained for the night but was floated off the next morning.

On the 15th the Wilberforce joined us, and was during two nights and part of one day afterwards beached on the sand on right bank to refit the rudder.

On the 16th, the Soudan recrossed the bar to communicate with the Harriott transport which was still anchored outside, and returned to the river on the morning of the 17th, having received on board the remaining stores. She was also aground for twelve hours to have her rudder-tails repaired.

There are two villages on the left bank of the mouth of the Nun, one close to the river, and the other about a mile in the bush, to which the common name of "Acassah" is given. They are governed by Emmery, a chief who is subject to King Boy of Brass. The natives trade in palm oil and ivory, and no doubt in slaves. The huts in the village near the water amount to fifty-seven, and in that inland to sixty-six; which, by admitting six as the probable average number inhabiting each hut, will give a population of 738 for the two villages. The huts are oblong quadrangles, formed of bamboos and palm leaves, and divided into two and sometimes into three compartments. The common dress of the natives consisted of a cheque shirt of English manufacture and a cloth wrapped round the middle. The men, who are rather tall, carry spears; and a sheathed knife or dagger is usually worn at the girdle. Emmery's court costume was somewhat remarkable; on the occasion of his coming on board the *Albert*, and afterwards, on receiving a visit from Dr. Stanger and myself, he wore a uniform coatee that had belonged to the drummer of an English regiment, a plain black hat, and his lower man was

only partially invested with a blue cotton handkerchief. He seems to be a quiet inoffensive man, about fifty years of age. With Emmery's permission, and by his kind explanation to the mothers in the village, I vaccinated ten children.* Circumcision is practised at a very early age at Acassah; I saw several children, not more than six or eight months old, who had been subjected to this operation. Several very disgusting cases of syphilitic and leprous ulcers were seen. The bodies of those thus afflicted were besmeared with a red-coloured powder, probably camwood. Cocoa-nuts were offered here in abundance; fowls and eggs were also obtained, but in small quantities.

The banks of the mouth of the Nun are from a foot and a half to two feet above the level of the river. This elevation is continued only a short distance in the bush, for the land speedily becomes low and swampy. Each side terminates in a sandy flat, which is overgrown with weeds from above water mark to the outskirts of the forest. A short distance up the river lagoons and creeks strike into the land on both sides, and here the mangrove is the most prominent feature of vegetation. The branches of these trees meeting from opposite sides of the lagoons exclude the light, forming archways

* While I was vaccinating the children Emmery was much more interestingly employed with Dr. Stanger. The doctor, to the great delight of the old chief, was cutting button-holes in the "royal robe," the drummer's coatee.

which give them a sombre and inauspicious appearance. Small bays are formed by the sea, during the rising of the tide, running into indentations in the sand, which communicate with the lagoons. Crocodiles and a host of reptiles abound in these swamps, and the roots of the mangrove are covered with shell-fish and animal matter of various kinds. During low water a disagreeable odour was perceptible in some of the lagoons entered by Dr. Stanger and myself, but the most delicate tests failed to give any evidence of the existence of sulphuretted hydrogen in the waters of any of them.*

While the ships of the expedition were at the mouth of the Nun, rain fell nearly every day, accompanied sometimes by thunder and lightning. The sea breeze set in about nine in the morning, and blew sufficiently strong to ventilate the ships thoroughly. Fish was caught in considerable quantity, and served out to the ships' companies.

August 19th. five P.M. The necessary arrangements for pursuing the objects of the expedition being now completed, the Albert with the Amelia in tow, proceeded upwards, leaving the Wilberforce and Soudan to follow next day. As we approached Alburkah island, the river which had varied in breadth from three quarters of a mile to a mile, at once expanded to a spacious sheet, four thousand

* Vide Chap. ii. Sect. 2, on Causes of Fever.

yards broad, by micrometric measurement. By the time we entered Lewis's creek (between Alburkah island and the left bank) the sun was fast setting; the shade thrown over the water by the gloomy mangrove, became more and more deep, and at a little past seven we anchored at the top of the creek: the moon rose shortly afterwards. At seven next morning we weighed, and steamed up the Nun. The number of palms soon increased; the mangrove was growing densely to the water's edge; large grasses and juncas were abundant on the banks; plantains of a large size were also seen. We were often so close to the bank that the yards rustled among the branches. A great quantity of vegetable matter, including trunks of large trees, were seen floating down the stream; some of the larger masses were more than two thirds immersed. Having passed a few scattered huts, on both sides, we reached Sunday island about half-past one P.M. This island is sixteen miles from the sea, and is the limit of the mangrove. A short way above it the water ceased to give evidence of the presence of chlorides, and little or no trace of salt was found on evaporation; a fact corroborative of the statement that the mangrove does not vegetate beyond the reach of salt water.* At four P.M. landed at

* "The mangroves and the other vegetables, with which they live constantly in society, perish as the ground dries, and they are no longer bathed with salt water." (Humboldt's Personal Narrative, vol. iii. p. 374.)

small village on the right bank, called Paraboli. An Ibu pilot, whom we had seen at Acassah was here at this time, and the captain wished him to accompany us, but he wanted three hundred bars for his services, which we were not in need of. The women of the village when we (Dr. Stanger and myself) first landed, manifested considerable alarm by running into the bush. They, however, soon returned, when they saw the men talking to us.* In addition to the marks on the face, the more prominent parts of the body, as the breasts, abdomen, and hips, were tattooed with dark circles. The clay here contained mica, hence Dr. Stanger concluded that granite would be found higher up the river. At this village, the bank was about three feet above the river.

In the evening anchored in four and a half fathoms of water in mid-channel, a short way below a village on the right bank, to avoid a swamp that was near it. The Wilberforce and the Soudan, which had joined in the forenoon, came to, a short distance from us. Some heavy rain, from which the people were protected, fell during the early part of the day; the afternoon and evening very fine.

Temperature of atmosphere 82°, of river 82°·20.

* The people were of the same description as those seen at Acassah.

August 21st. So early as half-past five the vessels were again in motion, and at eight we were at a group of huts called Kiambli, where the chief sent a present of two fowls and some plantains. The trees are now larger and more umbrageous. Some magnificent bombax, palm-oil (*Elais Guieensis*), and cocoa-nut trees were seen in the morning; plantains and yams were also more extensively cultivated. At ten passed a branch of the river leading to Benin. At twelve the temperature of the water was 82° Fahr., of specific gravity 1002°; depth three fathoms. About one P.M. Injiamma, a considerable village on the left bank, was passed, and in an hour afterwards, another branch, leading, it was supposed, to the Benin. We were soon at a large village on the left bank called Atchaimanna. Here Captain Trotter threw some handkerchiefs overboard, which were soon picked up by the natives, who had assembled in great numbers. In a few minutes a canoe came alongside, in which there was a young female, evidently of rank by her authoritative tone to the canoe-men. She brought all the handkerchiefs with her, desiring to know, whether they had been accidentally lost overboard, or if they were intended for them. As a reward for her honesty, the captain presented them to the sable damsel herself. The chief afterwards came off, dressed in that favorite garb of distinction, a drummer's coat. Just as he was nearly alongside,

it was found necessary to steam more into the middle stream, and the commotion in the water, caused by this manœuvre, so alarmed him, that he gave orders to the canoe-men to paddle to the shore, and could not be persuaded to return. In the afternoon we had an opportunity of observing the dexterity of the natives in the water. Some handkerchiefs were thrown overboard, in the middle of the river, opposite a small village; two canoes were at once manned, and in a trice were paddling with all speed after the booty, which was being rapidly carried down the stream. Others, more impatient, at once dashed into the river, and struck out after the canoes, which they soon came up with, and held fast, until the prize was reached by one of their own party, who bore it on shore in triumph. Some more handkerchiefs were thrown, and there was soon a general scramble; more canoes were launched, and more swimmers dashed in. One canoe, containing five men, was upset in their eagerness to seize a handkerchief. The swimmers were borne a long way down by the force of the current, but we were under no apprehension for their safety, being by this time well persuaded of their semi-amphibious nature.

Several of the villages were surrounded by water. In the evening at half-past six, anchored in the middle of the river, which was here 361 yards in breadth, at a village on right bank, called Atachai

or Assassai. There was a little rain in the morning, but the day throughout was beautifully fine. The crew in excellent health.

The next day being Sunday, was a day of rest on board all the ships. In the afternoon some of the officers landed at the village; the natives came down at first armed with muskets, spears, and knives, but they were soon convinced of our peaceable intentions, and shook hands with great delight. Here I dressed some bad ulcers, for which the poor people seemed grateful.

August 23d. Again landed at Atachai, and at Captain Trotter's request presented a "dash" to Apiro the chief, in return for some plantains which he had sent on board. On our passage to the village we could not but admire the tall Gramineæ and Cyperaceæ, as well as Convolvuli and Leguminosæ, growing in the swamps. I endeavoured to purchase two bullocks from the chief, who, however, would not part with them without a "dash" or present of rum being preliminary to the bargain. Apiro, who was rather an old man, seemed to be well furnished with wives; several of them were peeping at us through a small bamboo trelliswork; others were walking about the court-yard behind his hut; some of them were young and good-looking. A cotton handkerchief passed round the loins was their sole covering; they wore massive ivory wristlets. The marks on the face were here deeper than we had as yet seen in the river. In

general, these marks seemed to have been formed by a succession of lineal scratches or punctures. Here they resembled the cicatrices of long deep incisions filled up by granulation.

Longitude by Chronometer, 6°12'30 East.	{	Barometer (Newman)	
		at the Village	30°·1090.
		Thermometer	87 ·000.
		Temperature of River	81 ·400.

At ten A.M. weighed, and descended the river to look after the Wilberforce, which we had left behind on the 21st, to explore a channel on the right bank. This we entered about twelve, and in an hour we had reached a very clean and neatly-built village, where the natives were collected in great numbers. Several other villages of the same description were seen, at most of which heaps of palm-oil pots were lying, filled and ready for sale. At three P.M. we turned round to regain the river, as the channel was observed to be trending to the eastward, and it was hence inferred that there was a passage to the main stream in that direction, through which the Wilberforce had in all probability passed. It rained heavily in the afternoon, and about seven in the evening we rejoined the Amelia, which we had left in the morning at Atachai. After taking the Amelia in tow we proceeded upwards, but soon got aground on a bank, where we remained half an hour. At nine, came up with the Soudan aground.

August 24th. The crew were employed from half-past five until eight in the morning getting the Soudan afloat. At half-past nine entered a creek leading to Brass, about 175 yards wide. Here we found a large canoe belonging to King Boy, laden with palm oil, on its way from Ibu to Brass. At eleven A.M. passed a village on the right bank, called Ian, where three canoes came off to us, in the largest of which was the chief, dressed in a soldier's coat. About half a mile above Ian we came to Aki, a small cluster of huts on the left bank; and adjoining to it was a village called Binnemah, which, as well as the others, we were told belonged to the kingdom of Hippotiamah. Here the current swept the ship alongside the bank, and the people soon assembled, armed with cutlasses and long knives. These they, however, in a short time threw away, and with much merriment united their efforts to push the vessel off. Some *cowries* (small shells, the current coin of the country, 'cypræa moneta') were thrown on shore, which they would not touch. At first we imagined that some spirit of fanatic bigotry had inspired them with a dread of anything belonging to a white man; but they afterwards explained to us that a present could be received only from the hand. A quantity was then given them in the manner they desired, when the rejected cowries were speedily picked up. Binnemah contained only thirty-five clay huts, and it was completely

surrounded by swamp. As usual, yaws, lepra, craw craw, and other cutaneous diseases prevailed among the inhabitants. Circumcision is practised. Proceeding upwards the vessel touched the ground at half-past six in the evening, but was got off by "backing the engine." Shortly afterwards anchored in five fathoms water, as did also the Soudan and Amelia. Temp. of atmosphere $80^{\circ}70$, of river $82^{\circ}00$.

August 25th. The river now increased in width, and the character of the vegetation was changed, chiefly in the greater abundance of bombax, palm-oil, and cocoa-nut trees, on both banks, which now varied in height from four to seven feet above the level of the river. The villages were also more numerous than we had yet seen; and the extent of ground under cultivation was proportionally greater. At twelve o'clock we were at Stirling island. The Soudan passed between the island and right bank, while we took the left bank passage. The vegetation on the island was of the same kind as that on the banks of the river, tall grasses and juncas growing to the water's edge all around. At three P.M. we were at a cluster of villages on the right bank, called Imbilamma, where a canoe came off with yams, bananas, plantains, &c. It contained two traders, one from King Peppel of Bonny, and the other from King Boy of Brass. They had collected

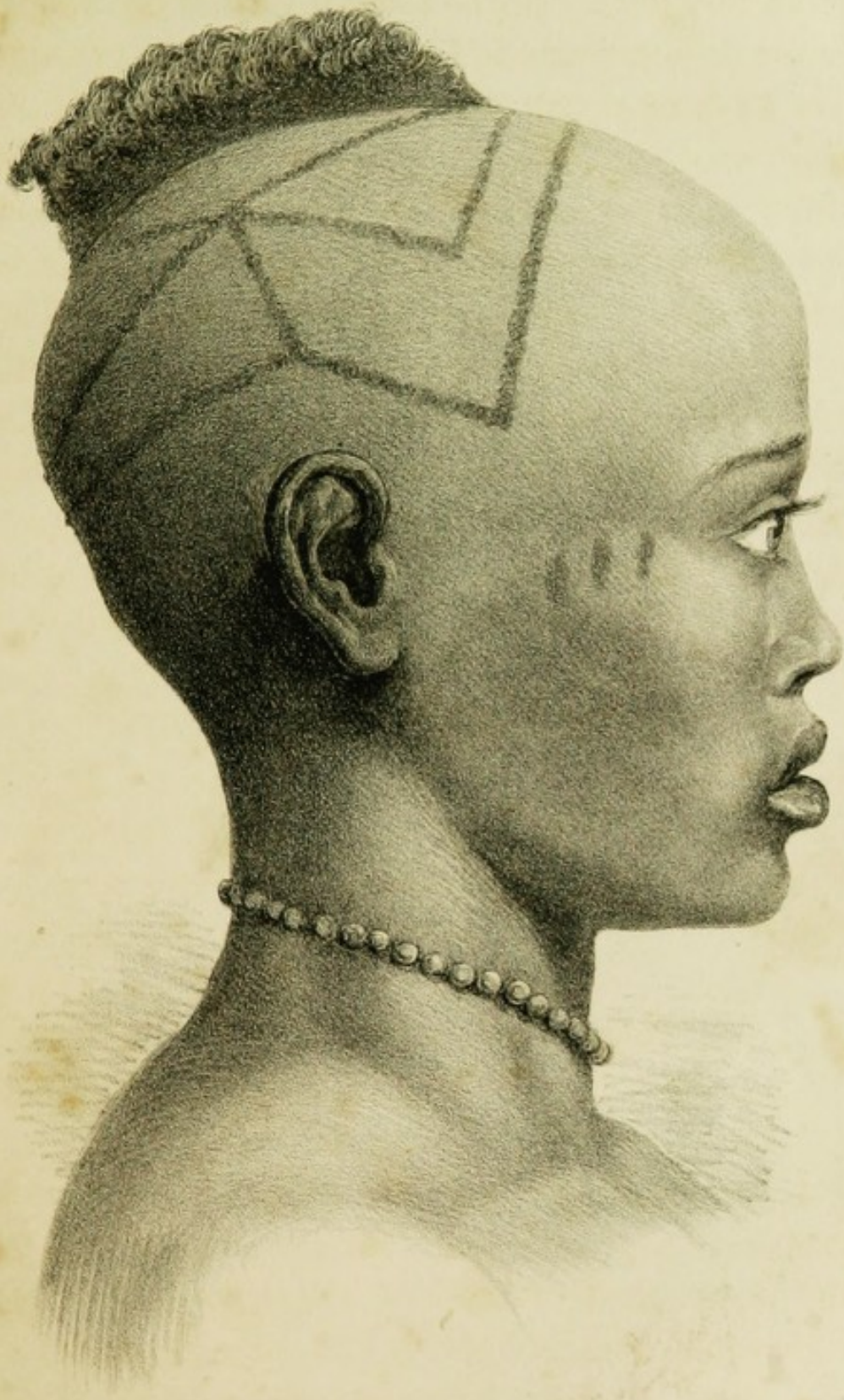
a good deal of palm oil, but stoutly denied having any slaves. About seven in the evening we reached Truro island, and shortly afterwards stopped for the night.

August 26th. There was a general haze over the land in the morning, which disappeared as the sun rose. About seven a spacious branch leading to Benin was passed. A short way above this the main stream was upwards of a mile in breadth. At eight the sun shone with unusual splendour, the trees on each side, now of larger growth, displayed their ever-varying tints of foliage, while those in the distance, ahead, ranged over each other, indicating undulation in the land. Several large plantain and yam plantations, and many large canoes were seen in the course of the day. At three P.M. we were approaching Ibu, and at four we were off the creek leading to the town, when Atché, a tall, fine-looking young man, came on board to welcome us to his father's dominions. Atché (whose only covering was a yellow striped shirt) was accompanied by one of Obi's wives, and her female slave. Many canoes were soon alongside. The Wilberforce had arrived the previous evening; Obi had been on board of her great part of the day, and was delighted and astonished at everything he saw. Temp. of atmosphere $80^{\circ}5$, of river $82^{\circ}5$.

August 27th. In the morning Ali Hare, a smart young fellow, came on board from Obi, to announce that he would visit the ship in the forenoon. Ali Hare was accompanied by about a dozen remarkably fine boys, sons of Obi, all about ten years of age. I say all, for if not born within the same month, they were certainly nearly coeval. They were all in a state of complete nudity, and presented unequivocal evidence of having been subjected to a certain ritual of Jewish origin. Many of them had the hair cut close, or shaved, so as to leave it in tufts and lines, describing diamonds and other angular figures over the head.

Abstract of Meteorological Observations from Aug. 9, 1841, until our arrival at Aboh.	Barom.	Therm.	Dry bulb.	Wet bulb.	Dew Point.	Wind.
Outside the river } Aug. 9 to 12, 1841 }	29·800	79·00	79·00	76·05	73·70	s.w.
In the Nun, and } ascending to Aboh }	29·800	80·600	80·000	76·500	74·00	s.w.

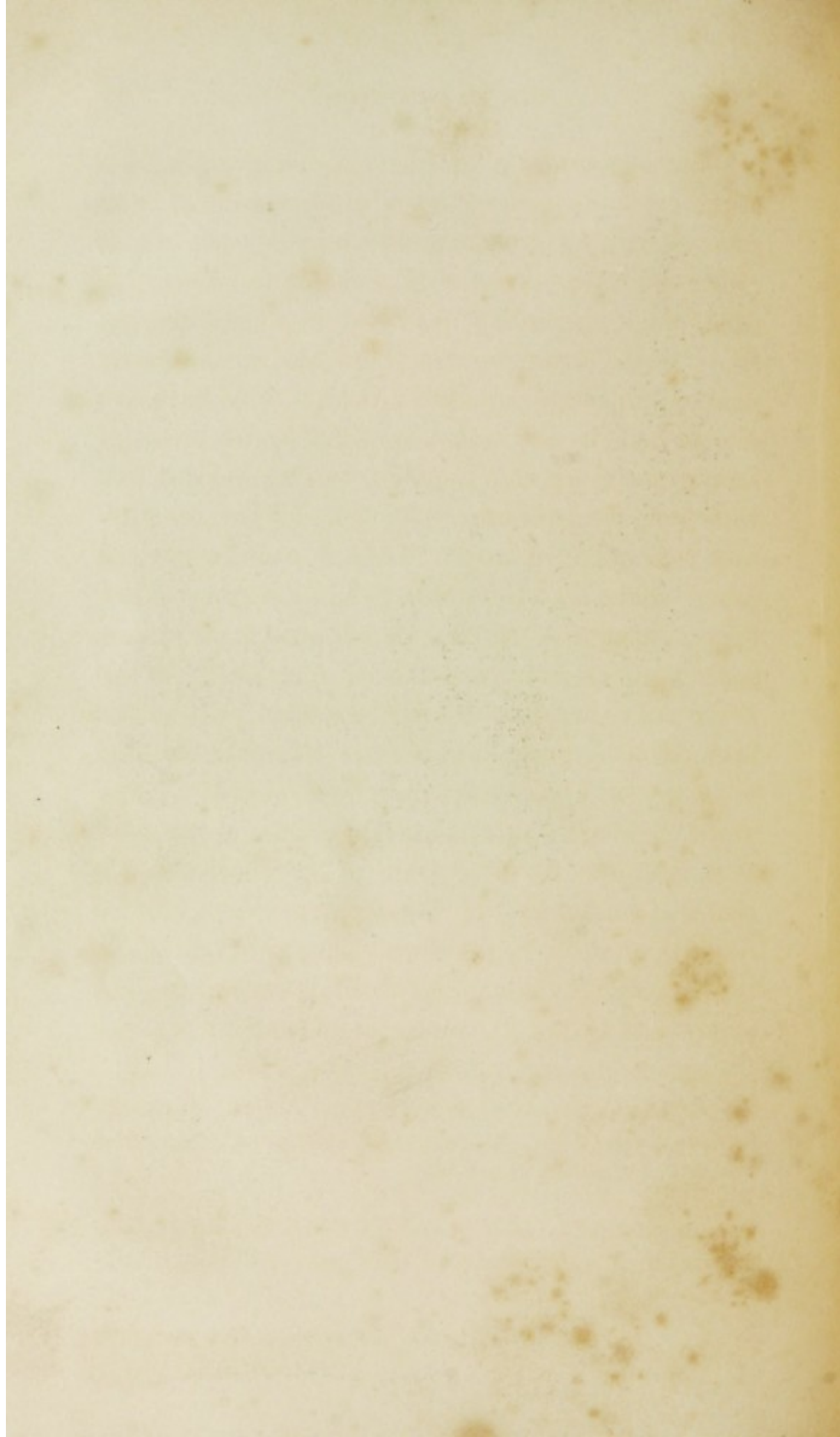
Ibu, or more properly Aboh, so called from its proximity to the water, is in latitude $5^{\circ}43'$ north, and longitude $6^{\circ}34'30''$ east. It is situated on the right bank of the Niger, is 120 miles from the sea, and about 40 miles below the apex of the Delta. The creek which leads to the town from the river



John Pennock del.

Engraved by J. G. Thompson.

ONE OF THE SONS OF ONYEBE OBI OBAI
CHIEF OF ABOKE RIVER NIGER.



is about a mile and a quarter long. The outer limit of the creek is formed by a narrow strip of land covered with tall grasses and clumps of bush, which was completely overflowed. Leading from this main creek, a number of lateral branches run up to the town, reaching the huts during the rainy season, and often inundating them. The huts are seldom built in continuous rows : the most common arrangement seemed to be a quadrangular court, with separate dwellings, with verandahs in front, on each side of the square. The huts were in general raised some feet from the ground, resting either upon an elevation of clay, or supported on strong wooden pillars from four to eight feet high. In the latter case access to the hut is gained by a ladder leading to the principal aperture. They all seemed to be remarkably clean and well matted. The actual number of huts in Aboh is estimated by Laird at from 800 to 1000.* Obi's palace consisted of a confused assemblage of huts, arranged in a similar manner to those in the town. The court in which Obi received us contained a rude portico, covered partly with matting. In an apartment which ex-

* No rock was seen while we were at Aboh, although search was made by sounding for one observed in the bed of the river by Captain William Allen, during the dry season, when that officer was in the expedition with Lander. When Lieut. Webb, in the Wilberforce, ascended the Niger in July, 1842, he found a large mass of sandstone, nearly in the middle of the river, half way betwixt the entrance of the Aboh creek and Lander lake.

tended along one side of the square there were a great number of Obi's wives, who kept gazing at us, and bursting into fits of uncontrollable laughter. Their mirth brought from another part of the building about twenty damsels of more mature age, who, the interpreter told us, were "superannuated wives" of Obi, whom he permitted to live within the precincts of his palace. At the farther end of the portico there was a mud elevation, surrounded on both sides by fetishes of various kinds, one of which was described by the interpreter as the "Ju Ju" for war.

The women of the better class were in general encumbered with heavy ivory anklets, weighing several pounds. I have seen them on mere children, and am sure that their enormous weight must have distorted the limbs, and retarded their proper development. The men wore wristlets of ivory, and, occasionally, leathern ones ornamented with couries and the teeth of various animals. Their anklets were in general of iron or copper.

Disease seemed to me to be less common at Aboh than in other African towns, notwithstanding its insalubrious locality. I saw no cases of confirmed lepra, although two or three in an incipient stage came under my notice. *Craw Craw*, or aggravated itch, was, however, very common. I was very desirous of operating upon a case of squinting, but the mother of the child, who at first consented to

the operation, afterwards refused, as she was afraid of its effects.

The number of wives a man has at Ibu seems to be regulated by his rank. When Obi and his staff were on board the *Albert*, I collected the following information on this head from Ajeh, his brother, and some of the other "Headmen."

	Age.	WIVES.		CHILDREN.	
		Living.	Dead.	Living.	Dead.
1. Ajeh, king's brother . . .	40	80	40	uncertain	uncertain
2. Amorama, judge, and } king's mouth . . . }	40	4	2	2	6
3. Ozama, headman . . .	35	4	2	2	6
4. Omenibo, headman . . .	32	3	2	3	6
5. Amebah, headman . . .	28	4	1	3	6
6. Magog, bugler . . .	34	2	1	6	3
7. Ambili, headman . . .	35	3	2	3	11
8. Ogrou, headman . . .	30	3	1	2	2
9. Obi, king	44	110	uncertain	uncertain	uncertain

Human beings are occasionally offered in sacrifice at Ibu. Twins are in all cases put to death, and it is said that children who cut their upper-jaw teeth first were instantly destroyed. Obi is said to be respected or feared throughout the lower Niger. His appearance is certainly prepossessing; he is upwards of six feet high, and stout in proportion;

his forehead is large, and his countenance generally indicates acute perception; his features, with the exception of his nose, which is large, slightly snubbed, and flattened, are well formed; his hands were small, and his feet well arched. He had a great quantity of red pipe-coral round his neck, wrists, and ankles: his dress was wholly of a scarlet colour, but I must leave a more particular description to another narrative, which will in due time appear. An instance of his firmness was shown one day on board of the *Albert*: while he was engaged with the commissioners, I was amusing his brother and some of the Headmen by performing some experiments with Smee's galvanic battery. Obi came up to us just as the instrument was fitted for giving shocks; Amorama the judge, a little man, touched the cylinders at the end of the conductors, and as the battery was at the moment acting rather powerfully, he dropped them with rapidity, and would not again come near. Most of the others looked upon this new and extraordinary agent with suspicion and awe; even Obi himself stooped somewhat doubtingly to take the shock, but he seemed determined to show no signs of irresolution or fear before his people. He took a firm grasp of the cylinders, and held them upwards of a minute, although I could perceive the muscles of the shoulders and chest in strong electric excitation. To his brother I presented an ear of wheat inclosed hermetically in a piece of glass tube, and desired

the interpreter to tell him that it was one of the kinds of corn grown in the country of the white men. This information he said was so far good; but he wanted to know how the corn got into the tube, seeing that there was no opening; and received, with much doubt, the explanation, of the glass being melted by fire, and then moulded to any form. Another portion of tube containing water, and likewise hermetically sealed, excited his astonishment still more, and he could not be made to believe that anything so wonderful could be effected by other than supernatural power.

The soil of Aboh consists of sand and clay, with vegetable mould. At Afgub, an island opposite Aboh, the upper end of which is parallel with the entrance of the creek, the soil contains more sand than clay, and a proportion of mica. This island was so overflowed when the expedition was at Aboh that landing was effected with much difficulty. Yams are cultivated extensively on the island for the supply of the Bonny, Brass, and other traders, who resort to Aboh. Here, on the 27th of August, the height of barometer and thermometer were,

At 11 A.M.	. . . . .	30·176
At noon	. . . . .	30·100
At 1 P.M.	. . . . .	30·139
Thermometer	. . . . .	79·000
Thermometer buried three feet under- ground for three hours	. . . . .	79·500

At three P.M. of the 28th of August, Obi and his headmen left the Albert, and the squadron proceeded up the river. At five P.M. a branch to Bonny was passed, and shortly afterwards a village marked in Captain Allen's chart as the "Hostile Town." The river above this seemed widened to upwards of a mile, when we anchored for the night and following day, being Sunday. It rained heavily in the course of the afternoon, but cleared away beautifully towards the evening.

August 29th. The sky was this day beautifully clear, and the water had the stillness of the most placid lake. In the morning, three young damsels came on board from a village on left bank, called Ogou. Being Sunday all was quiet on board the vessels. No canoes were seen on the river; no sound was heard on the shore. Heavy showers during the day.

August 30th. Weighed at five A.M.; the Albert took the Soudan in tow, while the Wilberforce did the same to the Amelia. We were soon at Bullock's island, and about nine we had reached its upper extremity. The island seemed to be swamped throughout. An egret and a few other birds were the only living things appearing on it. A short way above this a human body was seen floating downwards with the stream; on coming near to it,

we found the face downward, the nates and abdomen distended, the viscera of the latter protruding; the hands and feet seemed blanched; the back appeared as if it had been scorched. A band ornamented with beads crossed the loins, and a cincture round the head was similarly adorned. At twelve, the *Albert* entered a passage between the left bank and a group of islands in the middle of the river. This delightful passage was about four or five miles long, and varied in breadth from fifty to sixty yards, and its banks were richly clothed. The stately bombax from its enormous trunk reared its wide-spreading branches in the midst of cassiæ and other shrubs and trees of endless variety of tint and shade. The amount of cultivation of yams, bananas, and plantains indicated more extensive habitation than we had yet seen, with the exception of Aboh. We landed for a few minutes at one of the villages called Osochai. Here the chief was sitting under the verandah in front of his hut. Some articles of Fetishe were nailed to the verandah, among which were skulls of oxen and monkeys. We were anxious to purchase some bullocks from him, but the old man, like all other Africans, was slow in his negotiation, and we had no time to wait. A short way above this village, at a sudden turn of the river, the *Albert* was swept among the bushes on the left bank. The *Soudan's* hawser was cast off when she passed ahead, the *Albert* following her. At this

place we were surrounded by about sixty canoes returning from the Kirri market. That of our friend Atché, one of Obi's sons, was distinguished by a red flag with yellow edging, and contained not less than thirty canoemen. Atché soon came on board, and told us that he had made "good market," having purchased plenty of ivory at Kirri.

August 31st. A large crocodile was observed this morning at eight, floating ahead of the ship. The monster was first taken for a log of wood. Several others were afterwards seen at the water's edge basking in the sun. The soil here was found to be sandy intermixed with fine scales of mica. The banks were now clear and well defined, about three feet above the level of the river, and high land to the northward was distinctly seen in the distance. In the evening we were off a town on the left bank, called Damagu, in the kingdom of Iddah. Here the river had encroached upon the banks and inundated many of the huts so as to render them uninhabitable. These were the first in the Niger that we had seen built in a circular form. It was at this place that M'Gregor Laird lost many of his men from fever. A fine tall man, dressed in a long blue tobe, came on board; he introduced himself as a trader, and stated that he had a great many elephants' teeth for sale.

Sept. 1st. Weighed at six in the morning, and at seven passed a walled town on left bank, called Oodjem; above this the bank was low and flat, without trees, overflowed and detached in strips from the land by long narrow creeks running parallel with the spacious main stream, now a mile and a half broad. About eleven the Albert anchored, and the Soudan proceeded into the Edoh branch for the purpose of exploring it. The Wilberforce, with the Amelia in tow, joined the Albert, and the Soudan came out of the Edoh in the evening by moonlight.

Sept. 2d. The steam was again up this morning at six. At one P.M. we were at Lander's islands, where, and on the main, the land was completely inundated. Most of the huts in the villages were more than half under water. About half-past four the red cliffs of Iddah were seen from the deck. As we approached nearer, high land of conical and tabular form appeared in the distance. These were features in nature new to us since entering the Niger. The evening was beautiful, and the effect of the whole scene was that of general exhilaration, with a feeling of thankfulness and gratitude that we had advanced thus far on our mission with the whole of the crews in the enjoyment of perfect health.

SECTION IV.

*Journal of proceedings to the completion of
the Expedition.*

Iddah, in the kingdom of Eggarra. Iddah is situated on the left bank of the Niger, which is here nearly a mile and a half broad, in latitude $7^{\circ}6'10''$ north, and longitude $6^{\circ}43'31''$ east. The cliff upon which the town is built varies in height from 140 to 185 feet above the level of the river, and is formed by the outcropping of a rock of ferruginous sandstone, horizontally stratified. Looking to the southward, English island and the other islands below it were seen inundated, and broken up into patches by the rising of the river. North Abokko island, and the others up the river, were similarly overflowed, the people being obliged to paddle from hut to hut in canoes. The opposite shore is for some way low, flat, and swampy. The land behind, however, gradually rises to hills of considerable height, which seem to be richly wooded. From the anchorage (within 200 yards of the cliff) a magnificent range of rounded and conical hills and high table land was seen in the distance, stretching from the north-east to south-west, with a dense forest, extending from the table

land downwards, through which a series of streams were pursuing curiously tortuous courses, until they joined the main stream of the Niger, a short distance above the town of Iddah.

Iddah contains two towns; one of which belonged to Abokko, a brother of the former Attah of Iddah, and is still called Abokko's town. The huts are all of a circular form, are well built of coarse brick hardened by the sun, and mud, and surrounded by verandahs, but are small, dark, and gloomy, light being admitted only through a low narrow door-way. The palace of the Attah consists of a series of circular huts, communicating with each other, and one or two quadrangular buildings in the middle of a court-yard, which is surrounded by a mud wall. The Attah is a man of immense size, jet black, most gaudily dressed, and haughty and despotic in his government. On being invited to visit the Albert, he replied, that a king in his country never condescended to go into a canoe, and that rain never could fall upon him. He, however, offered to the officers sent to wait upon him palm wine, a kind of beer, and the emblem of welcome, the goora nut.*

* It is customary, on paying a visit to an African chief, to be requested to sit down upon a mat, when palm wine, or an acid beer, is presented. When the goora nut is offered, the stranger is considered to be high in the estimation of his host, and to refuse it would be an unpardonable insult. It is a very pleasant bitter, and is the seed of the "*Sterculia acuminata*," thus de-

His sable majesty, however, improved upon acquaintance, and although he to the last maintained all the same outward dignity, yet he expressed himself as complimented that the Queen of England had sent commissioners to him, and readily acquiesced, after proper explanations had been given, to the terms of a treaty for the abolition of the slave trade, and the discontinuance of human sacrifice in his dominions. I had no means of ascertaining anything like the exact amount of the population of Iddah, but I should think it cannot be much under 7000. The bulk of the people are Pagans, but the Mallams from the Upper Niger are said to have converted many of the upper classes to the Mahomedan faith. The tobe, which we had first seen worn at Damagu, was also very common at Iddah. Polygamy, as throughout the Niger, prevails at Iddah. Edina, a headman, when showing us his wives, who were young and rather pretty, laughed when I asked him how many fair damsels he had married, and said, "I have only fifteen wives now, but I am in hopes of soon adding to my stock."

Circumcision is practised, and always at an early age. The chief men of the Attah are eunuchs, who

scribed by Sprengel : "Foliis oblongis, acuminatis, integerrimis glabris, longe petiolatis, paniculis axillaribus, antheris 2 serialibus sessilibus fructibus, 1 Spermis." (Guinea.)

are operated upon by the Mallams, who use for this purpose a small razor-shaped knife.

At the death of a king, his chief wife and several of his headmen are immolated to attend him in the next world. When a king succeeds to the throne he sacrifices at least one wife and several headmen, merely to show how he can exercise his prerogative.

The soil partakes of the nature of the rocks, with a stratum of vegetable mould. The natives do not seem to pay much attention to cultivation. Yams, dawa corn, shea butter, ground-nuts, and coconuts were, however, exposed in the markets in considerable quantities. The magnificent Baobab or monkey's bread (*Adansonia digitata*) abounds in various parts of the town and neighbourhood. Cutaneous diseases in a most aggravated form were common: several cases of extensive ulcer with exfoliation of the bones were seen.

Up to this time the expedition had been fortunate beyond all expectation. The Delta had been passed, and we were entering the valley of the Niger under circumstances seemingly the most auspicious. The crews were in the best possible condition, and with a general buoyancy of feeling, looked forward to the period when the vessels were to ascend the river; while they contemplated with delight the novel and diversified scenery of the high land before them. With such prospects so favorable

beyond all anticipation, it is not to be wondered if we indulged a rather sanguine hope that the continuance of health would be granted to us, and that we should, under Providence, thus be enabled to persevere in the great object of our mission. But it was otherwise ordained.

Sept. 4th. Fever of a most malignant character broke out in the Albert, and almost simultaneously in the other vessels, and abated not until the whole expedition was completely paralysed.

The Albert was anchored within a short distance of the cliff. The Wilberforce and Soudan were near the opposite side of the river wooding.

On the evening of the 6th Sept. the Wilberforce, in shifting from the wooding place to the anchorage under the town, grounded on a sand bank close to English Island, and in spite of all efforts was not got off until the 8th. The Soudan, after taking in her complement of wood, proceeded at once some miles further up the river. Meanwhile, the disease was making steady progress on board of all the vessels, and, to add to our misfortunes, William Johnson, the Eggarra interpreter, fell overboard and was drowned.

On the afternoon of the 8th Sept. the Albert and Amelia left Iddah. During our stay at this

place, the weather was close and sultry, the atmosphere being in an unwholesome stagnant state, from which condition it was occasionally relieved by the occurrence of strong tornadoes: there was one of unusual violence as the vessels weighed. In the intervals between the squalls, we had some magnificent views of the distant high land, placed, as it were, on a brilliant ground of sky, illumined only in that direction, and everywhere else enveloped in a dark gloom. At seven P.M. anchored near a small village called Bafra.

Sept. 9th. Weighed at daylight. Some red cliffs were seen on the right bank, and several villages among the swamps on the left side of the river. At four in the afternoon I landed with Dr. Stanger on the right bank at Ikori, a little way above the Bird Rock. The people, who had assembled in considerable numbers, fled at our approach, but soon returned; most of them carried long bows, and large quivers of poisoned arrows; others had muskets. Mica slate was found here in a nearly perpendicular position. In the middle of the river there was a rock about five yards square, and about three feet above the water: this was "bird rock," already mentioned, which is a mass of quartz imbedded in mica slate. Several new cases of fever were this day added to the sick list, and Mr. Nightingale, the assistant-surgeon, who had been in the tender from the time we left Sierra Leone,

was received on board the *Albert* yesterday, with the same disease. A tornado was experienced towards the evening, which cooled the air, and afforded great relief to the patients.

Sept. 10th. We were again steaming upwards at daylight, and in the forenoon the river flowed in a narrower channel; the tabular hills around us, with precipitous sides, were upwards of a thousand feet high; large masses of granite were seen here and there in the thick bush at their bases. At eleven A.M. Beaufort island was passed; and at two P.M. we came to anchor for a short time near a village situated on the summit of a hill on the left bank. I then went on board the *Soudan* to inquire into the state of the crew, and was grieved to find that the captain's steward had died on the previous day, and that Mr. Ellis, the first lieutenant, Mr. Marshall, the acting-surgeon, and several of the seamen and marines, were laid up with fever.

The effect of the high land upon the sick was most extraordinary in rousing their energies, which from the commencement of the disease were, in general, in a state of great depression. This moral stimulant seemed to exert a most salutary influence upon men who had not for days raised their heads from the pillow; many now began to look up, and call to mind hills in their own country, which they fancied bore a resemblance to those around them.

At five P.M. we were approaching the confluence of the Niger and Tchadda, the junction of the main roads (so to speak) to central Africa,—the grand arteries through which it is devoutly to be hoped civilization, and its attendant blessings, will be diffused throughout this benighted country. High table land was seen stretching from north-east to south-west. On the Tchadda the land was lower and more undulating than that on the banks of the Niger; the upper portions of the hills were beautifully tinted by the sun, now low in the horizon. At sunset anchored off Adda Kuddu. No new case of fever occurred on board the *Albert* this day, but George Powell, the cooper, who was taken ill at Iddah, was, in the evening, in a very precarious state.

Sept. 11th. Landed for a short time in the morning, with Captain Trotter, at Adda Kuddu, and found the town totally deserted; the inhabitants had been expelled by the Filatah people some time back. All the huts were in a ruinous condition, but the dye pits, of which there were several, seemed to be in good order. The soil was a rich vegetable mould, with blocks of granite scattered about, but the rocks were chiefly of gneiss. Castor-oil, cotton, indigo,* and other plants, were

* Mr. Ansell, collector of plants to the Expedition, reports that the plant used by the natives for dyeing, is of the genus *Tephrosia*, and near to the "*Tephrosia Toxicaria*."

abundant. Some guinea-hens were seen, as also several other birds of beautiful plumage. In the forenoon I visited the Wilberforce and Soudan, and found sickness on the increase in both vessels. In the evening George Powell died on board the Albert; the Wilberforce also lost a man about the same time.

Sept. 12th to 17th. Stirling Hill having been selected as a more favorable position than Adda Kuddu for the residence of Mr. Carr and the model-farm people, the vessels moved up to that place; and the various farming implements, and materials for the house were, during this period, transferred from the ships to the shore. This duty necessarily involved considerable labour, and was performed chiefly by blacks, but requiring the supervision of at least one officer, and some assistance from the white seamen; the latter were consequently subjected to an exposure, which could not have been otherwise than prejudicial. The weather was intensely hot, and the stagnation of the atmosphere during the day was most oppressive. Squalls, with vivid lightning, were common in the evening. As the sickness continued on the increase on board all of the ships, as several deaths had already occurred, and as many of the men continued in a hopeless state,—it was evident that some decisive step was called for to prevent the total discomfiture of the expedition.

To remain where we were was out of the question; therefore the adoption of one out of two alternatives became imperative,—to seek for a more genial climate, either *in the river*, or *out of the river*. Mount Patteh was near us, rising to a table 1160 feet high: the air on its summit might prove more salubrious than that of the river, but then, it might not. To transport the sick thither would subject them to an amount of fatigue and exposure, independently of the risk of losing time, which the prospect of mere possible benefit did not seem to justify. There also remained the chance of the more open countries higher up the Niger or Tchadda being comparatively healthy; but to move all the ships further into the interior, upon such precarious grounds, would have been to place the fate of the whole expedition upon a contingency which might lead to the most calamitous results. Feeling confident that the disease would assume a milder form, in the climate of the open sea, I placed the following table before Captain Trotter, recommending one vessel to be sent out of the river with the whole of the sick, to proceed onwards to Fernando Po, or if possible to Ascension, where they would have the benefit of hospital accommodation, in addition to that likely to be derived from climate.

REPORT of the Number and Condition of the SICK on board
H.M.S. Albert, Wilberforce, and Soudan, at the Confluence
of the Niger and Tchadda on the 17th of September, 1841.

	No. of Officers, including Engineers.	No. of White Seaman.	No. of Sappers and Miners.	No. of Kroomen, coloured Men entered in England, African Boys, &c.	Black Agriculturalists, &c.	Total.
H.M.S. ALBERT,						
<i>Including Amelia Tender.</i>						
No. victualled on entering river }	21	25	12	67	23	148
Placed on the sick list for fever since 3d inst. . . }	2	15	5	5	0	27
Discharged to duty	1	0	0	0	0	1
Died	1	3	0	0	0	4
Remain on sick list	0	12	5	5	0	22
Of whom are convalescent . .	0	2	2	2	0	6
Effective on board the ship and tender }	19	10	7	62	0	98
Ashore at farm	0	0	0	0	23	23
H.M.S. WILBERFORCE.						
No. victualled on entering river }	21	23	13	47	0	104
Placed on the sick list for fever since 4th inst. . . }	7	13	5	0	0	25
Discharged to duty	0	1	0	0	0	1
Died	0	1	1	0	0	2
Remain on sick list	7	11	4	0	0	22
Of whom are convalescent . .	1	1	0	0	0	2
Effective on board	14	12	8	47	0	81
H.M.S. SOUDAN.						
No. victualled on entering river }	11	15	4	21	0	51
Placed on the sick list for fever since 4th inst. . . }	5	9	2	1	0	17
Discharged to duty	0	0	0	0	0	0
Died	0	1	0	0	0	1
Remain on sick list	5	8	2	1	0	16
Effective on board	6	6	2	20	0	34

SUMMARY.

	Whites.	Blacks.	Total.
Total victualled	145	158	303
Placed on sick list	63	6	69
Discharged to duty	2	0	2
Died	7	0	7
Remain on sick list	54	6	60
Effective on board and on shore	84	152	236

Sept. 19th. The Soudan steamed down the river in the afternoon, with forty cases of fever on board, including thirteen from the Albert and six from the Wilberforce. Lieutenant Fishbourne had the command, and Mr. Thomson, assistant-surgeon of the Wilberforce, the medical charge. The Soudan had not long left the confluence when Commander William Allen reported that several others of his crew had been attacked with fever, among whom were two of the engineers. There were also some new cases in the Albert. With appearances so formidable, it became a matter of question whether the whole of the squadron should be withdrawn for the season. But as one vessel could still be made sufficiently effective to make an effort to carry out the objects of the expedition, it was finally determined that the Albert was to make the best of her way up the Niger; and that the

Wilberforce was at once to proceed out of the river. She accordingly steamed downwards on the morning of the 21st of September. Among the sick on board were Mr. Foster, master; Mr. Cyrus Wakeham, purser; Mr. Toby, mate; Dr. Vogel, botanist; Mr. Rosher, mineralogist; Messrs. Simpson and Terry, clerks; Mr. Bowden, purser, and Mr. Harvey, master of the *Albert*; and Mr. Collman, assistant-surgeon, of the *Soudan*, the latter of whom was seized suddenly a few hours before she sailed. Captain Allen and Commissioner Cook were also both unwell.

The site of the settlement at the confluence of the Niger and Tchadda. The land comprised in the English territory, purchased from the Attah of Iddah, extends from the northern ridge of Mount Patteh downwards to Mount Soracte, including Beaufort Island,—a tract, about sixteen miles long and five miles wide. Stirling Hill (the talus of Mount Patteh) is about two hundred feet high, and was already in a state of partial cultivation, with yams, cotton, and a kind of millet. Mount Patteh rises behind Mount Stirling to the height of 1160 feet above the level of the river, forming on the summit an extensive flat table, on which there are several villages. This situation commands a splendid view of the Niger; and the broad expanse of the Tchadda is seen flowing smoothly from the eastward. High table land appears in all direc-

tions: the north side of the mountain is a precipitous cliff, under which there is a village, containing about fifty circular huts: the distance from the sea is 272 miles. The natives of this and the other villages in the neighbourhood were in constant fear of an incursion by the Fulatahs, who spread a report that now all chance of safety was lost to the Kakanda people, as the steam-ships had come by sea to kill them, and that they would continue to persecute them by land. The soil is a ferruginous sand, formed by the decomposition of the rock of Mount Patteh, with a vegetable mould. The faces of the Kakanda people were marked on each side by three elliptical incisions, extending from the temple to the chin. The eyelids of the women are stained with galena, which they keep in small leathern bottles, with globular bottoms, and long necks. Cotton cloths of good manufacture, spun cotton, calabashes beautifully carved and ornamented, small squares of chalk produced by the incineration of bone, tobacco, camwood balls, shea butter, dried buffalo flesh, and dried fish were brought on board in great quantities. Some of the men had small daggers and cutlasses, which they said came from Rabba: most of them wore tobies. The heads of the women were in general close shaven. As with most Africans, traffic seemed to be the predominant passion with them, with the usual good share of dexterity in turning a bargain to their own account.

Mr. Carr, the superintendent of the model-farm, and Mr. Ansell, gardener, remained at Stirling Hill with the agriculturists and labourers from Sierra Leone. On board of the *Amelia* were Mr. Kingdon, catechist; Mr. King, an intelligent man of colour, with a sufficient number of blacks to keep the vessel in order, and render assistance to Mr. Carr.

The *Albert*, with her complement of men and officers sadly reduced in number, but full of hope, and resolved, if possible, to reach Rabba, now proceeded alone up the Niger. In addition to those already mentioned as having left us to return to the sea in the *Wilberforce* and *Soudan*, Mr. Muller, the chaplain for the time, exchanged duties with the Rev. F. Schön, who since our leaving Sierra Leone had been on board the *Wilberforce*; so that there remained of those who had left England, in the gun-room, only Dr. Stanger and myself. Above the confluence, the land on the left bank was rounded and undulating; and the river became more winding in its course. At three P. M. we were off a village on the right bank, called Kelebeh. The huts were circular, built of mud, and thatched with grass and palm-leaves; many of them were more than half under water. Here we lost sight of an aquatic plant, which, from about twenty miles above the Nun mouth, had been most abundant, particularly at Aboh,

where the surface of the river was in many parts literally covered with it.* In the afternoon, when near Muyé, a chief town of Kakanda, the natives at once launched a canoe, with the intention of bringing off wood to the ship; but being anxious to cut a quantity ourselves higher up the river, we pushed on, and, about seven, anchored off Litemu, a town on the right bank. Muyé, we were informed, was formerly situated about three miles inland; but the incursions of the dreaded Fulatahs caused the Kakanda people to resort to the river side, for the sake of greater security. The people told us that the river would not rise higher this season; and that in three months it would be very low. Circumcision is performed here by the Mallams from Egga, who also profess to teach the Mahomedan religion. Smallpox and dysentery are said to prevail during the dry season: for cure of the latter, the Mallams use a decoction made of the leaves and root of a plant called Laboji, which I did not see. The day was beautiful, but extremely hot: a tornado, however, came on in the evening, attended with heavy rain. The first and third engineers were complaining during the day and in the afternoon. Captain Bird Allen, who had joined us at the confluence, to act in concert

* *Pistia Stratiotes*. Sprengel, speaking of this plant, says, "Nilus secum ex interiore Africa affert, Pelusium usque: sed florentem haud in Ægypto viderunt." (Vide Systema, vol. iii.)

with Captain Trotter, I was grieved to observe, had symptoms of fever.

Sept. 22d. Mr. Fairholme and Mr. Webb, mates, were both placed on the sick list, and Captain Allen's symptoms were unequivocal. In the course of the forenoon three new cases were presented. The river at Lilemu was more than a mile in breadth, and having burst over the banks, was seen cutting deeply into the flats on each side. Long belts of palms and clusters of huts were observed completely surrounded by water. Having procured a good quantity of wood, we weighed at one P.M., and in an hour were at a small island on the right bank called Gori, where a market of some note is held. Landed with Captain Trotter, Dr. Stanger, and Mr. Schön, and found an immense number of canoes assembled at the market-place. We were soon conducted through a series of narrow lanes to the residence of the chief, whom we found to be an old and rather intelligent looking man, sitting on a mat smoking his pipe. His "mouth" told us that slaves, salt, ivory, and a number of other commodities were brought to the market, and that Gori was an independent territory :* and further, that he had power over four other towns, but added, that their tenure

* He here made a mistake, for next day, on the arrival of Aduku, the Attah's son, he found it necessary to acknowledge submission to the Attah of Iddah.

was rather precarious by reason of the frequent visits of the dreaded Fulatahs. In the market-place we saw not less than from 1500 to 2000 people. The articles exposed for sale were bags of salt from Rabba, tobies of various colours, country cloths, camwood in balls, iron work, as hoes and shovels, indian corn, dried buffalo's flesh, and dried fish, ground nuts, twine, silk, seeds of various kinds, shea butter, straw hats with enormous brims, platters of wood, and calabashes beautifully carved.

Sept. 23d. No improvement among the patients; one was dangerously ill. A number of the people came from Gori with firewood, which was purchased, but the unceasing clatter of their tongues was very annoying, and we were glad to get rid of them. In the course of the forenoon a large canoe came alongside; it belonged to the headman of Muyé, and was commanded by his son. It contained three horses, corn, calabashes, and three slaves, two females and one male, purchased at the Egga market. As Muyé was in the dominion of Iddah, the canoe, slaves, and the whole of the property were condemnable in virtue of a treaty made with the Attah, seventeen days previously. Aduku, the Attah's son, was fortunately at Gori, and Captain Trotter, determined to show that the terms of the treaty would be strictly enforced, after a formal trial, declared the whole of the property in the

canoe to be forfeited; but in consequence of the solemn protestations, supported by strong probability, of Ajimba, the commander of the canoe, that he purchased the slaves in perfect ignorance of any law against it, he was allowed to depart with every thing except the slaves, who were now liberated and detained on board the *Albert*. Poor creatures, on first coming on board, they looked around and cried bitterly, one of them afterwards told an Akou boy, one of the crew, that they imagined at the time we would kill and eat them. They however gained confidence, on being cleaned and properly dressed; Captain Trotter gave the very appropriate names of Hannah Buxton and Elizabeth Fry, to the two females, and the man was called Albert Gori, in compliment to His Royal Highness Prince Albert, and as commemorative of the place where he for ever threw off the chains of human bondage. In the afternoon Buddu, a large Kakanda town on the right bank, was passed, and in the evening we stopped for the night a short way above Adama Dalu, on the left bank. Two new fever cases were added to the sick list in the course of the day. The early part of the day was rainy, afterwards the weather was most sultry and oppressive.

Sept. 24th. The river now seemed to extend far beyond its usual limits, as many villages were seen completely inundated and deserted. Several canoes

came alongside with goats and fowls for sale ; the left bank seemed destitute of huts, with the exception of one miserable looking village called Bezzani, where the squalid wretchedness of the inhabitants corresponded with the appearance of the place. In the afternoon we were off Mount Elphinstone Fleming, which was of tabular form, with sloping sides, seemingly well cultivated. The Terry mountains were visible in the back ground : this range consists of rounded and table hills, with an extensive valley between it and Mount Elphinstone Fleming, to which the name of Oldfield Plains has been given. The vessel touched the ground three times in the course of the day. A tornado was experienced in the evening, with the usual relief to all. One of the stokers complained in the afternoon, and the other patients continued nearly in the same state.

Sept. 25th. The Kroomen were sent on shore to cut wood, near a village on the right bank, called Kinami. This place is situated on a bank about eight feet above the river, consists of seven different clusters of huts, and is chiefly inhabited by Nufi people. The chief sent an old woman on board to consult me about her disease, which was lepra in its most aggravated form of ulceration ; and in return for some medicine I gave her, the chief sent me some beer of an acid but not disagreeable taste. My patients on board were by

no means improving; and, to add to our misfortunes, five more of our most useful men were obliged to lie down in the afternoon, with all the symptoms of fever. The next day, Sunday, was beautifully clear; but the heat was oppressive beyond endurance: the thermometer being 92° Fahr. in the coolest part of the ship. Divine service was performed by Mr. Schön: but what with death, with those that had left us at the confluence, and those lying sick around us, the congregation seemed reduced to a mere skeleton of what we had been! Even weighing anchor now became an act of difficulty, from our weakened condition: but the steam was got up on the afternoon of the 27th, chiefly with the view of ventilating the ship; by the action of the fanners, propelled by the engines, chlorine was diffused from the medicator throughout the ship, and found to be very grateful to the patients. John Fuge died at eight P. M.

Sept. 28th. In the forenoon we were approaching Egga, which seemed to be a long straggling town lying close to the river on the right bank. The only remaining engineer now began to feel the effect of the duties, which of late had pressed hard upon him, and, on our anchoring at Egga, he lay down, and shortly afterwards expressed himself as much better; several of the other patients were in a very low condition, and one of the best seamen was in a state of great danger.

ABSTRACT of METEOROLOGICAL JOURNAL from Aboh to Egga.

	Barom.	Therm.	Dry bulb.	Wet bulb.	Dew point.	Wind.
At Aboh, Iddah, } and Confluence }	29·690	84·000	84·000	75·90	73·50	Very light s.w. calm. During tornados E.
Confluence of Ni- ger and Tchadda } to Egga . }	29·570	86·600	86·600	79·500	72·000	

Egga. Egga is upwards of 340 miles from the sea, and was formerly the seat of government of the Nufi people. It is at present under the immediate rule of Rogang, a native of this part of the Niger, who is, however, subject to Sumo Sariki the Fulatah king at Rabba. Sumo Sariki must be one of the most powerful chiefs of Central Africa. Although a vassal to the Sultan of Soccatoo, he pays him merely a nominal tribute, and he is constantly extending the limits of his already immense territory.

When Lander was at Egga he supposed the town to be four miles long and two in breadth. I had no opportunity, from the great number of sick I had to attend to, of going on shore, but Mr. Schön and Dr. Stanger estimated the population at not less than eight thousand. While we were at Egga the town was completely surrounded by water, and the land for miles in all directions was completely

swamped. On the shore opposite the town Dr. Stanger, after wading two miles from the main stream, was nearly up to his middle in water, when he reached a shea butter tree, which he found to have a large trunk, not very lofty, but umbrageous. Specimens of the leaves and fruit were obtained, but no flowers. On the drying up of the morass behind the town, after the cessation of the rains, pestilential effluvia are exhaled from its bed, which, according to the Mallams, create bad fevers, eruptive diseases, and dysentery, proving fatal to great numbers of the inhabitants. The huts are packed close to each other, and the streets are so narrow as scarcely to allow two people to walk abreast. The accumulation of filth is thus favoured, and the stench of the town is horrible. Until the subjugation of the Nufi people by the Fulatahs, Paganism prevailed at Egga, and much of this still remains, mixed up with the Mahomedanism introduced by their conquerors.

Most of the men I saw wore the tobe ; many of the Nufis were dressed with a cloth, which hung somewhat gracefully from one of the shoulders, after the fashion of the Roman toga. They were in general tall and well made ; the form of the head, the countenance, and the lighter shade of colour of the skin, indicated an intermixture of the Caucasian with the negro race. The practice of blackening

the eyelids with galena* was very common, and many of the women had their nails stained with henna. They unhesitatingly brought their children on board to be vaccinated, and the Mallams were not a little pleased at being shown and taught how to perform the operation. The shea butter tree (*Bassia Parkia*)† abounds in the neighbourhood; a quantity of the butter was purchased in the market-place at Egga, weighing about sixteen pounds, for cowries to the amount of about two shillings sterling. The country in the immediate neighbourhood, as seen

* This practice is, no doubt, of great antiquity, for when (2 Kings, ix. 30,) Jezebel is said to have painted her face, the original words are said to be, "she adjusted her eyes with the powder of lead ore." (Note appended to Moore's *Lalla Rooke*.)

† *Bassia* Lin., named of Ferdinand Bassi, Curator of the Botanical Garden at Bologna. Nat. order, Sapotaceæ. Called *Parkia* in honour of the distinguished African traveller, Mungo Park, who brought specimens of the tree to England, and described it as resembling the American oak. The butter, according to M. Chevreuil, consists of a small proportion of aromatic principle, 2dly of oleine, 3dly of stearine; this last is analogous to the stearine of mutton fat, for in saponification it gives stearic acid. This vegetable butter, according to the same chemist, is perfectly liquid at 120° Fahr., at 100·250 it begins to get turbid, at 96½ it exhibits a liquid portion in which float some small brilliant crystals; the liquid part is a combination of oleine and stearine. A thermometer plunged into melted vegetable butter falls to 80¾; it afterwards ascends to 89¾, when the vegetable butter becomes concrete. The vegetable butter is easily converted into soap, when heated with solution of potass or soda, and the soaps thus obtained are analogous to those made with mutton fat, with this advantage, that they are inodorous.

from where the Albert was anchored in mid-channel, about three quarters of a mile from each side of the river, was in general low and uninteresting. Opposite the town there were a few small hills, beautifully green, and tolerably wooded. In the distance table land was seen to the northward, known in Captain Allen's chart by the names of the Earl Grey range, and the Admiralty mountains.

AVERAGES of OBSERVATIONS taken at and below Egga, from the 1st to the 5th October, inclusive. (3 P.M.)

	Barom.	Therm.	Dry bulb.	Wet bulb.	Dew point.	Wind.
Averages . . .	29·540	89·330	90·000	79·300	72·160	Dead calm all day, occasional tornados at night.

On leaving the confluence on the 21st September, it had been hoped that the violence of the fever was in a measure exhausted, and that the climate of the more open country, higher up the Niger, would be found sufficiently healthy to enable us to reach Rabba. The result proved otherwise. Captain B. Allen was taken ill on the evening of the same day, and when we arrived at Egga not less than twenty more of the crew had been attacked, of whom two had died. On the 3d of October Captain Trotter was seized with fever. Captain B. Allen was in a

very critical state, and there remained, capable of doing any duty, only one white seaman, the sergeant and one private of marines, Dr. Stanger, Mr. Willie, mate, John Huxley, hospital-attendant, and myself. Mr. Willie was already labouring under incipient fever, and could not be persuaded, even when very ill two days afterwards, to keep quiet. The season was advancing, and the river had already begun to fall. Dr. Stanger found by the marks on shore that the water had fallen fourteen inches on the 29th September, and on the 5th October not less than three feet. Under such circumstances, to have endeavoured to proceed to Rabba would have been madness, and as there was no object to be gained by remaining longer where we were, it was resolved that we should withdraw from the river with all possible speed. The Kroomen having now cut a good deal of wood, we weighed on the morning of the 4th October, and dropped down with the stream, some distance below Egga, and the next day, in the same manner, we reached the village of Eddogi. On the 6th Dr. Stanger undertook to work the engines, with what assistance he could get from Mr. Brown, the only engineer who could move out of bed. The steam was accordingly got up, and we were soon making good way downwards. Mr. Willie being now too ill to have any charge, I was necessitated to attend to the duties of the ship, in addition to those of my profession.

Captain Trotter was a little better, but Captain Allen and Lieut. Stenhouse were still dangerously ill. At half-past twelve the vessel touched the ground, but by reversing the engines was got from under one fathom to three fathoms water. About five in the afternoon she again struck on a bank near Adama Dalu, and shortly afterwards we anchored for the night near the left bank, on the opposite side of the river to Buddu, a town of Kakanda, already spoken of.

October 7th. Captain Allen and Mr. Webb were extremely weak, but Captain Trotter and the other patients were, if anything, better. Mr. Wilmett, and Mr. Lodge one of the engineers, were very noisy during the night. In the morning, accompanied by Mr. Schön, I made a hurried visit to Buddu, where we found that the chief was absent, having been summoned to a grand palaver with the Attah of Iddah. Buddu appeared to be a town capable of containing three thousand inhabitants. The huts were similar to those at Egga, and, what I had not before seen, each contained on the summit of the pyramidal-shaped roof a large earthen pot, black polished, and mounted for the purpose, as Mamansa, the chief's son, told me, of warding off the lightning. The people acknowledged to have been great slave dealers, but denied that they had ever sacrificed human beings. In the dry season they

said that belly complaints, smallpox, and sore eyes, killed a number of their people; Mamansa was glad to see me vaccinate some children, and was delighted beyond all measure when, after making him operate himself, I presented him with a lancet. He asked me gravely for a charm to renovate decayed virile powers. On leaving he presented us with a goat and a large jar of beer, which he said would make a good breakfast. About twelve we returned on board, and having weighed, steamed until two P.M., then dropped with the stream below Muyé and anchored for the night.

October 8th. Mr. W., one of the patients, who for some days had been in a state of delirium, contrived, notwithstanding that he was watched by two black men, to push back the slide of his cabin window and jump overboard; his cries when in the water were terrible, and awoke every one. The boat was lowered with all possible haste, but William Guy, a Gambia man, followed by Tom Osmond, a Krooman,* at once plunged into the river, and, guided by his cries, (for the night was extremely dark,) came up with him and saved him. Weighed at six A.M., and while getting the steam up, dropped down with the stream about two miles. The Victoria range, which we knew to be not far

* Both received the "Honorary Silver Medalion" from the Royal Humane Society of London.

above the confluence, was in sight in the forenoon, which cheered up the spirits of all. A gloom was, however, thrown over the ship in consequence of another patient, the second engineer, jumping overboard; he had been laid up with fever at Egga, and had the previous day manifested symptoms of wandering, for which, as a matter of precaution, he was restrained in his cot: in the morning, being quite sensible, and complaining of being bound, he was released; he asked for a drink of water, and seemed perfectly collected; in ten minutes afterwards he got out of his cot unperceived, (on the poop,) and slipped overboard. Strange to say there were four officers lying near him, besides two sick attendants who were just outside the curtain, and no one saw him move. Poor fellow, he kept his head above water for some time, while being carried rapidly down with the current, but sank, just as the boat was within a few feet of him. We were obliged to stop frequently in the course of the day, as the river was often not more than one, one and a half, and two fathoms deep. Had we got on shore with a falling river, at this period, the certain consequences, under all circumstances, were but too dreadful to contemplate. At this period the anxiety of Dr. Stanger and myself for the safety of the vessel, and the mental anguish at seeing nearly all our shipmates in a helpless condition, cannot be expressed. At six P.M. we anchored about six miles above the confluence.

October 9th. Experienced a strong tornado during the night. Anxious to ascertain the condition of our friends at the model farm, the vessel was got under weigh at six in the morning, but was soon carried among the bushes by the sweep of the current. The steam was got up some time afterwards, and about half-past eight we were gratified by the first glimpse of the Eglintown tent on Stirling hill. The quantity of cleared land, and the advance made in the building of the superintendent's house, induced us to hope that he and the two Europeans had been mercifully protected from disease ; but in our hopes we were again doomed to disappointment.

Accompanied by Dr. Stanger I immediately went on board the *Amelia*, and found there Mr. Kingdon, schoolmaster, in the low stage of fever, and Mr. Ansell, the gardener, lying in his cot with the same disease. On the shore no better tidings awaited us, for Mr. Carr also was confined to bed ; he had been ill ten days, and was still in a very doubtful state. Although Captain Trotter was still much indisposed, I communicated my wishes to him relative to those gentlemen, and he desired me to act as, under circumstances, I best saw fit ; and being confirmed in my opinion by that of Dr. Stanger, I at once resolved to take them on board the *Albert*, where they would have the benefit of medical assistance, in addition to that likely to accrue from change of climate. The natives had been on all occasions

most friendly to the settlers, and abundance of provisions and labour were easily procured at a moderate price : we therefore had little hesitation in leaving Moore, an American man of colour, of steadiness and respectability, in the temporary management of the model farm ; and the Amelia in charge of Thomas King, assisted by William Guy, a good seaman, and twelve other blacks. King had joined the expedition at Sierra Leone, and his conduct had, in addition to the excellent character given him by Mr. Schön, been such as to entitle him to confidence.

As the river was rapidly falling, and the state of the sick demanding our immediate removal from the river ; every moment was precious, and all who were able laboured night and day. Nine months' provisions were sent to the Amelia, a good supply of wood was received on board the Albert, and every other arrangement was concluded within twenty-four hours of our arrival at the model farm.

About ten o'clock on the morning of Sunday, October 10th, the voyage downwards was recommenced. Captain Bird Allen was now in a very languid state, but sufficiently sensible to express his gratification at the hopes of being soon out of the river. He had been to all appearance sinking fast the previous day, but was roused by warm ap-

plications to the feet, and stimuli taken internally. New hopes seemed to be kindled up among all the other patients. Passing Adda Kuddu, Beaufort island, and Ikori, we were at the Bird rock about half-past one P.M., where we found that the river had fallen several feet. The day throughout was exceedingly fine. At six P.M. we were off the cliffs of Iddah, and shortly afterwards came to, about two miles below the town.

October 11th. The sick were, upon the whole, better, but Captain Allen, Lieut. Stenhouse, and Mr. Willie, were in a very doubtful condition. Mr. Kingdon was also incoherent during the night. In the morning the son of the Attah came on board, accompanied by two Mallams, to know "what was the matter," why we did not anchor near the town as we did before. The Attah desired them to say "he never liked his friends to be from him when they were in his neighbourhood, and begged that we would return." On being told that we wanted to get out of the river, as our people were sick, they said, "That is enough, we must instantly tell the king." They then left us, and said that the Attah would send a bullock and some yams to the people at the confluence. We soon weighed: at half-past three were off Damugu, and at seven anchored off the village Atchaba, a short way below Kiri or Onye market. I was sorry to observe that

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our indefatigable and excellent chaplain, Mr. Schön, was far from being well during the day.

October 12th. There was a heavy squall with thunder and lightning in the morning, followed by a thick haze, which prevented our weighing until ten o'clock. When at the northern end of Bullock's island, about midday, we saw not less than seven huge hippopotami in the mud, on the left bank of the river; some showed their heads only, while the enormous backs of others were distinctly visible above the water. At five, to our great joy, we anchored at Aboh, where we were soon surrounded by upwards of a hundred canoes. The vociferations and cheers of the people, welcoming us back, although doubtless well meant, were most annoying to the sick. Atché, Obi's favorite son, was soon on board, and on being told, that we wished to get out of the river with all speed, left the ship, and sent a canoe-load of wood on board the same evening by moonlight, promising to complete us in the morning.

October 13th. Mr. Kingdon breathed his last at two in the morning, and was buried by Mr. Schön and myself, on the left bank opposite Aboh, where we had much difficulty in landing, from the flooded state of the shore.* On returning on board,

* When we were at Aboh on the 26th of August, the river was

we found Obi seated at breakfast in the gun-room; he and his people had brought abundance of wood, besides goats, fowls, yams, and plantains. Obi's prompt assistance to us on this occasion was of the highest importance. He is decidedly a fine character, and assuredly did not discredit the high opinion we had already formed of him. He was melted into pity, when he saw the captains sick in the cabin.

At ten we weighed, at twelve we were off a large Benin branch, and shortly afterwards at Truro island. A great number of villages were passed, at most of which, the natives had canoe-loads of wood ready to bring on board of us. Many canoes were seen with palm oil, belonging chiefly to king Peppel, of Bonny. At three in the afternoon, when near Stirling island, a steamer was seen coming up the river at full speed, which we directly perceived did not belong to the expedition: but we were soon close to her, and in a very short time, Capt. Beecroft

still rising. So it was at Iddah and the Confluence. At Egga it began to fall about the 25th of September, and as has already been noticed, it had fallen on the 5th of October not less than three feet. At the Bird Rock, Iddah, and much lower down, the marks on the banks indicated a fall, although to what extent was not ascertained, but on our return to Aboh, Mr. Schön on landing at the town, found that the river was sufficiently high to enable him to reach the entrance of Obi's palace in the boat. He considered that the water had risen at least three feet, owing to the heavy rains which fall here in October.

was alongside from the *Ethiope*, for such she was. He at once offered any assistance in his power, and it was finally arranged that he was to send his engineer on board the *Albert* next morning, and that the *Ethiope* was to return with us, taking the lead, as Captain Beecroft had a perfect knowledge of the river.

October 14th. Both vessels weighed at six in the morning. The weather was beautiful throughout the day. At six P.M. came to anchor off Barracoon point, near the mouth of the Nun. The sight of the open sea acted like a charm upon every one. Next day the Kroomen were employed in cutting firewood. The rigging was set up, and other preparations were made for sea.

October 16th. At five in the morning Captain Beecroft came on board, and as the steam was up, we weighed immediately; when just within the bar the *Soudan* was seen outside. The bar was crossed in comparative quiet, and after an exchange of anxious inquiries with the *Soudan*, the three vessels steamed on towards Fernando Po. George Cole, a marine, who had been attacked with fever at Egga, died in the forenoon. Captain Trotter was much better, but Captain Allen, Lieut. Stenhouse, Mr. Webb, and Mr. Willie, were very low. Weather still continued fine, and the difference of

atmospherical temperature since leaving the river, was of most sensible benefit to all, more especially to the sick.

October 17th, Sunday. In the forenoon the dark outline of the mountain of Fernando Po was seen through the haze, which hung over the land. At twelve we were close in with the shore; about three P.M. opened the anchorage of Clarence Cove, where we came to at a little past four.

I wish I could pay a just tribute to the prompt and noble conduct of Captain Beecroft. Captain William Allen, anxious about the fate of the *Albert*, and from his previous fearful experience of the Niger, dreading the worst, was very desirous that Beecroft then at Fernando Po in the *Ethiope*, should ascend the Niger to render us what assistance we might stand in need of. This wish was no sooner made known, than he at once weighed for the river. The timely aid he rendered us can be fully appreciated only by those who were in the position to feel the full force of its value.

At Clarence Cove, island of Fernando Po. Immediately the anchor was let go, I went on shore to Mr. White, the superintendent of the West African Company, at Fernando Po, to make arrangements about landing the sick, as our engineers were all laid up, and we were in every other

respect, unfit to proceed onwards to Ascension. Mr. White kindly offered to receive the officers at Government house; and Paradise house, a fine large building, was placed at my disposal, for the accommodation of the men. Mr. Hensman, the medical officer of the company, at once gave up his dwelling-house to those officers, for whom there was no room at the Government house. On the 18th of October Captain Trotter, Captain Allen, and the whole of the sick were comfortably lodged on shore. In the evening, Mr. Willie, whose case was hopeless long before we left the river, breathed his last. Poor fellow! the hand of death seemed to be upon him from the very first: he never complained of pain, but gradually sunk. With the exception of Captain Allen and Lieut. Stenhouse, who were fast passing from this earthly scene, there was soon a manifest improvement among the sick generally. Fresh meat, bread, and milk were provided every day, and a regular system of diet was established in the hospitals.

October 21st. I had been for some days troubled with headach, and some other unpleasant symptoms, which I had hoped to drive away, but which now assumed the form of the river fever, accompanied by nausea, heat of skin, and distressing dyspnœa. At the end of three weeks I began slowly to recover. Mr. Thomson, acting-surgeon

of the Soudan, and Dr. Stanger, were my medical attendants; and to their unremitting attention and kindness my recovery, under Providence, must be entirely attributed.

My case affords a strong exemplification of the fact that disease is prevented, or at all events retarded by intense mental occupation: for I am confident that the fever made several efforts to seize me (so to speak) when descending the Niger, but never succeeded in overcoming me until the excitement had in a great measure subsided,—after the sick had been all safely landed at Fernando Po. This excitement was sufficient to keep under a disease which had already, to a certain extent, laid hold upon me, with my body in a state of exhaustion, otherwise favorable to its full development. For several weeks I had not had two hours of continuous sleep, having constantly to attend to about thirty patients, causing me to expose myself on deck at all hours of the night; besides, from Egga to near the mouth of the river, I was scarcely off deck during the whole of the day.

During my illness, Captain Bird Allen, Lieut. David Stenhouse, Mr. James Woodhouse, assistant-surgeon, Mr. Wilmett, clerk, and a private of marines had all paid the common debt of nature.

As Captain Trotter's convalescence, although steady, was rather slow, Mr. Thomson, surgeon of the Soudan, and in charge of the hospital while I was sick, recommended that he should proceed to

England in the Warree, merchant schooner, then lying at Clarence Cove, bound to Liverpool. I at once concurred with Mr. Thomson. Mr. William Merriman, gunner; Mr. James Brown, third engineer; Mr. Ansell Gardener; James Haughton and William M'Laughlin, seamen, also went home as invalids in the Warree.

Lieut. Fishbourne, appointed acting commander of the Soudan, now commanded the Albert; Mr. James N. Strange was the only lieutenant, and Mr. W. H. T. Green was acting master. Mr. Bowden, the secretary to the commissioners, and purser of the Albert, rejoined his ship early in November.

The Rev. Mr. Schön, who had been with us from the time of the Albert's proceeding upwards from the confluence, and who had been most constant in his attendance upon the sick, also embarked in the Warree for a passage to England. The sailing of the Warree was delayed until the 23d of November, when she was taken in tow by the Albert with her steam up, and in the afternoon was clear of the Cove. The night was beautifully moonlight, and the sea presented a surface of liquid silver, until it was lost in the gloomy shade of the densely-wooded land. On the evening of the 25th of November we anchored at West bay, Princes island. The weather was close and sultry. The scenery of West bay consists of high land, in the form of towers, and peaks of ever-varying height, clad in all the gorgeousness of tropical luxuriance. Leaving Princes island next

day, we saw, on the morning of the 27th, the island of St. Thomas, and in the forenoon were close in with St. Anna de Chaves, the capital. In the afternoon I was called on board the Warree, and found it necessary to tap William M'Laughlin, a seaman invalid, who had been for some time dropsical. At eleven P. M. we were at the isle of Rollas; when our excellent and worthy chief left the Albert, accompanied by Doctor Stanger, who had been my constant companion in health and in toil, and my kind attendant during sickness. They were soon on board the Warree, which at once made sail for England.

After wooding at Rollas, the Albert was again under sail on the evening of the 29th of November, thereby economizing fuel, and giving our engineer (not over strong) a respite of two days.

On the 2d of December we were at Princes island. The next day we encountered a tornado, and at two in the afternoon we were within a short distance of Fernando Po, which seemed enveloped in dense vapour; and, in the evening, anchored at Clarence Cove. The rainy season was just over, and the dreaded period of the "smokes" had begun. The thermometer averaged 85° Fahr.; and the sea-breeze was by no means strong. Mr. White, the superintendent, was just recovering from an attack of fever; and Dr. Vogel, the botanist, was laid up with dysentery, under the care of Mr.

Thomson, who had been left in charge of the hospital. On the 16th of December Dr. Vogel died, and in the evening his body was deposited in the burial ground, by torch-light. It was pitch-dark, and the stars seen through the dense foliage were the only objects in nature that relieved the surrounding dismal gloom. At every step we trod over our former messmates or fellow-labourers. As near as possible to the grave of Lander lie thirteen of the Niger expedition, who, like himself, fell in the cause of Africa:—Captain Bird Allen; Lieut. David Hope Stenhouse; G. B. Harvey, master; James Woodhouse, assistant-surgeon; Horatio Collman, assistant-surgeon; W. C. Willie, mate; William H. Wilmett, clerk; Dr. Vogel, botanist; Robert Milward, purser's steward; Morgan Kingston, marine; John M'Clintock, Christopher Bigley, and Peter Fitzgerald, stokers.

Up to the 18th of December, when we finally left Fernando Po, the crew were employed making patent fuel, getting stores from the shore shipped on board the Soudan, and the presents and other articles on board the Albert, and in wooding and watering. Having been indisposed the greater part of the time I was at Fernando Po, I have only a few remarks to make relative to its general topography, added to information, regarding the population, kindly given me by Dr. Prince of the Baptist Missionary Association.

Clarence Cove is formed by an indentation in the land extending from Point Adelaide on the south-west to Point William on the north-east. The distance between the two points is about a mile and two thirds, and from the outer limit of the Cove to the landing-place at the town upwards of a mile. The physical aspect of Fernando Po generally presents a densely-wooded mountainous district. The peak, which has not to the knowledge of any one ever been ascended by man, is from ten to eleven thousand feet above the level of the sea: at certain periods of the year great part of it is enveloped in vapour. The cliff, on which the town is built, extends over nearly the whole of the semi-circle formed by the bay, varies in height from eighty to a hundred feet, and is composed of tuffa covering basalt.* The rainy season sets in about the middle or towards the end of May, and continues until about the beginning of December. The

* Mr. Roscher, the mineralogist of the Expedition, examined the cliff, and kindly furnished me with the following extract from his notes: "The tuffas covering the basalt, forming the cliffs at Clarence Cove, are of three different ages and relative positions. The lowest formation is a volcanic breccia, composed of pebbles, basalt and ashes, products of volcanic action. The dip is on the point 5° to the north-east: near the town the formation lies nearly horizontal. The second formation is composed of thin layers of ashes, in which are imbedded conglomerates, consisting of fragments of basalt, with a compact structure dipping 15° to the south. The third formation is of an aqueous precipitate, composed of alternating beds of aluminous masses, and of fine conglomerate dipping 20° to the south-east.

rains were particularly heavy in November, 1841, attended by thunder and lightning. The period of the "smokes" follows the cessation of the rains, continues from December to February inclusive, and is considered to be extremely prejudicial to Europeans. At the landing-place there is a wharf, constructed of wood, but much in want of repair: from this there is a rough and steep road, cut in the cliff, leading to the town. The principal buildings,—Government house, Paradise house, the house of the medical officer, and several large store-houses, overlook the bay. The town is situated farther back; and the houses, which are built of wood, are ranged in regular order and numbered. An exuberant vegetation abounds throughout the town, and little attention is paid to the cleanliness of the houses by the greater part of the inhabitants, who are nearly all natives of Africa. The water obtained from the rivulets is of excellent quality, and always abundant. Provisions, with the exception of yams, are dear.

The following analytical summary of the population of Clarence town, including that portion occupied by the Kroo people, was kindly given me by Dr. Prince:

Number of adult Males	.	460
„ „ Females	.	155
„ male Children	.	149
„ female „	.	109=873

Number of Houses 178, or one house to about every 5 persons.

With the exception of six from England, one from Scotland, one from Germany, and six coloured people from the United States of America, the whole were natives of Africa. Of Kroo people alone there were 192, of whom 158 were dwelling in their proper part of the town, and the remaining 34 were dispersed throughout Clarence. There were six Bubié women, living with as many Kroomen; two of whom have had both hands amputated by their own countrymen, for having been twice convicted of adultery. There were only twelve married people among the rest of the blacks.*

DEATHS at CLARENCE TOWN, from the 1st of January to the 15th of December, 1841.

Remittent fever, of which 11 cases belonged to the Niger expedition	13	Atrophy	-	2
Pleuritis	2	Syphilis	-	2
Gastritis	1	Lumbrici	-	1
Bronchitis	1	Hydrops	-	3
Dysentery	8	Ulcers	-	4
Paralysis	1	Vulnus	-	1
Cerebral irritation	1	Childbirth	-	1
		Diseases, whose names are not recorded	-	11

Total 52.

BIRTHS from the 1st of January to the 15th of December, 1841.

Males . . . 13

Females . . . 12

Total 25

* This was the case at the period of Dr. Prince's arrival on the island early in 1841. On the 15th of December, of the same year, forty-nine marriages had been solemnized.

Deducting the eleven cases from the expedition, the mortality will be about 1 in every 21·29, among a population almost wholly composed of African blacks.

The aborigines, the Adeeyahs or Bubies, as they are commonly called, are dispersed throughout the island, congregating in small villages in the bush. They have hitherto showed little inclination to advance in civilization, yet they cultivate yams and other fruits, employ themselves in fishing, and work willingly in clearing ground for a trifling remuneration. Both sexes are seen walking about Clarence town in a state of almost complete nudity. They are in general short, but strongly built, the hair is longer and less woolly, the chin less prominent, the countenance a shade lighter, and altogether less Ethiopian in character than that of the natives of the continent of Africa. The number in the woods has been variously estimated, from 5000 to 10,000.

On the evening of Dec. 18th we bade adieu to Fernando Po, and had a fine passage to Prince's island, where we procured an abundance of fresh stock and firewood. On the 24th we reached St. Anna De Chaves, in the island of St. Thomas, where I landed with Captain Fishbourne. The town is a straggling, dirty, and deserted-looking place. The governor was in the country, but the commander of the

forces offered his services, to assist in providing us with stock. The place altogether is in a miserable condition. In the palmy days of the slave trade, it was a thriving port, and still has the reputation of carrying on slave exportation, although to a small amount. The hospital is fearfully filthy. There were several hideous cases of ulcer, with exfoliation of the bones, doomed, alas! never to heal in the pestiferous atmosphere of the house. In the forenoon we were again steaming towards Rollas, and in the course of the day saw some beautiful displays of basaltic columns facing the sea. The island of St. Thomas seemed to be thickly wooded throughout, and exhibited numerous high conical peaks, similar to those at Prince's island. In the evening anchored between St. Thomas and Rollas, where we found H.M.S. Pluto.

Isle of Rollas. This island is situated at the southern end of St. Thomas, nearly under the equator. The distance between the two islands is about a mile and a quarter. Rollas is about three miles in circumference, and is bounded by huge masses of compact and vesicular lava: in the latter of which, natural bridges have been formed and deep caverns excavated by the action of the sea. Under these bridges the surf is seen rushing with terrific violence, and suddenly filling the caverns with the noise of loud explosions. The centre of

the island is occupied by trees of great size. Near the sea-shore the palms, more especially the coconut, are in extreme abundance. There are also numerous beautiful epiphytes. The natives obtain plenty of palm wine, by tapping the trees near the summit of the stem, and attaching a calabash, which is generally found filled within twelve or fourteen hours. There are not above twenty people on the island: they live in small wretched huts, on the shore; hew their own canoes out of the solid tree; catch turtle and fish, and seem to have little intercourse with their neighbours on the opposite island. Some wild boars were killed, and found to be of good quality; and our sportsmen brought on board a number of wild pigeons, which formed a most excellent diet for the convalescent.

Having watered at a rivulet flowing into a bay in St. Thomas, and obtained fire-wood at Rollas, we were again under steam, on our way to Anno Bon, on the afternoon of the 5th January, 1842. Next day at two P.M. Anno Bon was seen ahead, and at eleven P.M. we were off the town.

Island of Anno Bon, latitude $1^{\circ}30$ south, and longitude $5^{\circ}30$ east, is about twenty-five miles in circumference. The northern end terminates in a sandy flat, on which the town is built; towards the south-east the land shoulders up to a considerable

height, terminating in three peaks; the plateau of this hill, which is an old volcanic cone, contains a large fresh-water lake, and the surrounding vegetation is beautifully green. Stock is to be had in abundance in exchange for old clothes, and the plantains and bananas were unusually fine. The natives are all blacks, but their countenances denote an intermixture of the European with the negro; they are bigoted Roman Catholics, and extremely ignorant. In the town there were two chapels, in the porches of which they were selling goats, pigs, and fowls. The number of huts was about three hundred. I unfortunately had a severe attack of intermittent, and was consequently only for a short time on shore.

January 10th, 1842. Sailed in the evening from Anno Bon. As we advanced to the southward, a manifest improvement took place among the invalids. The fresh supplies obtained at Anno Bon were of eminent service. On the 16th, Tom Davis, a Krooman, who had been received from H.M.S. Pluto, for a passage to Ascension hospital, died of confirmed pulmonary consumption. Being under sail only, and not meeting with the south-east trade before we reached the latitude of about 8° south, it was not until the forenoon of the 28th that Ascension was seen. The steam was then at once

got up ; and at six P.M. we reached the anchorage on the north-west side of the island, where we found H.M.S. Wilberforce and Brisk.

The following morning twelve patients, including Mr. Bowden, purser of the *Albert*, who had suffered two severe relapses, and three convalescents from the *Pluto*, were discharged to the hospital: their complaints were intermittent and dysentery, the common sequences of the fever.

As the main object of this narrative has been to put the reader in possession of all circumstances of position and climate, by which disease was likely to be influenced or modified on board of the ships of the Expedition, it now becomes necessary to trace the *Soudan* in her progress from the confluence of the Niger and Tchadda downwards to Fernando Po, where she was for the time laid up ; and in the same brief manner to follow the *Wilberforce* to the same destination, and afterwards to Ascension.

The day after the *Soudan* left the confluence, the three officers, including the second engineer, who accompanied Lieutenant Fishbourne, were unable, from illness, to render him any assistance ; but, with the help of two stokers, he reached the mouth of the river in the very short space of two days, and there fell in with H.M. brigantine *Dolphin*, in command of Lieut. Littlehales, to

which Lieut. Ellis, Mr. Belam, acting-master; Mr. Sidney, mate; Mr. Gustaffson, first-engineer; and William Johnson, second-engineer, of Soudan; Lieut. H. C. Harston, of the Wilberforce, and twenty-nine seamen, marines, and sappers were transferred for a passage to the island of Ascension. The Soudan then continued onwards to Fernando Po; but the stokers were also soon laid down with fever, and for the last twenty-four hours before reaching Clarence Cove, Lieut. Fishbourne was compelled to work the engines and do every other duty himself.

Mr. Thomson had, as has already been stated, forty fever patients under his charge when leaving the squadron; nine more were afterwards added to the list, of whom thirty-five were discharged to the Dolphin, for a passage to Ascension; two were sent to the Wilberforce, seven were dismissed cured, and five died*—Mr. William Barrett Marshall, acting-

* Of the thirteen patients belonging to the Albert, who were sent down the river in the Soudan, one died near the mouth of the river; four died on board the Dolphin, on the passage to Ascension; three recovered, and rejoined the ship (Albert) at Fernando Po; and the rest, shortly after their arrival at Ascension, were invalided and sent home to England.

Of the six cases from the Wilberforce, sent out of the river in the Soudan, the whole proceeded to Ascension, in the Dolphin; five were shortly afterwards invalided; and one, the purser's steward, recovered and returned to the Wilberforce. Of twenty-nine cases, of the Soudan herself, one died before, and two just

surgeon; Mr. Nicholas Waters, clerk in charge; Christopher Bigley, stoker, and John Thomas, carpenter's crew of the Soudan; and Mr. Louis Wolfe, seamen's school-master of the Albert.

The Wilberforce steamed down the river, on the morning of the 21st of September: at this time Dr. Pritchett, assisted by Mr. Woodhouse, had upwards of thirty cases of fever to attend to. The effective force of the ship being thus weakened, and it being necessary to make several stoppages to procure supplies of wood, she did not leave the river before the 29th, having lost, on the passage down, Mr. Cyrus Wakeham, purser. On the 1st of October she reached Fernando Po; and on the day following, Mr. G. B. Harvey, acting-master of the Albert, Mr. Horatio Collman, acting assistant-surgeon of the Soudan, and Peter Fitzgerald, one of her own stokers, died.

Leaving Fernando Po on the 9th of October, the Wilberforce proceeded to Ascension, where she arrived on the 17th of November, having on her way made a short stay at Prince's island, Rollas,

after leaving the river; four others died on board the Dolphin, during the passage to Ascension; the others were invalided, with the exception of two officers, Lieut. Ellis and Mr. Sidney, one engineer, Mr. Gustaffson, and two coloured men; one of whom was discharged from the service, and the other, the sick-berth attendant, returned to the Soudan and eventually to England.

and Anno Bon: by this time two more deaths had occurred, but her crew generally were in a state of improved health.

On the 20th of Nov. 1841, an interpreter and one seaman, belonging to the Wilberforce, were invalided. The Wilberforce having recruited the health of her crew, and having entered some new hands at Ascension, proceeded to the coast early in March, 1842. About a month before she sailed, Mr. Toby, acting-lieutenant, was invalided. Mr. Fairholme, acting-lieutenant, who had joined her at Ascension, was also invalided at Cape Coast, on the 21st of March. On the 8th of April, she arrived at Fernando Po, and was for the space of four months afterwards employed surveying the Amboises islands and Cameroon river.

Early in June, the carpenter, and a seaman who had previously suffered from the remittent in the Niger, were placed on the sick list, the one for ague, and the other for remittent.

On the 7th of June, the second engineer, Alexander Ross, was attacked with fever, and died on the 14th at Amboises.

The Wilberforce returned to Fernando Po on the 20th of June. When it was decided by the government that the expedition should be given up, it became necessary that one vessel should ascend the

river as high as the confluence, to ascertain the precise condition of the settlers at the model farm, and if necessary to bring away the whole of the people, and the implements connected with the establishment.

Lieut. Webb, who had joined the *Wilberforce* at Ascension, volunteered to perform this duty, and he accordingly entered the Nun branch of the Niger with the *Wilberforce*, on the 2d of July, 1842. H.M. steam-vessel *Kite* (which arrived from England just as Captain Allen was preparing to re-ascend the Niger) towed the *Wilberforce* to the mouth of the Nun, and returned to Fernando Po with Captain Allen, and the remaining officers and crews of the *Wilberforce* and *Soudan*, and sailed from that place for England, on the 7th of July, leaving Mr. Stirling, assistant-surgeon, to wait the return of the *Wilberforce* from the river. During the passage home Captain Allen experienced a severe attack of fever, but recovered before the *Kite* reached Plymouth on the 2d of September.

The white crew of the *Wilberforce*, on her second voyage up the Niger, in addition to Lieut. Webb, the commander, consisted of Mr. Joseph Webb, clerk in charge, Mr. Hensman, acting assistant-surgeon, Mr. Waddington, boatswain, Mr. William Johnstone, first engineer, Mr. Richard Cameron, second engineer, Mr. Henry Collins, third engineer,

and Mr. Henry Davie, acting-carpenter; of the above, with the exception of Mr. Hensman and Mr. Richard Cameron, all had been up the Niger the previous year, where they had suffered from remittent fever.

Mr. Hensman had been several times in the Bonny and other rivers on the coast; and had acted for at least twelve months as resident medical officer at Fernando Po: he had had both remittent and intermittent fever. Richard Cameron had shortly before arrived from England, and had not previously been in a warm climate. The Wilberforce reached Aboh, on the 6th of July, Iddah on the 10th, where she was aground for two hours between English island and the cliffs. On her way upwards she again grounded near Beaufort island, and was unable to proceed until the 17th, but arrived at the confluence the following day. Mr. Webb was engaged embarking the people and the farm implements, until the 22d, when he turned the vessel's head downwards, with the Amelia in tow, and ultimately left the river on the 27th of July. Henry Davie (whose life had been despaired of when the Expedition was in the Niger in 1841,) was attacked on the 19th of July, when at the confluence, and was not convalescent until the middle of August. The first engineer was taken ill on the same day, and could do no duty until the 18th of September.

Cameron was seized at the confluence, and was long unwell. Mr. Waddington was laid up on the 26th of July, while the vessel was in one of the Benin branches : he however got better for a while, but relapsed, and died at Fernando Po on the 12th of September. Mr. Hensman was seized with fever on the 25th of July. Collins was added to this melancholy list, as the vessel was leaving the river ; and Mr. Joseph Webb, the clerk, fell ill a few days afterwards, and died of fever on the 22d of September. Lieut. Webb, the excellent and enterprising commander, alone escaped.

The Wilberforce arrived at Fernando Po, on the 29th of July ; and on the 18th of September she sailed from thence for England, where she arrived on the 16th of November.

Lieut. Strange of the *Albert*, on being promoted to the rank of commander, proceeded to England on the 21st of June, in H.M.S. *Rolla*, as did also Mr. Müller, the chaplain of the *Albert*. Mr. Bowden and five of the crew were invalided, and took a passage home in the same vessel. Their complaints were intermittent complicated with dysentery, the usual sequelæ of the fever, rendering them unfit for service on the coast, to which there was at this time some probability of our returning ; one had been only a few months from England.

On the 8th of October, Captain John Foote, the

senior officer on the west coast of Africa, arrived at Ascension, when the remaining officers, and those of the crew of the *Albert* who had been engaged in the expedition, were transferred to *H.M.B. Dolphin*, for a passage to England.

The *Dolphin* sailed from Ascension on the 14th of October, and calling for about twenty hours at St. Michael's in the Western islands, arrived at Spithead on the morning of the 19th of November.

SECTION V.

Vital Statistics of the Expedition at its close.

STATISTICAL ACCOUNT of the Cases of FEVER that actually occurred on board H.M.S. Albert, (including Amelia tender and Model Farm), Wilberforce, and Soudan, while the vessels were in the Niger: showing also where the Deaths took place.*

H.M.S. Albert, including Amelia Tender and Model Farm.

Albert in the river 64 days.

Number of officers, white seamen, marines, and sappers	62†
Of whom were attacked with fever in the Niger	55, or 1 in 1·127
Died on board the Albert	9
„ Wilberforce	1
„ Soudan	1
„ Dolphin	4
Merchant ship Warree	1
Died at Fernando Po Sick Quarters	6
Royal Naval Hospital, Ascension	1 = 23
Ratio of deaths in total number victualled	1 in 2·696
in number of cases	1 in 2·391
Men of Colour of various nations entered in England	15‡
„ attacked with fever in Niger	6, or 1 in 2·500
Blacks entered on the coast	76
attacked with fever in river	0

* These Tables are wholly irrespective of the ships to which the officers, seamen, &c., belonged. They are intended to denote

H.M.S. Wilberforce ; in the River 45 days.

Number of officers, white seamen, marines and sappers	56*
Of whom were attacked with fever in the Niger	48, or 1 in 1·666
Died on board the Wilberforce	6
at Fernando Po Sick Quarters	1=7
Ratio of Deaths in number victualled	1 in 8·000
Ratio of Deaths in number of cases	1 in 6·857
Men of colour of various nations entered in England	7†
„ attacked with fever in Niger	3, or 1 in 2·500
Blacks entered on the coast	39

on board of what ships they were first seized with fever: and in what ships, or where the deaths took place. Without some plan of this nature, it would be impossible to convey a clear idea of the vital statistics of the expedition; seeing that at the Confluence, the distribution of the crews of the squadron was considerably changed.

† Adding Captain B. Allen, Mr. Webb, mate, and William McLauchlan, sailmaker of Soudan, who joined before the Albert left the confluence to proceed upwards, and were taken ill immediately afterwards: also Mr. Kingdon, schoolmaster, and Mr. Ansell, collector, who were received on board in a dangerous state from fever, when the Albert was at the confluence on her way out of the river, and deducting Lieut. Fishbourne.

‡ Adding one received at confluence when the Albert was descending the river.

* Deducting Mr. Ansell.

† Deducting the officer of colour received on board Albert at model farm.

H.M.S. Soudan ; in the River 40 days.

Number of officers, seamen, marines, and sappers	27*
„ „ attacked with fever in Niger	27, or 1 in 1·000
Died on board the Soudan	5
„ „ Wilberforce	1
„ „ Dolphin	4=10
Ratio of deaths in total number victualled	1 in 2·700
Men of colour entered in England	3
„ „ attacked with fever in Niger	2, or 1 in 1·500
Blacks entered on the coast	18

<i>Statistical Summary deduced from the above Tables.</i>	Albert, &c.	Wilberforce.	Soudan.	Total.
Total Number of Whites	62	56	27	145
Cases of fever among ditto	55	48	27	130†
Deaths among ditto	23	7	10	40
Number of blacks	91	46	21	158
Cases of fever	6	3	2	11

* Including Lieut. Fishbourne, who joined her at the confluence, before descending the river.

† *Names of those who escaped the Fever in the Niger.*

ALBERT. William Stanger, M.D., geologist, suffered afterwards from intermittent in England.

Theodore Müller, chaplain, left the river at the confluence.

Charles Hodges, sergt. marines, was frequently unwell afterwards from headach, but was a good deal relieved by ulcers breaking out in the legs.

H.M.S. Wilberforce on her return to the Coast in 1842.

Died of fever	1
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Wilberforce's Second Voyage up the Niger in July, 1842.

Number of whites on board . . .	8
Number attacked with fever . . .	7, or 1 in 1·140
Deaths in number on board from after-effects	2, or 1 in 4·000
Ditto in number of cases	1 in 3·500

Morgan Kinson, P. marine, died of gastritis at Fernando Po.
 John Huxley, sick-berth attendant, had a severe fever seven weeks after leaving the river at Fernando Po.

William Lamb, mid-steward, ditto, ditto.

Archibald Yair, sick-berth attendant, left at the confluence in Soudan, and was quite well throughout.

WILBERFORCE. William Cook, commissioner, left the river in Wilberforce.

James N. Stange, lieut. (now commander), ditto, ditto.

Morris Pritchett, M.D., surgeon, ditto, ditto.

James F. Schön, chaplain, ascended to Egga in Albert.

T. R. H. Thomson, assistant-surgeon (now surgeon), left the river in Soudan.

John Stirling, assistant-surgeon, left the river in the Soudan.

Walsh, carpenter's crew, left the river in the Wilberforce.

Douglas, mid-steward, ditto, ditto.

RETURN of the TOTAL MORTALITY stated under the respective Ships to which the Officers, Seamen, Marines, &c. belonged, from the time the Expedition left England to its completion.

	ALBERT, including the AMELIA, &c.				WILBERFORCE.				SOUDAN.				Grand Total.
	Officers, including Engineers.	White Seamen, Marines, and Sappers.	Kroomen, liberated Africans, &c.	Total.	Officers, including Engineers.	White Seamen, Marines, and Sappers.	Kroomen, liberated Africans, &c.	Total.	Officers, including Engineers.	White Seamen, Marines, and Sappers.	Kroomen, liberated Africans, and other Blacks.	Total.	
Average complement	21	37	88	146	21	36	49	106	11	19	21	51	303
Deaths from fever contracted on the coast	..	..	..	..	1	..	1	2	..	..	..	..	2
Accidents " " in the river	6	14	..	20	3	6	..	9	5	8	..	13	42
Other complaints	1	2	1	4	..	1	1	1	..	..	1	1	6
	7	18	1	26	4	7	2	13	5	8	1	14	53

Ideal Section of the River Niger from the Delta to Egga, shewing the relation of the Sandstone to the Older Rocks.

S.W.

N.E.

Iddah

Ikari
85' H.

Soracte
about 1200 A.

Palleh Hill
1160 ft.

Beaufort Island
Adda Kuddu
100' S.

Delta

Sandstone

Mica
Slate

Granite

Gneiss

Sandstone

CHAPTER II.

HISTORY OF THE FEVER.

SECTION I.

Description and Morbid Anatomy of the Fever.

THE following account of the fever is drawn up principally from the cases which occurred on board H.M.S. ALBERT, commencing at Iddah in the Kingdom of Eggarra, River Niger.

Precursory symptoms and mode of invasion. There was little uniformity in the character of the premonitory symptoms, or in the mode of attack. A number of the patients were for twenty-four hours, and sometimes more, sensible of headach, often slight; and some experienced painful scintillations along the spine, attended with a feeling of coldness before they considered it necessary to apply for medical assistance; while in others the approach of the disease was announced by a sensation of weakness, and sometimes of burning heat in the epigastrium. Giddiness, lassitude, tremulous and foul tongue, with small quick pulse, and general oppression succeeded. The eyes looked heavy, were

occasionally suffused, and the motions of the pupil were performed languidly. On two occasions that came under my notice, the individuals were seized without any warning symptom, and were at once so overwhelmed as to be for a time deprived of motion and sensation.

In general, however, some of the above-mentioned symptoms, varying in duration and intensity, preceded the accession.

Character, course, and duration of the symptoms. The accession was seldom accompanied by very marked shivering, yet previous to the period of vascular excitement, the patient usually experienced a sensation of coldness, and for the sake of warmth would fain have exposed himself to the rays of the sun. He would shortly express a wish to lie down, and would complain somewhat suddenly of increase of headach or giddiness, and intense heat of the skin, which had a dry parched feel, restlessness, intolerable nausea, and difficult breathing. The dyspnea in several instances, particularly in my own case, was extremely distressing, and continued from one to four hours, until relieved by spontaneous vomiting, or the occurrence of diaphoresis. Headach was with some the prominent symptom during the hot stage, and the feeling was described as that of a cord being tightly girded round the temples. The thirst was very urgent; the tongue was foul in the centre, moist, clean or reddish, and invariably marked by indentations on the edges.

The countenance was more or less flushed, the eye occasionally suffused and always looked wild. Pulse rapid but small, frequently feeble; thirst urgent, bowels constipated, and urine passed often and in small quantity. There was in general tenderness of the epigastrium, sometimes acute, but often not discoverable unless upon pressure.

In some cases, coldness of the stomach was complained of some days before death. A subsidence of febrile action in general followed in from three to six hours, or at all events, the symptoms if continued beyond the latter period became much mitigated. Diaphoresis came on, the thirst moderated, and the signs of oppression in a great measure disappeared. The principal complaint at this period was from *the disagreeable odour of the perspiration, particularly in those cases that subsequently proved fatal*. I was not sensible of this peculiarity in the smell of the perspiration in my own case, but I perceived it very distinctly in several others. The sweating continued until from eight to twelve hours had been occupied by the whole paroxysm. The patient, although considerably exhausted, expressed himself as free from all trouble, and the countenance also indicated improvement. This seemingly favorable change did not last long, for the accession generally returned in from six to ten or twelve hours. Occasionally the respite extended to twenty-four hours. In a few cases, there was a treacherous interval of forty-eight hours, in the

early period of the disease ; but these invariably assumed afterwards a low malignant type. The fever in them seemed to have rested only to give strength for a fresh accession.

The accessions did not seem to observe any law of periodicity. They came on, disappeared, and returned at all hours of the day and night. The evening, however, was a more common time of accession than any other ; in which case, after the cold sensation had passed off, the paroxysm generally ran through its stages in the course of the night, and had suffered a considerable remission by the hour of breakfast (eight) the next morning.

In a few instances the remissions were as complete as in the interval of ague. These were, however, only exceptions to the general rule, for total absence of fever was indeed of rare occurrence during the course of the disease.

I cannot say that the influence of critical days was at all apparent, further than if no material improvement was evident by the eighth or ninth day, the prognosis was then most gloomy. The patient became weak, irritable, and exhausted, and extremely restless. The remissions were most indistinctly marked ; the skin was dry and constricted, the tongue parched, pulse small and irregular ; the fever, in short, now assumed a low asthenic form. Occasional symptoms of mental aberration would appear at this period ; the countenance pale and shrunk ; but not unfrequently the patient would

talk most rationally upon the state of his mind, so far as regarded his eternal happiness. In several cases this stage was wonderfully protracted, as in Case XII.

Local pain was seldom much complained of: indeed, with the exception of headach (often very slight) at the commencement of the paroxysm, there were several instances in which the patients expressed themselves as quite well, throughout the disease, although this ultimately proved fatal.

When the disease was about to take a favorable turn, the remissions became distinctly marked, and the intervals were lengthened. The countenance (the best criterion) assumed a natural expression, a certain look of convalescence, that one can only become acquainted with by experience and contrasting it with that indicative of a fatal termination. The skin became moist, the thirst diminished, the pulse was more voluminous and softer; the tongue gradually lost its tremulousness, and could be more easily thrust out of the mouth; it often continued a long time loaded, but the crust was less brown, and more moist, and seemed to have lost its firm attachment to the organ: at this period diarrhœa was by no means uncommon, and also a copious flow of urine, which latter was a very favorable symptom. A strong desire for food was expressed by most of the patients who had advanced thus far, and I had more than once cause to regret having gratified it.

Such were the general characteristics of the fever as it occurred in the Niger; but the description is not to be regarded as applicable to all the cases, for, on board of the *Albert* alone, there were several, in which there was neither complaint nor evidence of suffering of any kind. There was a disinclination to be spoken to, or to be in any way disturbed; and a listless expression of countenance, with a clammy skin, and small pulse. The periods of exacerbation were so feebly marked as to be scarcely perceptible: food and medicine were taken when offered, but seldom or ever was anything asked for, and the invariable answer to inquiries after their health was, "I am very well." Constant watchfulness was the only appreciable symptom in these cases, which all terminated fatally, seemingly from mere exhaustion. It would have been interesting to have ascertained the nature and amount of the organic lesions in these cases; but, unfortunately, circumstances did not permit any of the bodies being examined.

Contingent symptoms. Of the contingent symptoms the most prominent were delirium, yellowness of skin, and convulsions, affecting various parts of the body.

Delirium was a very bad symptom in the fever of the Niger: of twenty-one cases in which it occurred fourteen died, of whom one was drowned by eluding his nurse, and jumping into the river. It was not uncommon for patients, whether affected with

delirium or not, to be haunted by dreams of a frightful nature,—as of being drowned, stabbed, or falling from a precipice. In the worst cases the mental aberrations were expressive of some personal misfortune, or unheard-of disease. The imposition of the slightest restraint was always a heavy grievance. In one case the patient constantly harped upon his being condemned to everlasting punishment; when reason for awhile resumed her authority he would express shame and contrition for previous misconduct. The most solemn promises to behave well, if left at liberty, were not unfrequently made, only to be broken, whenever an opportunity offered for the exercise of the cunning, so characteristic of this stage of the disease.

Petechiæ or *sudamina* were not observed in any case. In two cases which proved fatal on the seventh day, livid blotches appeared on the feet and hands, and gradually extended to the chest and abdomen.

Yellowness of the skin occurred in nineteen cases, thirteen of which were fatal, and the average day of the appearance of this symptom was the ninth. The yellow colour was first seen in the conjunctiva, and afterwards extended over the face, arms, and the rest of the body. It was in general light, and did not appear after death in any case in which it had not existed during life.

The fæces in these cases were generally of a

bilious colour; the urine deposited a sediment, but its chemical qualities were not ascertained.

Convulsions. In three of the fatal cases on board the *Albert*, the muscles of the pharynx and larynx were convulsively affected, preventing or much impeding deglutition. In two others, also fatal, the spasms were confined to the muscles of the abdomen and limbs. Mr. Loney, the assistant-surgeon of the *Dolphin*, the vessel that received the sick from the Soudan, at the mouth of the river, informed me that out of eight deaths, which took place during the passage to Ascension, there were two cases in which deglutition was at first difficult, and soon stopped altogether, and two others in which there were general convulsions, more especially of the extremities.

In one case paralysis of both arms, from which the patient has not yet altogether recovered, supervened during the early period of the disease.

Partial paralysis of the right arm occurred in my own case, four months after convalescence from the fever had been going on, and lasted about six weeks. One man, on board the *Wilberforce*, was placed on the list, for paralysis, in November, after having had fever in the Niger.*

In no case was there the slightest appearance of

* Captain William Allen informs me that he suffered from partial paralysis, with wasting of one arm, for many months after an attack of fever, which he suffered when in the expedition up the Niger with Lander.

“black vomit.” Bilious vomiting was common in the early stage of the disease; and the attendant retching was very troublesome. Irritability of the stomach, although more frequent at the beginning of the fever, was by no means confined to this period, for it was observed to have occurred also during the height and decline of the disease.

STATISTICS of the Periods of DEATHS, and RECOVERIES from FEVER, on board the ALBERT, WILBERFORCE, and SOUDAN.

Death ensued on the	Albert.	Wilberforce.	Soudan.	Where died.		
				In River Niger.	At Fernando Po.	At Sea.
3d day, from being attacked, on board	1	::	::	1	::	::
4th	1	::	1	2	::	::
7th	1	2	2	5	::	::
9th	3	::	3	2	1	3
10th	::	2	1	2	1	::
11th	1	::	3	::	3	1
12th	2	::	::	1	::	1
13th	1	1	::	::	2	::
14th	1	::	::	1	::	::
15th	::	1	1	::	1	1
16th	::	2	::	::	1	1
18th	1	::	::	::	::	1
20th	2	::	::	1	::	1
21st	1	::	::	1	::	::
33d	::	::	1	::	1	::
37th	1	::	::	::	1	::
38th	1	::	::	::	1	::
43d	1	::	::	::	1	::

Note. A man, not included in the above, belonging to the Albert, died in June, 1842, afterwards at Ascension hospital; one belonging to the Soudan died of dropsy, on board the Warree, in January, 1842.

In the Quorra, says M'Gregor Laird, "at Iddah, on the 13th of November, all hands were laid down with fever. On the 18th the first deaths occurred, two in number; two others died on the 19th; three on the 20th; three on the 21st; two on the 22d; one on the 24th. On the 4th of December two died, and one on the 11th of the same month, making a mortality of 16 in 23."

Of the recoveries on board the Albert, there occurred on the 16th day, one. On the 18th, one. On the 20th, one. On the 23d, one. On the 27th, two. On the 30th, one. On the 32d, one. On the 42d, one. On the 43d, one. On the 50th, one. On the 56th, one, afterwards invalided. On the 57th, one. On the 61st, one, afterwards invalided. On the 70th, one, afterwards invalided. On the 74th, one, afterwards invalided. On the 84th, one. On the 89th, one. On the 91st, one. On the 92d, one, afterwards invalided. On the 97th, one. On the 95th, one, ultimately invalided. On the 102d, two; both ultimately invalided. On the 121st, one, and on the 129th, one; both of the latter were invalided some months afterwards. Average duration on the sick-list, 64.52 days.

On board the Wilberforce there recovered, on the 3d day, one. On the 4th, three. On the 5th, one. On the 6th, two: one of whom died on the

second voyage up the Niger. On the 9th, one. On the 10th, two. On the 12th, one. On the 13th, one. On the 14th, one. On the 16th, three. On the 21st, two; of whom one died during the second voyage up the Niger. On the 22d, one. On the 23d, one, afterwards invalided. On the 24th, three. On the 25th, one. On the 26th, two. On the 27th, one. On the 31st, one. On the 32d, one. On the 33d, one. On the 34th, one. On the 35th, one. On the 36th, one; afterwards invalided. On the 38th, one. On the 39th, one. On the 41st, one; and, on the 130th, one. Average duration on sick-list, 26·259 days.

I have no means of ascertaining the duration of the disease in those of the Soudan who recovered, but in looking over the Tables of Vital Statistics at the termination of the expedition, it will be seen that a proportionately greater number died belonging to that vessel than either of the other two. It must, however, be borne in mind that her commander and sailmaker, both of whom died, ascended the Niger in the Albert, as high as Egga, and that her schoolmaster was seized with his fatal illness at the model farm, when the Soudan and Wilberforce had left the river. The Soudan was unavoidably much crowded by the sick from the Albert and Wilberforce. The Wilberforce, with all the advantage of following close after the Soudan, and

gaining the open sea, had the additional one of having ample space for her sick, not only in the river, but during the passage to Ascension; for six had been discharged to the Soudan, while a lesser number had been received by her from the Albert.

Meanwhile the Albert was still advancing into the interior of Africa, and in spite of all our efforts and hopes the fever pursued its course little controlled by treatment of any kind, until it had prostrated nearly all the whites on board. No sooner did the disease seem to be subdued than it recurred. In short, there was a constant presence of cause, and a consequent perpetuation or reproduction of disease.

On the arrival of the Albert at Fernando Po on the 17th of October, the enfeebled condition of the crew rendered her totally unfit to proceed to the southward, and the sick were accordingly sent on shore, as has been already detailed in the brief general narrative.

MORBID APPEARANCES. From circumstances which could not be controlled, the post-mortem examinations were by no means so numerous or scrutinising as is desirable in the investigation of a disease whose causes and nature are comparatively so little known. The results however, although limited, are so far satisfactory that they corroborate, in

most respects, opinions derived from former experience on the coast of Africa, more especially with reference to the pathological condition of the gastro-enteric mucous membrane, during and after certain forms of remittent fever. The following statements are founded on the examination of eight bodies.

Head. In two cases where the head was examined, softening was found in the corpus callosum and walls of the ventricles. In one case there was a small quantity of serous fluid in the base of the brain, and an unusual proportion in the ventricles. The dura mater was always sound. The pia mater in one case red and injected. No subarachnoid effusion was observed.

Thorax. The contents of the thorax were in nearly all cases healthy in appearance. Adhesions between the costal and pulmonary pleuræ were found in one instance, with tubercular deposits in the lungs in the state of induration. In another, a cartilaginous state of the tricuspid valves, with serous effusion in the left pleural sac.

Abdomen. The peritoneum and its processes, as well as the surface of the intestinal tube, had in general a bilious tinge.

The stomach. In several cases the stomach contained from one to five ounces of yellowish-green fluid. The mucous coat was invariably softened, whether this fluid were present or not. In three cases livid patches were variously distributed over

the inner surface of the stomach, becoming more distinct when the mucous tunic was scraped off, exhibiting stelliform nuclei in their centres. In two cases, the livid marks were arranged in the form of parallel streaks. These pathological appearances were chiefly in the splenic extremity of the stomach and near the pylorus. In one case there was remarkable venous arborescence on the exterior of the stomach, attended with general engorgement of the portal system. Small points of ulceration were observed in three cases, and slight thickening of the mucous lining in one instance only.

Duodenum. The lesions observed in the duodenum were of the same nature as those in the stomach, but much less marked. In one case the lower portion of this gut contained a yellowish secretion, of the consistence of mucus.

The jejunum was free from disease, and likewise the ileum, until within three feet of its lower end, where were observed, softening of the mucous lining generally and livid spots. A series of small ulcerations were seen in four cases. In one, the membrane was thickened, rough, and the ulcerations had nearly perforated the bowel; this case proved fatal by terminating in dysentery. The agminated glands of Peyer were distinct and enlarged in three cases.

Colon. The colon was usually nearly empty. On these occasions a dark, bilious, pultaceous matter

was found in this portion of the tube, but in small quantity only; it was viscid and tenacious, adhering to the mucous tunic: where lividity or ulcerated points were found at the lower end of the ileum, the same lesions were seen to exist on the arch of the colon. Softening of the mucous coat was remarkable in three cases. In that of the case of dysentery already mentioned, there was softening of the tunic where it was not ulcerated, and induration and elevation round the edges of the ulcerated patches.

Liver. The liver was congested in one instance; larger than usual in two cases. It was anemious in two cases where the patients died early, and on two other occasions when death took place long subsequent to febrile action. In the latter cases this organ was of a pale gray colour, and had a dry appearance on being sliced. This condition was not confined to one lobe.

Gall-bladder. The gall-bladder was distended with bile of the colour and consistence of tar in three cases; one of which was fatal on the third, one on the seventh, and the other on the ninth day. In another instance the gall-bladder was nearly filled with bloody bile. The man in this case died suddenly, many weeks after the fever had left him.

The enlarged condition of Peyer's glands, which is regarded by Chomel and Louis as constant in the

typhoid fever of France, occurred in three cases out of eight that were examined. In four cases, the subjects of which with one exception died early, slight ulcerations of the gastro-enteric mucous membrane were observed. This fact is worthy of attention, inasmuch as it would seem to imply that the cause of the river fever, in whichever way it is introduced into the system, induces an unhealthy action in mucous surfaces much more rapidly than even the low typhoid fevers of France. Chomel does not consider that ulcerations take place in typhoid fevers earlier than the twentieth day, when there is, also, softening of the mucous membrane around the follicles, or in that part of it which covers them. Louis found the patches of Peyer natural in twenty autopsies, made by himself, of yellow-fever cases at Gibraltar, during the epidemic of 1828.

Spleen. In one case the spleen was enlarged, soft, and breaking down under the fingers; in another enlarged, gorged with blood, but firm. This viscus was not altered from the normal condition in the other cases examined. The *pancreas* was not in any case otherwise than natural. The *kidneys* were mottled and larger than usual on one occasion. The *bladder* was in general collapsed. A case in which bloody urine was voided was not inspected.

The morbid appearances observed in the intestines are very like those so often found in fatal cases of the typhoid fever of this country. This is not

the place to recapitulate the evidence opposed to the doctrines of Broussais, regarding the nature of fever; but every day's experience tends to prove that the ulcerations and other lesions of the bowels are a specific effect of the fever poison, and not the cause of the fever itself.

Morbid changes of some kind were found in the mucous membrane of the bowels in all cases, but none of these changes were constant, therefore are not essential to the existence of the fever. Besides, in the cases we examined the morbid appearances were plainly insufficient of themselves to account for death, so that we are obliged to admit some agency quite independent of local inflammation. In this opinion I am borne out by the high authority of M. Louis, who, when speaking of the epidemic yellow fever of Gibraltar, in 1828, says "there is in this disease something beyond what we see; we must admit that the cause of the disease often kills by itself, or independently of appreciable alteration of the organs, and even up to a certain point of apparent derangement of the functions." The morbid appearances are, however, so far valuable, that they account in a great measure for ailments that occur as sequences of the fever, weeks and sometimes months after febrile action has ceased.

I have no intention to enter upon the disputed question as to whether the blood in fever receives

the morbid impression through the medium of the nerves, or independent of them; but I may state that in two cases the blood was found in a fluid state several hours after death; and the general character of the morbid anatomy seems to prove that the cause of the disease was a poison introduced into the blood, through some channel. The yellowness of skin I believe to have been owing to the bile not being eliminated by the liver, and consequently remaining latent in the circulation.

SECTION II.

Sequences of the Fever.

UNDER this head I shall principally confine my observations to the illustration of a fact in the pathology of the fevers of Africa, more especially of those contracted in rivers, which does not seem to have engaged much attention. I mean the existence of an irritability and great susceptibility of disease in the mucous lining of the bowels, for a long time after the cessation of the primary attack. The colicky, dysenteric and other symptoms, so common among men who have suffered from fever in Africa, depend, I believe, in the majority of instances, upon lesions of the mucous membrane of the bowels that come on during the fever. This opinion I formed while serving on the coast of Africa some years since, and my late experience has tended to confirm it.

Previous to my joining H.M.S. Scout, under the command of Captain Robert Craigie, in 1838, the crew of that vessel had suffered from fever contracted in the river Bonny; and a prize crew had suffered from the same disease at Sierra Leone, whither they had been sent in a slave vessel. Several deaths took place; of those who recovered some were invalided, and a few continued in the ship. The latter were quite free from disease while the vessel was at the

Cape of Good Hope. In the less temperate climate of the Mauritius, they were troubled with diarrhoea, and on the return of the ship to the West coast, they all were attacked with intermittent, dysentery, or affections of the liver or spleen. At this period it was necessary to invalid some of the cases for a change of climate; and two cases proved fatal, one from intestinal hemorrhage, and the other from colic, followed by symptoms of inflammation of the bowels.

Of the diseases that are likely to be produced after fever, acute inflammation of the bowels may be shortly noticed. The lining membrane of the bowels may be for a long time even ulcerated, without any great complaint or marked suffering, until from some cause acute inflammation is set up. In one of the cases in which disease of the bowels was consequent on the fever, and which proved fatal, the patient had symptoms of colic which passed into those of enteritis. On dissection, the lower end of the ileum and the colon were found studded with old ulcers, around which were marks of recent inflammatory action.

Colic. This complaint is common among crews on the west coast of Africa, more especially among those who have suffered from fever. Indeed it may be safely asserted that few convalescents from fever will escape an attack of colic unless extreme caution be used. I have seen it produced by very slight infringement of strict rules of diet. An

almost imperceptible change in the temperature or hygrometrical condition of the atmosphere, will also bring on colicky symptoms, in persons who have had African fever, so sensible in them are the bowels of impressions made on the skin. As irritating matter in the bowels often causes colic in healthy persons, we may fairly suppose that it will bring it on still more readily in those whose bowels are in a morbid condition from fever, whether this condition be that of mere tenderness, of chronic inflammation, or ulceration of the membrane. Colic in its milder or severer form, is likely to ensue from the action of acrid bile and other morbid secretions, as well as by irritating substances taken into the stomach.

Hematemesis and hemorrhage from the bowels are much less frequent as sequences of fever than colic; but they sometimes occur as such. I saw one case of hematemesis, at Ascension hospital, which terminated in recovery; and one of hemorrhage from the bowels, after fever, which proved fatal, on board ship: in this last case there were ulcerated patches low down in the ileum and in the colon: the liver was enlarged and indurated, and the spleen was in a state of congestion. I inferred that the activity of the hemorrhage in this case was owing to the condition of the liver, which, by obstructing the portal circulation, caused the blood to be extravasated at the ulcers, the weakest points in the surface of the mucous membrane. Hemor-

rhage may, however, take place from mucous membranes, without any discoverable breach of surface.

Dysentery. Diarrhœa and dysentery are also frequent among those who have suffered from African fever; and further evince the morbid susceptibility of the bowels induced by that disease: this was remarked in the former expedition up the Niger. Mr. M'Gregor Laird, who accompanied Lander, informed me that two persons, Dr. Briggs and a seaman, on board the Quorra, died of dysentery after recovery from the fever: Dr. Briggs died in the river, and the seaman at sea some months afterwards. Dr. Briggs had so far recovered as to be able to go out shooting, and suffered only from occasional intermittent. Mr. Laird himself had a severe attack, from which he recovered, under the care of a native doctor. Of those in the Albert who had fever in the Niger, and who did not at once leave the coast, few escaped bowel complaints, which often assumed the form of dysentery. Dr. Vogel, botanist to the Expedition, died of this disease at Fernando Po, ten weeks after he got rid of the river fever. Many of the men were troubled with it, three months after the Albert left the Niger. At the hospital of Ascension a private marine died of dysentery, complicated with abdominal dropsy, ten months subsequent to a severe attack of fever contracted in the Niger. Dysentery may be an immediate sequence of the fever, or it may come on long after the fever has passed.

Hepatic disease will not unfrequently occur, as a result of these affections of the gastro-enteric lining. The mode by which inflammation is propagated from the gastro-intestinal mucous surface to the liver has not, so far as I am aware, been satisfactorily explained: whether this takes place by sympathetic irritation, by being spread by continuity of surface along the biliary ducts, or by being conveyed along the internal coat of the vena portæ, I am unable to say; but feel confident that I have met with several well-marked cases, in which hepatitis, in various forms, followed chronic disease of the gastro-enteric mucous membrane.

The period during which the lesions of the intestines are inactive or latent. There seems reason to believe that the morbid susceptibility of the bowels consequent on fever may, for a time, be latent, and that chronic inflammation, enlargement of the follicles, softenings and even ulcerations may exist without producing constitutional disturbance. The duration of this period of inaction will vary according to circumstances. A change from a warm humid atmosphere to a drier and more bracing one, with proper attention to diet, clothing, and the avoidance of all causes likely to produce a determination from the surface to the abdominal organs, may not only destroy the morbid sensibility of the bowels consequent on fever, but even cure some of the worst forms of disease produced by it. Due regard must also be paid to the state of the bowels,

so as to prevent acrid bile, or any other secretion from fretting the already irritable surface.

It often happens that the disorders referrible to the bowels do not appear, until convalescence from fever has considerably advanced. This is the period at which the patient is apt to throw off restraint. He neglects precaution as to clothing, and becomes less careful in his diet. The liver and other organs become deranged, the morbid secretions are poured out on the tender surface of the mucous membrane of the bowels, and disease in various forms is thus lighted up.

Intermittent Fever. It is, I believe, generally admitted that remittent fevers are only severer grades of the same pathological states as constitute intermittents. Remittent fever occurred in six out of seven whites, who returned to the Niger in the Wilberforce, and during the same voyage two blacks had slight agues. On board the Albert none of those who had fever in the Niger, and were not at once sent to England, escaped intermittent. Five who suffered severely were invalided at Ascension, nearly nine months after the vessel left the Niger. In the Wilberforce nine cases of ague, following Niger fever, occurred during the passage to Ascension. The severity of the intermittent did not always bear a relation to the intensity of the primary remittent. Commander Fishbourne was affected by the remittent in a comparatively mild form, but he was many months afterwards as vio-

lently visited by intermittent as any one in the Expedition. Nearly twelve months after recovery from remittent, and after about eight months of freedom from intermittent, I was three days confined to bed, with the latter complaint, during the passage to England, just as we were getting into cold weather. It appears, therefore, that after remittent a person continues long liable to intermittent, and further that remittent and intermittent are produced by the same cause in different degrees of intensity. While the system is in this condition of susceptibility, a second attack of remittent will certainly follow exposure to malaria, while a return of intermittent may be induced even in a healthy district by slight indiscretion in diet, or by sudden changes in the condition of the atmosphere. In nearly all the chronic cases of intermittent a marked increase in the duration and severity of the attacks was observed when they came on during the first quarter of the moon's age.

One man, who was born at Greenhithe in Kent, and who had been, in his youth, subject to ague, was again seized with it in the Niger, but it speedily degenerated into the remittent type. The case of Dr. Stanger is somewhat remarkable: this gentleman was brought up in a fenny district, and had suffered a good deal from ague: he escaped the fever of the Niger entirely; but on his return home to England he had several very severe fits of ague.

SECTION III.

Causes of the Fever.

No subject in medical philosophy has been investigated with less satisfactory results than the causes of those fevers which, in intertropical countries, are the especial bane of European life. But it can hardly be a matter of surprise to find men of eminence arriving at conclusions of the most opposite and contradictory nature ; seeing that endemic fevers are known to prevail during all periods and varieties of season, whether remarkable for protracted rains or unusual drought ; and to originate in districts whose situation and geological character are not such as are generally said to belong to miasmatic localities ; while, on the other hand, the inhabitants of large tracts of country, of a kind commonly understood to be fertile in the production of fevers, not unfrequently possess an almost total immunity from this form of disease.*

* Dr. John Wilson, in his able Statistical Reports of the Health of the Navy, speaking of South America, inquires, "Why is it, that in a land-locked harbour in this part of the world, under a powerful sun, surrounded by marshes and rank vegetation, ships lie for months or years without the occurrence of a single case of concentrated fever : while in other places, in Africa, in Asia, in North-

Notwithstanding these perplexing facts, it seems to admit of no doubt that the domain of the worst form of intermittent and remittent fever is to be found, in countries overspread with marshes, abounding in alluvial deposits, with luxuriant vegetation, and subject to periodical inundation, and to a high degree of atmospherical temperature. Such are the Pontine marshes, the maremma of Italy, the too celebrated ditches of Walcheren, and the banks and

America, and more especially in the West Indian Islands, things, to superficial observation, which appear to be the same, are productive of so much disease and death?"

Dr. Ferguson states that the only essential requisite to produce the poison of fever is that water should be absorbed by soil, and then exposed to speedy evaporation. (Vide Paper in Edinburgh Philosophical Transactions.)

Humboldt, in the fifth volume of his Personal Narrative, in mentioning the fevers in the village of Atures and Maypures, around the two great cataracts of the Oroonoko, says that the natives believe the pestilent exhalations that arise from the bare rocks of the Raudales to be the cause. "Among the cataracts, and whenever the Oroonoko, between the missions of Corichana and Santa Barbara, periodically washes the granite rocks, they become smooth black, and as if coated with blacklead. The colouring matter does not penetrate the stone, which is coarse-grained granite, containing a few solitary crystals of hornblende. The same appearance is seen in the primitive rocks of Syene, and was observed by the naturalists of Captain Tuckey's expedition in the 'Yallalas' that obstructed the Congo." Humboldt asks, "Can it be possible that, under the influence of excessive heat and constant humidity, the black crusts of the granitic rocks are capable of acting on the ambient air, and producing miasmata with a triple basis of carbon, azote, and hydrogen?"

deltas of some of the great rivers of Africa, Asia, and of some parts of America. Moreover, it is well known that drainage and other means which civilization has suggested have rendered places healthy that were previously notorious for their insalubrity. In support of this assertion, the present comparative exemption from endemic disease enjoyed in our country may be cited. To go further back, Hippocrates states that Abydos, after having been twice nearly depopulated by a pestilential fever, was rendered healthy by draining the city according to his advice. It was one among many of the gigantic schemes of Napoleon to reclaim the Pontine marshes; and authorities, I believe, consider that he would have succeeded had his intended operations been carried into execution. According to M. Thevenot, a late writer on the Diseases of Africa, particularly of Senegal,—from the sanitary regulations and other measures adopted at Saint Louis, with all the disadvantages of climate and soil,—a great progress has been made in public health. In the garrison alone, we have seen that the mortality is lowered from 1-12th to 1-20th since 1829, and from 1-16th to 1-20th since 1824.

Supposing, however, it should be generally admitted that soils, with certain conditions of structure and organic products, acted upon by the usual meteoric agencies, generate fevers and other endemic diseases, the inquiry has only advanced a little; for

even then, we should possess only a vague knowledge of the means by which this influence is exerted and modified, and still less of the precise nature of the subtle cause thus unaccountably called into action.

Passing over the doctrines of planetary influence, the want of elasticity in the atmosphere, and of animalculæ entering the body through various channels, as constituting the poisonous matter of fever—it may be said that the causes have, in the present day, been more commonly referred to heat and moisture, or to both conjoined. A moist atmosphere is supposed to act in various ways : among others, by checking perspiration, and retaining the deleterious exhalations supposed to escape by the skin ; by repelling the healthy circulation of the skin, and thus favouring its power of absorption ; by withdrawing electricity from the body ; and by being a good conductor of miasmata, introducing them into the system through the vessels. Terrestrial exhalations containing the proximate principles resulting from the decomposition of animal and vegetable matter, and the consequent formation of deleterious gases vitiating the air, are considered to be mainly instrumental in the production of endemic disease. Eudiometry has done little to unravel the mystery, as to the constitution of malarious atmospheres. Chemists have endeavoured to unfold the nature of pestilential gaseous emanations, with various and, upon the whole, unsatisfactory results.

Dr. M' Culloch says, "It has been frequently remarked in Holland, that the severest seasons of fever have followed casual irruptions of the sea, and also that on these occasions there has been produced a degree of putrefaction attended with an insufferable smell, unusual in other cases." Evidence of similar effects from incursions of the sea over embankments, or so as to mix with fresh water, is to be found in various authors. One remarkable case is briefly recorded by Professor Traill of Edinburgh, in his "Outlines of Medical Jurisprudence," and is detailed at greater length by Professor Daniell, of King's College, London. Dr. Traill observes— "Marshes into which sea water enters are more pestilential than mere fresh water swamps." A striking instance of this is given in the Memoirs of Gaetano Giornini. "A Luccesan engineer, about the middle of the last century, adapted floodgates to the stream in the Littorale of Lucca, which by opening only outwards allowed the land waters to descend, but prevented the sea when driven by the west wind from entering and mingling with the swamps. The Littorale became healthy, and its population increased from 1500 to 9408; marsh fever disappeared except on two occasions since, when by the worming of the gates sea water was insensibly admitted, and on both occasions marsh fever raised its head, until arrested by the repair of this valuable contrivance. The town of Via Reggio, with 2000 inhabitants, stands in what was before an uninhabitable salt

marsh, and the mortality in that district, which before the labours of the engineers, even with the system of annual migration during the hot months, was one in fifteen, is now only one in forty, the average mortality in Europe."

In consequence of the unusually rapid destruction of the copper on the bottoms of ships employed blockading the river on the west coast of Africa, the attention of government was called to the subject; and, in 1839, Sir William Burnett, the Inspector-general of Naval Hospitals and Fleets, caused an analysis to be made of several bottles of water taken by me when surgeon of H.M.S. Scout, at various distances off and within the mouth of the river Bonny: the water was found to contain a quantity of sulphuretted hydrogen, besides various proportions of oceanic salts: this analysis was followed by that of several other bottles of water from rivers on the west coast of Africa, by Professor Daniell; and all those from off the river, or near their mouths, contained a notable amount of sulphuretted hydrogen, while those which had been filled a good way up the rivers afforded no trace of this gas. The professor also examined several specimens of copper from the ships' bottoms that had been injured on the coast, and analysed the black and green crusts with which they were in part covered: the black crust was found to consist of sulphuret of copper, and the green, of sub-chlo-

ride of the same metal. Professor Daniell, connecting these results with those derived from the analysis of the waters, concluded that the injury to the copper arose primarily from the sulphuretted hydrogen. In a series of able papers, published in Nos. 2 and 3 of the "Friend of Africa," he explained the formation of this deleterious gas, by the decomposition of the sulphates of sea-water when mixed with fresh water containing vegetable matter: "Decaying vegetable matter abstracts the oxygen from the sulphate of soda, and a sulphuret of sodium is formed: this again acting upon water decomposes it; and sulphuretted hydrogen is one of the products of the decomposition."

From the effects, upon the human body, of air impregnated with sulphuretted hydrogen, Professor Daniell considered that if the water along the whole line of coast, which is intersected by rivers opening into the sea, contained that gas, and were perpetually evolving it, that there was a very probable connexion between such an evolution and the notorious unhealthiness of the coast of Africa.*

* Dr. M'Culloch says, rather testily, "The accused gases have been carbonic acid, azote, hydro-carburetted gas, hydro-sulphuretted gas, and even ammonia."

Speaking of Cariaco, Humboldt says, "At length we reach the borders of the lake of Campoma, the exhalations from which contribute to render the climate of Cariaco unhealthy. The Rio Azul and the hydro-sulphurous hot springs fall into the Laguna di Campoma together." He adds, "Fetid exhalations

In December 1840 Sir William Burnett issued a general memorandum to the medical officers of Her Majesty's squadron on the west coast of Africa, directing them to examine with great care the waters in the neighbourhood of rivers, with the view of ascertaining the presence of sulphuretted hydrogen, and "to report to him from time to time their proceedings thereupon." A case, containing bottles filled with test solution, was also provided; and Sir William, in his observations and directions for the medical officers of the Niger Expedition, with reference to localities where decaying animal and vegetable matters abound, observes, "although I am quite sure that the inhalation of sulphuretted hydrogen gas is not alone the cause of fever in such countries, yet, as it certainly exercises a deleterious effect upon those exposed to its influence, the steamers should not remain in such situations, and its presence can be readily detected * by the use of

arise continually from the stagnant water of this meer. The smell of sulphuretted hydrogen is mingled with that of putrid fishes and rotting plants." Again, "miasmata are formed in the valley of Cariaco, as in the Campagna di Roma; but the heat of the climate of the tropics increases their deleterious energy. These miasmata are probably ternary or quaternary combinations of azote, hydrogen, carbon, and sulphur." (Personal Narrative, vol. iii. p. 188.)

* Dr. D. B. Reid, in his pamphlet *On the Ventilation of the Niger Steam Ships*, says, "An exposure to sulphuretted hydrogen, where its action may be traced from the slightest visible effect till it becomes so excessive as to be accompanied by convulsions,

the test, with which the surgeon of each ship is furnished." A complete chemical chest fitted up with the necessary apparatus, was most liberally supplied by the government to each of the ships, for the purpose of affording the surgeons every facility to ascertain whether this or any other noxious gas was present in the water, or in the air, on any part of the coast, or within the rivers; and generally of admitting their investigations being pursued to an indefinite extent.

When the ships of the Expedition arrived on the coast, in June 1841, the waters were regularly tested, not only at and within the rivers, but at various distances from them at sea; at Sierra Leone, the river St. Paul, the river Mesurado, the River Sinoe, the Sengana, and the Nun: the experiments were made with great care during all times of tide, and on each occasion one bottle was filled with the water, labelled and hermetically sealed, for transmission to the inspector-general of naval hospitals and fleets, while another bottle was filled, labelled, and *corked* and *sealed* with *wax* in the usual manner: the latter were kept *on board*

does not appear to be followed by the usual effects of exposure to malaria, while there is no reason to doubt that a true malaria can exist independent of sulph. hydrogen: it may therefore be perhaps at present regarded rather as a most oppressive accompaniment to the action of miasma wherever it appears, than viewed in the same light as the actual and predominant malaria."

for further examination. On the 26th of July, 1841, on opening a bottle, labelled "June 24th, 1841; water, taken eight miles from Sierra Leone;" and another, marked, "July 3d, taken from off the river Mesurado, two miles from the mouth;" both, by their odour, denoted that the water in them was impregnated with sulphuretted hydrogen. In the presence of Dr. Stanger, Dr. Pritchett, and Mr. Roscher, the mineralogist, small quantities of water from each bottle were poured into a series of test-tubes, which afforded a copious black precipitate on the addition of sulphate of copper to one, the same from nitrate of silver to another, and on carbonate of lead being thrown into a third; sulphur was also deposited, on the addition of nitric acid to a small portion of the water. With proofs so unequivocal of the existence of sulphuretted hydrogen, which all of us had failed to detect in water when first collected, an analysis was made of the contents of the respective bottles, with the view of estimating the amount of this gas contained in each of them, and the results were as follows:

SIERRA LEONE WATER.

Salts, pure white, procured by evaporation,	
calculated for the imperial gallon . . .	1620 grains
Specific gravity of the water	1016
Sulphuretted hydrogen, per imperial gallon	2.40 cubic inches.

WATER from off the river MESURADO, west coast of Africa.

Salts, of a dirty white, obtained by evaporation, calculated for the imperial gallon	1280 grains
Specific gravity of water	1012
Sulphuretted hydrogen, per imp. gallon	6.40 cubic inches.

In the quantitative estimation of the sulphuretted hydrogen contained in the water from off the Mesurado, the mode adopted was that recommended by Rose of Berlin, which I had before practised, under the direction of Dr. D. B. Reid, namely, by throwing down an insoluble sulphuret, by the addition of a metallic oxide in solution, oxidating by adding nitric acid, and precipitating the sulphuric acid, formed as a sulphate by the nitrate of baryta, and determining the amount of sulphuretted hydrogen therefrom.

The amount of sulphuretted hydrogen in the water taken "off Sierra Leone" was calculated from the quantities of the sulphurets of copper, silver, and lead produced, by adding to it salts of these metals in solution.

Sulphuretted hydrogen was not found in water when first taken up, on any part of the coast,*

* On the 10th of August, 1841, when the vessels of the Expedition were at anchor, about six miles off the mouth of the Nun, in nine fathoms water, the streams of the Nun and Sengana were seen flowing into the sea so dirty-coloured and muddy, that their progress through the salt water was, for several miles, distinctly marked: this sudden rush of water from the river is

either previously or subsequently to the above experiments; therefore I feel bound to conclude known to the cruisers, on the coast, by the name of the "Freshes." Quantities of water were taken up along-side before the river-water reached the ship, and at various periods after it had been intermingling with the sea-water all around.

Before the intermixture of the waters,—

The temperature at the bottom was	79° Fahr.
„ half-way up	79 ·5 do.
„ surface	79 ·0 do.
Specific gravity	1019·60

After the waters were mixed,—

The temperature at the bottom was	79 ·0 Fahr.
„ half-way up	79 ·5 do.
„ surface	79 ·5 do.
Specific gravity	1013·50

No evidence of sulphuretted hydrogen in either case.

The same results from experiments made upon water taken alongside the ships have, so far as I have heard, been uniform in the squadron on the west coast. The late Mr. John Tait, who was assistant-surgeon of H.M.S. Buzzard, Lieut. Levinge, commander, which was anchored off the Nun for several months, writes me thus on the subject:—

“SIR—Understanding that you are anxious to obtain information respecting the waters of the rivers on this coast, I beg to sub-join the result of my very limited experiments: 1st. Water taken off the Nun, in the early part of June, after heavy rains and at ebb-tide, showed no trace of sulphuretted hydrogen on the application of the test recommended by Professor Daniell. The same having been kept, and *corked* in a bottle, for about two months, gave out a very offensive odour. 2d. Water taken on the same day during the flood showed no change of colour, either when taken, or after being kept for a similar period, as in the

that the formation of this gas took place after the water was received into the bottles. In both bottles there was a sediment composed of vegetable matter, more especially in the water from off the Mesurado, and there may have been much more of this as well as of animal decomposed substance in an unappreciable state of division. Was it this sedimentary matter acting upon the water in a state of stagnation, or separation from the mass, favoured by a high temperature, that caused the development of sulphuretted hydrogen? or was it the gallic acid, or tannin of the cork, acting upon water containing only a reduced proportion of the oceanic sulphates?

Captain Littlehailes, late in command of H.M.S. Dolphin, informed me, that while lying off the

former case, and emitted no disagreeable odour." Mr. Goodridge, surgeon of H.M.S. Iris, in a letter addressed to me, dated Ascension, April 1, 1842, says: "Sulphuretted hydrogen may be produced in the waters of the coast; but the tests have not proved its existence in a single instance in which I have tried it; although I have repeatedly and carefully examined the waters of every river, and of every degree of latitude, between the Gambia and Congo or Zaire. The rivers Gambia, Pongos, Sierra Leone, Nun, Bonny, and Congo, have all been visited by me, and I have taken frequent opportunities of trying the test at all times of tide, and at various distances from the land, and always with the same results. W. G."

I have testimony to the same effect from Mr. John Russell, late assistant-surgeon of H.M.S. Rolla, and from Mr. Crawford, assistant-surgeon of H.M.S. Termagant, both of which ships were employed on the west coast.

mouth of the Nun, in December, 1841, a most disagreeable odour was smelt in the hold of the vessel, which he supposed, at the time, to be owing to brine having escaped from the beef casks, and become putrid below. On minute examination no cause for the smell could be detected, but the hold was cleared, cleansed, and thoroughly ventilated. A case of fever having made its appearance on board, induced Captain L. to shift his berth some miles further seaward. In preparing to weigh for this purpose, it was necessary to get a stage on board, which had been for some days along-side, the people having been employed "hogging" the ship's bottom. This stage consisted of empty "breakers," (small casks,) lashed together, and on "starting" the bungs a horrible stench issued from them, which was found to be caused by a small leakage of water in each. The winds were very light at this period; the atmosphere was in general in a stagnant state,—the thermometer ranging from 82° to 85°. In fact, the oppression of the weather was such as Captain Littlehailes never experienced before or since, although he had served long in the East and West Indies.

While in charge of the naval hospital at Ascension, in August and September, 1842, it was customary for me to have a large cask filled once a week with salt water, to supply a shower bath, a luxury in which

I indulged every morning. On several occasions, it was remarked by Lieut. Foote, (who was living with me at the time,) as well as by myself, that the water in the bath was most offensive, more especially about the end of the week, when the barrel was nearly empty. This induced me to test the water, which was found to contain a very sensible proportion of sulphuretted hydrogen. Ascension, as is generally known, is a volcanic island, about eight miles long and six broad, surrounded by extensive beds of lava and scoriæ. Being destitute of vegetation, except on the green mountain which rears its summit among the other numerous old volcanic cones that are dispersed over the island, to the height of 2800 feet, and there being no streams of fresh water running into the sea, the salt water obtained there must be as nearly as possible *pure*.

It is thus evident that sulphuretted hydrogen may be developed not only in salt water mixed with fresh water containing vegetable substances, but that it may also be produced from *pure* oceanic water, under certain conditions of temperature, of separation from the mass, and of *partial** exclusion from

* On my return to England, Professor Daniell informed me that sulphuretted hydrogen had not been detected in any one of the bottles of water, sent home by me, *hermetically* sealed.

The description of one which Mr. Daniell kindly gave me, answers for all: "Water taken off the river Sinoe, west coast of

the action of atmospheric air. How then is sulphuretted hydrogen formed under the circumstances in question; and what prevents this gas being generated on the grand scale in the estuaries of the great African rivers, seeing that in those situations the materials requisite for its formation are constantly being brought into contact? There is perhaps no locality in the world whose physical features would seem altogether so favorable to the reaction of organic substances upon the sulphates of sea-water, as in the lagoons on each side of the Nun. These are densely studded with the mangrove, contain great quantities of mud, the water in them is always impregnated with sea-water, and in a state of constant stagnation, unless when disturbed by the intrusion of the tides. But the most delicate tests failed to give any evidence of the presence of sulphuretted hydrogen.

I consider the absence of the gas in question from the sea and river waters and superincumbent atmosphere to be distinctly proved: and all that has been observed appears to me to indicate that

Africa, just when the water becomes brackish, half a mile from the mouth. Rainy season, July 12th, 1841.

No smell,

No precip. sulph. copper.

Acet. lead, white precip.

Sp. gravity, 1006·3.

“The same results in all the others, with difference of sp. gravity, according to distance from river.”

the production of sulphuretted hydrogen is not the simple consequence of the contact of sulphates and organic matter, but that that kind of decomposition of the organic matter must be first set up which is known as fermentation or putrefaction. This peculiar process is encouraged by matter undergoing the same change, and thus a foul cask might rapidly affect the organic matter of the sea-water contained in it, as in the observation at Ascension. It also requires in general a slight access of air to occasion a preliminary oxidation, which precedes the putrefactive stage ; but this access must be slight, for free exposure to air is incompatible with putrefaction, and occasions the destruction of the organic matters by simple continued oxidation, and their conversion into water and carbonic acid.

The putrefaction, then, of the organic vegetable matter is not to be expected in running water or the open sea, when there is the fresh access of air and oxygen.

The matters in putrefactive decomposition are remarkable for their deoxidizing power, taking oxygen from sulphates, and leaving sulphurets, from which sulphuretted hydrogen is evolved by the carbonic acid present. The fermentation of bran is, for this reason, had recourse to, to deoxidize indigo in silk dyeing.

From this view it necessarily follows that no sulphuretted hydrogen was found in the *hermetically*

sealed bottles, because air was excluded and the oxidation, which is a prelude to putrefaction, was prevented. In the *corked* bottles, on the contrary, a slight permeation of air does occur, sufficient it appears to begin putrefaction, but insufficient to change it into a decomposition by oxidation alone; and finally, in the sea and running streams the vegetable matter appears to be destroyed by simple oxidation, without any putrefaction or consequent formation of sulphuretted hydrogen.

Moreover, the effects of sulphuretted hydrogen would most probably have been shown among the crews at once on entering the river; while we find, on the contrary, that the squadron was healthy until we were at Iddah, twenty-two days afterwards.

The circumstances of the occasional and not uniform production of sulphuretted hydrogen by the reaction of organic matter on the oceanic sulphates, may be said then to remain still an interesting but purely chemical subject of inquiry, to the elucidation of which the observations of the medical officers of the Niger Expedition have, it is hoped, in some degree contributed.

Before taking leave of this subject, I shall add the following remarks of the illustrious Humboldt, relative to the causation of disease in one of the most unhealthy districts in the continent of America.

“When in the bay of Higueroa,” says this ce-

lebrated traveller, "one of the most unhealthy of the whole coast, where the forests come down to the beach, which is covered with a thicket of mangroves, avicennias, &c. as the shore descends with a gentle slope, the small tides are sufficient alternately to cover and uncover the roots and part of the trunks of the mangroves. It is, no doubt, while the sun heats the humid wood, and causes the fermentation, as it were, of the ground, the remains of dead leaves, and the molluscæ enveloped in the drift of floating sea-weed, that those deleterious gases are formed which escape our researches. We saw the sea-water along the whole coast acquire a yellowish brown tint whenever it came in contact with the mangrove trees." Humboldt, struck with this phenomenon, instituted a series of experiments on the infusion of mangrove, the results of which led him to believe, that it was "the moistened bark and wood acting upon the atmosphere, in the forests of mangrove trees, and not the water strongly tinged with yellow, which formed a distinct band along the coast. In pursuing the different stages of the decomposition of the ligneous matter, I observed no appearance of a disengagement of *sulphuretted hydrogen*, to which many travellers attribute the smell perceived among mangroves. *The decomposition of the earthy and alkaline sulphates, and their transition to the state of sulphurets*, no doubt, may favour this disengagement, in many littoral and

marine plants : for instance, in the fuci ; but I am rather inclined to think that the rhizophora, the avicennia, and the conocarpus augment the insalubrity of the air by the animal matter they contain, jointly with tannin. Besides a thick wood covering, marshy grounds would diffuse noxious exhalations in the atmosphere, were it composed of trees which in themselves had no deleterious properties. Wherever mangroves grow on the sea-shore, the beach is covered with an infinite number of molluscæ and insects. These animals love the shade and faint light, and they find themselves sheltered from the shocks of the waves, amidst this scaffolding of thick and intertwining roots, which rises like lattice-work above the surface of the waters."

On entering the river, the squadron was healthy with the exception of a few cases of slight fever, chiefly among the blacks of the Wilberforce, caused by exposure to the rains when watering at Grand Bassa ; and one on board the Albert, occurring in a white whose constitution was broken by previous irregularities.

Generally speaking, the crews may be said to have been in a peculiar degree exempt from the more common causes predisposing to disease. The whites were almost all men in the vigour of life, with constitutions fully developed ; they were all volunteers, and many of them had already served

in warm climates. Their moral condition was good.

The victualling was according to the usual scale of the navy, with this difference, that preserved meats were issued twice a week. Cranberries and pickled vegetables were also served out on salt-meat days. The water of the river was found to be perfectly purified and wholesome by adding a little lime to it. A cup of coffee was provided for each white man before going on deck in the morning, and quinine dissolved in wine was frequently administered in ten-grain doses to all hands. Flannel dresses were always worn in the evening, and also during the day when the atmosphere was moist. Fires were also kept burning in the various compartments as occasion required. The awnings were constantly spread, and when it rained they were sloped. The greatest attention was paid to the dryness of the clothes, and the proper airing of the bedding. The oil-cloth covering the decks was kept cleaned. Hair-cloth, being a bad conductor of heat, was hung over the ship's sides to defend the iron from the sun's rays. The only Europeans exposed on the deck during the night were one officer, a quarter-master, and the serjeant or corporal of marines.

A reference to the Meteorological Tables will show that the atmosphere was in general far from being moist; the dryness of the air indeed increased as we

advanced upwards, and it was remarkable at Egga, so that it can hardly be supposed that the body was predisposed to disease, by the atmosphere carrying off its electricity by induction, or by impeded exhalation from the skin. I regret to say, that I cannot produce, as I intended, a series of experiments on the electric condition of the atmosphere, while in the river, and will not therefore even venture upon a hypothesis as to how far it was concerned in the causation of the disease.

On the other hand, it will be seen in the brief detail of the progress of the vessels through the Delta to Iddah, the Confluence, and afterwards to Egga, that we had traversed (and slowly) a country of a character recognized as eminently fertile in the production of fever. Swamps in a rich alluvial soil abounded. The islands and banks were everywhere more or less inundated. The vegetation was rank and profuse. The ships' companies were necessarily a good deal exposed on deck during the day, and were sometimes harassed by frequent anchoring and weighing in ascending the river. The actual labour cannot be said to have been great, but there was a degree of restless anxiety inseparable from being constantly liable to be called on deck. The upper deck was much lumbered, in a degree preventing the free circulation of the air. The same cause no doubt stood in the way of the decks being thoroughly

cleansed.* Notwithstanding that the room on the lower deck was proportionally greater than that of ships in the navy generally, yet so many men sleeping below under so high a temperature must have tended to diminish the vital energies, and consequently to lower the resisting powers to disease. The thermometer on the lower deck was seldom under 84° Fahr. The precaution of defending the ships' sides has been mentioned, and no doubt it was so far beneficial. The fires were "banked up" at night, in order to weigh and get up the steam next morning at daylight. Thus there was an unavoidable source of heat, which was constantly being diffused throughout the vessel by the active conductivity of the material of which she was composed. It will naturally be said that the vessel's construction of iron was favorable to her acquiring the temperature of the medium in which she floated, but it is at the same time to be borne in mind that the water of the river was seldom under 83° Fahr.†

When it is considered, as has been already noticed, that the vessels were constantly exposed to en-

* This remark applies only to the upper deck: the decks below are always clean.

† It is not to be understood that I am opposed to the use of iron vessels in warm climates. On the contrary, I think they possess many advantages over wooden ones, not the least of which, in

demic influence, while they remained in the Niger, it is impossible to say at what time the miasmatic poison was first inhaled; but I hardly think that it was imbibed by any individual before we left the mouth of the river: if this were so, then fever may be said to have ensued on the sixteenth day* from the period of its earliest imbibition. Quarter-masters, seamen, and marines, whose duties were chiefly on deck, stokers in the engine-room, cooks, and in short, men of various occupations and constitutionally dissimilar were simultaneously affected with fever.

Upon the whole, I am inclined to think that in those cases which appeared at Iddah, the germs of the disease were contracted in the Delta. The stagnant state of the atmosphere, (relieved by occasional tornadoes,) and the causes of malaric exhalation being still abundant, and accumulated in the lower part of the atmosphere, from the want of a wholesome agitation, were favorable to its development at Iddah. Up to this point, the south-west breeze had always been felt during part of the twenty-four hours. The miasma in this state of condensation,

a medico-economical point of view, is, that the action of air and water on iron has no bad effect upon the crews; while the decay of wood is known to be highly prejudicial to health; moreover iron vessels can be much more perfectly cleansed than wooden ones.

* The Quorra, M'Gregor Laird's vessel, entered the river on the 19th of October, and fever broke out twenty-one days afterwards, on the 11th of November.

so to speak, acted energetically upon men whose vital powers were already enfeebled, and who may have been for some time insensibly under its insidious influence.

Moral causes came also into operation after leaving Iddah: many of those who were well were dispirited, and not a few, when taken ill, became speedily despondent.

When out of the whole expedition there were only fifteen whites that were not attacked with fever in the Niger, it is scarcely possible to offer any opinion as to how far the susceptibility to this treacherous disease was influenced by temperament or idiosyncrasy. Of the blacks, consisting of natives of various parts of Africa, including Kroomen, Americans, West Indians of African origin and East Indians, to the number of 158, eleven only were affected by the fever in the river: they (the eleven) had all been in England, and for some years absent from their respective countries. The disease in them assumed a comparatively mild form, and in no case did it prove fatal; showing that the immunity from endemic disease in warm countries, which is enjoyed by the dark races, is to a certain extent destroyed by a temporary residence in another climate.

The question as to whether contagion contributed to the spread of the disease on board of the ships may, in my opinion, be briefly disposed of. All were

exposed to the same influences, and nearly all were attacked with fever. Two only of the four medical officers who died had been in attendance on fever patients. Dr. Pritchett, Mr. Thomson, Mr. Stirling and Dr. Stanger were among the few who escaped being seized with fever, although they were in constant intercourse with the sick; and I was the last person in the *Albert* laid down with fever. The nurses on board the *Albert* were among the latest taken ill, and one escaped altogether. No fact came under my observation affording the slightest evidence that the disease was communicable from one person to another.

Does one attack of river fever afford any protection against a second?

My own experience, added to information obtained from many of my brother officers, and from Mr. King, the surgeon of the *Ethiope*, who has been more in the Niger than any other medical man, is wholly unfavorable to the opinion that one attack of river fever affords any immunity from a second. On the contrary, those who have once suffered from this treacherous disease seem particularly predisposed to it, if they again venture within malarious influence. Of those who had the Niger remittent, on board the *Wilberforce* in 1841, many were again attacked with fever, on the return of the vessel to the coast the following year, while surveying the Cameroon river and Amboises islands; and when that

vessel proceeded up the Niger the second time, in July 1842, six out of seven who had already passed through river fever, were again seized with it, from the effects of which two died. In many cases the character of the second attack may not be exactly like that of the first, but Mr. Stirling, who saw the patients on the return of the vessel to Fernando Po, considered the fever as in no way differing from that which had come under his observation when in the river during the previous year.

But it seems after all to be a matter of no great consequence to establish a precise identity of character between primary and secondary attacks, if the agencies originating remittent and intermittent are admitted to be the same ; the production of the one form or other depending upon intensity of cause or peculiar susceptibility or idiosyncrasy of constitution. Whether the second attack be developed in the form of a remittent or intermittent, sufficient evidence is afforded that the system possesses no immunity in virtue of the first attack, for both diseases are essentially the same, differing only in degree.

I have thought it right to record the results of my experience with regard to this important feature in the remittent fever of African rivers, on account of its practical bearing with reference to the selection of men for service on the west coast of Africa, more especially those who are likely to be

employed in rivers. Indeed the whole history of the fevers of warm climates is unfavorable to the opinion, that in any one of them is any absolute protection against a second attack secured by a first.

Arejula the Spanish physician, Sir W. Pym, and Sir James Fellowes were the most strenuous advocates of the doctrine of protection, which has been confuted by Drs. Bancroft and Ferguson, and particularly by Sir W. Burnett,* who disproved many of the statements made by Sir W. Pym relative to the yellow fever of Gibraltar, upon which his opinion was based.

A further investigation of this subject was instituted by the Anglo-French Commission during the epidemic at Gibraltar, in 1828, of which M. Louis was president, the late Sir David Barry, vice-president, and M. Trousseau, secretary.

M. Louis assumes nine thousand as the smallest number of patients exposed to two epidemics, seen by the medical men examined by the commission; and states that they had to deliberate on only thirteen cases of presumed second attacks, of whom a majority of the commission declared one case of double attack evident, three probable, and the others doubtful or inadmissible.

* Vide Appendix to Practical Account of the Mediterranean Fever. (pp. 332-3-4.)

It has been a matter of question, how far the period at which the vessels entered the river was well chosen. To solve this question in any degree satisfactorily, it will be necessary to appeal to the generally recognized physical causes of fevers in swampy districts, and to those practical facts which have come under the observations of non-professional as well as professional men who have been much in Africa.

Experience has abundantly taught that the rivers of Africa are at all periods more or less unhealthy ; and if it be admitted that the effluvia causing fevers result from the decomposition of organic matter, (animal and vegetable,) or from exhalations from soils recently under water, then the season at which the river is high must be, theoretically, the least prejudicial to health.

It is on the immediate banks of rivers that the greatest accumulation of animal and vegetable detritus is found ; and, as the river rises, the banks at length are many feet below the surface, and in a condition not likely to evolve gases into the atmosphere above. It is true that the river, during the extension of its limits, is daily bringing those organic bodies with which it comes in contact to a condition favorable to decay. The elements for pestilential effluvia are present, but they remain inert so long as they are covered by the waters.

As the rains cease, and the river falls, the case is

completely altered. From day to day a greater surface of muddy soil becomes exposed, and the organic matters, saturated with water, are now powerfully acted upon by the sun, and gaseous emanations are abundantly evolved.

Divesting the subject of theory altogether, what do practical men say on the subject? Captain Midgely, a most intelligent man, who has been upwards of twelve years a regular trader to the Bonny, speaking of the season of 1841, says, "This season the rains ended unusually abruptly with the month of September, and sickness immediately ensued. There was little or no sickness in Bonny until the 1st October, since which it has been more than usually unhealthy, even for the season, for eight out of ten of the vessels have lost from two to five men each; and when I left Bonny, four days since, every vessel in the river had men lying in a very doubtful state." At Aboh, Iddah, the Confluence, and at Egga, the people declared that "bad bellies," fevers, eruptive and other diseases, proved very fatal during the dry season.

It is not to be understood that I imagine the causes that have been under consideration, the sole agents in bringing on fevers; but the action of the sun upon moist soils furnished with organic matter certainly contributes to their production, and this is, in a great degree if not altogether, prevented when the river is high.

My object is only to show that the time at which the expedition ascended the river, if not more healthy, is at least as healthy as any other period of the year, with this advantage, that a full river enables a more rapid transit to be made through the Delta than is possible when the water is low.

Latency of the Poison. In no case did the fever break out before the sixteenth day after commencing the ascent of the river, or sooner than the twenty-first day from entering the river. The *Albert*, *Amelia*, and *Soudan* were twenty-three days inside the river before fever made its appearance, and the *Wilberforce* about two days less; therefore, as the invasion of the disease was nearly, if not wholly, simultaneous on board the ships, a case may be said to have occurred in the *Wilberforce* on the twenty-first day.

Assuming that the poison was not inhaled until the vessels steamed upwards, which will reduce the period of latency to the shortest probable duration, and taking the cases on board the *Albert*, the ship the longest in the river, I find that out of fifty-five cases among the whites, and six among the people of colour entered in England, the days of seizure were as follows: on the 16th day, three; on the 17th, two; on the 18th, two; on the 19th, three; on the 20th, four; on the 25th, one; on the 26th, three; on the 29th, three; on the 30th, three; on the 31st, three; on the 33d, five; on the 34th, four;

on the 35th, two ; on the 36th, one ; on the 37th, six ; on the 42d, three ; on the 45th, one ; on the 47th, one ; on the 48th, one ; on the 51st, one ; on the 60th, three : average day of invasion 33·286. Among the six people of colour, two were attacked on the 16th day, one on the 18th, one on the 21st, one on the 29th, and one on the 42d day ; making the average period of attack the 25th day, (25·200.)

Bearing also in mind that about one ninth of the white crew escaped the river fever altogether ; that the people of colour only who had resided for some time in a temperate climate were affected by it, but in small proportion and in a mild degree ; and that the blacks entered in Africa did not suffer at all,—we shall have some data for the selection of crews for future operations in the Niger.

During the period when the river is high, a steam vessel, combining light draught of water with good speed, carrying three white officers, including a surgeon, coloured engineers, and manned wholly by Kroomen and other natives of western Africa, might enter the Niger, and avoiding unnecessary delay, reach Aboh, Iddah, the Confluence, Egga, and Rabba, and return to the sea in less than fourteen days.*

* Rabba is 433 miles from the sea, (according to Captain Allen's chart,) and allowing a steamer to have a speed of eight knots, and the current to be three knots an hour, she could reach Rabba in seven and a quarter days of twelve hours, at full speed. Six days would be required for her return, with proper prudence, until the river is better known.

The places just mentioned constitute a field whereon to base operations that may afterwards be carried out to an indefinite amount by properly cultivated native agency, and the employment of the least possible number of white people.

The comparatively civilized state of the inhabitants of Rabba, its position, the enterprising character of its ruler, and the present extension of Fulatah influence throughout the Niger, are valid reasons for opening up intercourse with this city. The importance of this measure has already been pointed out by Captain Trotter, and will no doubt be still more urged by him.

With regard to the special medical means for preventing attacks of the fever, nothing certain can be stated; I would, however, recommend the daily use of quinine, with a good diet, and a moderate allowance of wine; in short, that the body should be an exhaling rather than an absorbing surface: I would also advise the liberal diffusion of chlorine, protection from the sun, and other precautions elsewhere detailed in this work.

Supposing, in spite of all care, that one or the whole three whites imbibed the germs of the disease while in the river, but that it was not developed until after they had gained the open sea, there is every reason to believe that its character would be considerably modified, and the danger proportionably diminished.

TABLE OF EXPERIMENTS TO DETECT SULPHURETTED HYDROGEN.

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Names of PLACES.	Latitude.	Longitude.	Date and Season.	State of the TIDE.	In what RIVER; or how far distant from it.	Specific Gravity of the Water.	Temperature of the Water.
Off Sierra Leone and off Freetown, West Coast of Africa.	8°29'7" north.	13°14'3" west.	From the 24th June to July 2d, 1841. Rainy season.	At ebb, half ebb, and high water.	From eight to five miles from Sierra Leone River, and off Freetown in the Estuary.	Six miles off, 1023·80. Freetown, 1016·00.	From 82·5 to 83·5 Fabr.
Off the River St. Paul, West Coast of Africa.	6°22'0" north.	10°36'0" w.	July 5, 1841 Rainy season.	Low water.	Seven or eight miles from the mouth of the river.	,,	82· and 82·5 Fabr.
Off Monrovia in Liberia, and within the mouth of the River Mesurado, West Coast of Africa.	6°15'0" north.	10°36'0" west.	July 5 and 6 inclusive. Rainy season.	Within the mouth of the Mesurado, at half ebb; and in the river at low water.	In the Mesurado; and at sea, distant 1½ miles from the river.	1014.	82· and 82·5 Fabr.
Off the River Sinoe and within its mouth, West Coast of Africa.	5°0'0" north.	9°2'0" west.	From the 10th to the 14th July, 1841. Rainy season.	Half a mile from the mouth of the river, where water is brackish, and within the river, at various periods of the tide. Rainy season.	Taken three or four times within Sinoe River; and half a mile from the mouth seaward.	1019·85.	78·5 Fabr.

TESTS applied.	RESULTS.	REMARKS.
Solution of sulphate of copper.	No effect beyond slight tinge of blue, from colour of Solution.	The Sierra Leone River, and the Creeks running from it, are luxuriantly clothed with vegetation. The Mangrove abounds near the town, and in all probability for a long way up the river.
Solution of nitrate of silver.	Threw down a white curdy Precipitate, attaining after exposure to light a grayish colour.	
Carbonate of lead	No effect.	
Solution of sulphate of copper.	Result as in the former experiment.	Mr. M'Gregor Laird, in the Quorra, crossed the Bar, and ascended this river two or three miles, where plenty of wood was obtained. The Quorra and Alburkah were filled in the space of two days.
Solution of nitrate of silver.	Ditto	
Carbonate of lead	Ditto	
Solution of sulphate of copper.	The same as in the former experiments, with this difference, that with the Nitrate of Silver, a comparatively small proportion of Chloride, was thrown down in the water taken within the river.	The River Mesurado, near its mouth, is joined by a branch from St. Paul's, called the "Stockton Branch." The banks of these rivers are densely studded with the Mangrove, and the vegetation is of the most rank kind. The rocks are of highly ferruginous sandstone cut through by greenstone.
Solution of nitrate of silver.		
Carbonate of lead		
Solution of sulphate of copper.	The same as before, with the diminished quantity of Chloride of Silver, thrown down by the Nitrate being added to the water taken within the river.	Sinoe River, according to accounts obtained from the most intelligent natives, rises among high mountains in the interior, and in its course to the sea traverses rich districts, peopled by powerful tribes. Where the river terminates, the scenery is beautiful, and is here about half a mile broad, dotted with small islands, which, as well as the banks, are covered with a rich vegetation.
Solution of nitrate of silver.		The Mangrove here sends down its manifold shoots, which form a dense interlacing barrier between the river and its banks.
Carbonate of lead.		Rocks. Granite and Gneiss.

Names of PLACES.	Latitude.	Longitude.	Date and Season.	State of the TIDE.	In what RIVER ; or how far distant from it.	Specific Gravity of the Water.	Temperature of the Water.
Cape Coast Castle and off the 'Succoom' near Accrah.	5°6'0 north.	1°13'0 west.	From 19th to 30th July 1841. Cape Coast, and 'Succoom' on 31st July. Rainy season.	All periods of the tide. Succoom, half ebb.	Cape coast, a few miles distant from 'Secundee' River. Taken also five miles distant from the 'Succoom.'	"	"
Off the Sengana, Off the Nun, and within the Mouth of the Nun branch of Niger.	Nun, 4°16'50 north.	Nun, 6°2'49 east.	From the 8th to the 12th August 1841. Rainy season.	Off Sengana, half flood. Off Nun branch of the Niger at all periods of the tide.	'Sengana' two miles from mouth. Nun, various distances, from six miles outside to within the mouth, every five minutes.	Before "Fishes," 1019·60. After ditto, 1013·00.	79· and 79·500.
Prince's Island, Bight of Biafra.	1°38'0 north.	7°27'23 east.	Dec. 2, 1841 Commencement of dry season.	High water nearly.	No river, but there are a series of streams from the heights.	"	"
Saint Thomas's Island.	On the Equator.	6°44'42 east.	Jan. 3 & 5, 1842. Dry season.	Various periods.	A number of rivulets are discharged into the bay all round.	"	"

TESTS applied.	RESULTS.	REMARKS.
Sulphate of copper. Nitrate of silver. Carbonate of lead.	The same as in former experiments. No trace of S. H.	Both the rivers are of inferior size. I had no opportunity of entering either of them.
Sulphate of copper. Nitrate of silver. Heat.	No evidence of the existence of Sulphuretted Hydrogen.	Sengana River is of a large size, and empties itself into the sea, about eight miles to the westward of the Nun branch. This latter is the largest of the branches of the Niger. The waters in the rainy season (as on August 9th) rush out of the river, and impart a dirty mud colour to the sea over many miles. Several lagoons cut into the land on each side within the mouth. Densely studded with Mangrove.
Tests as before.	Results as before.	West Bay, as its name implies, is on the west side of Prince's. Streams of excellent water run down from the heights into the sea. The principal rivulet terminates in this Bay. Here the squadron usually obtain water.
Tests as before.	The same results.	We were anchored in a Bay, without name, on the south side of the island, near Rollas. Rocks volcanic.

SECTION IV.

Treatment of the Fever.

“Pessimum ægro Cœlum est, quod ægrum facit.”

THE most important step in the treatment of African fever is comprehended in this maxim of Celsus. By common admission of all who have served on the western coast, the causes of fevers exist in a state of concentration in the rivers; and hence, as a general rule, the greatest amount of mortality will be found on board those ships whose crews are most employed in river service.

I have no hesitation in saying that in most instances, a favorable turn in the form of the fever, even in its earlier stages, will attend a speedy removal from the locality where the disease originated; and that after the fever has run its course, change of climate is indispensable, if we wish to avoid intermittents, visceral complaints, and a host of ailments that rarely fail to follow in its train.

Having stated these as general principles, I shall now proceed to make a few remarks upon the effects of the remedial measures that were adopted on board the *Albert*.

General bloodletting. This remedy, which I had found to be so valuable in the treatment of fever in

the West Indies, and even of some parts of Africa,* has not, within my own experience, nor in that of most others, been at all successful on the west coast. In the adynamic form of fever which occurs in the rivers, general bleeding is certain to do harm. The patient may, it is true, feel relieved after bleeding, but the amendment is transient. The remission will not be prolonged, and the succeeding accession will be equally severe as the former ones, with this disadvantage, that it will now act upon a system weakened by the bleeding, and consequently less able to withstand it. There is, further, great danger of producing immediate depression of vital energy, so as in a great degree to prevent reaction, in which case the fever will assume a low asthenic type, from which wine and other stimulants will fail to rally.

Local bleeding will sometimes be beneficial: for instance, cupping the temples or the nape of the neck will in some cases relieve head symptoms; and vomiting was sometimes checked by cupping the epigastrium, when this symptom occurred early in the disease.

Blisters. As the type of the fever in general contraindicated bloodletting, general and local, blisters were much used, and were unquestionably of great

* When I was surgeon of H.M.S. Scout, in the Mozambique channel, in 1838, there were several cases of fever among the crew. The symptoms were those of strong vascular excitement, and general bloodletting was successfully adopted in every case.

service, especially when applied to the nape of the neck, while cold lotions were kept on the head at the same time. Sinapisms to the epigastrium generally checked vomiting; but they were less useful when put upon the extremities, during the low stage, than I had before observed them. I have also seen irritability of stomach, nervous twitchings, and other symptoms, successfully combated by the rapid production of a crop of pimples along the course of the spine, by means of the ointment of tartarized antimony. One precaution must be observed with regard to the application of cantharides as a blister. During the progress of the fever the mucous membranes generally are peculiarly susceptible of morbid action, and repeated blisters caused in most of the cases considerable strangury; and in one instance, well-marked inflammation of the bladder with hematuria ensued.

Mercury. My previous experience in the treatment of tropical fevers had generally pointed to mercury as the remedy to be prescribed when bleeding was inadmissible. In some of the cases that occurred in the Niger, the production of gentle ptyalism certainly did good, especially when the depression was not very great. In many cases, in which the vital energies were low from the very beginning, and continued so as long as we remained in the river, the full action of mercury would have been attended with danger. Calomel, combined first

with opium and afterwards with quinine, appeared to me to be the best modes of exhibiting this remedy.

Purgatives. The bowels were in general constipated, and required active purging, particularly during the early stage. Calomel, jalap, and the bitartrate of potash were given at first, so as to cause free evacuations, which were in general dark or of a bilious character. After the bowels had been well emptied, castor oil and the milder aperients answered better than strong purges; which then indeed do much harm. Enemata were given with benefit, when epigastric tenderness or irritability of the stomach, rendered the administration of purgatives by the mouth inadmissible.

Diaphoretics. The best diaphoretic was the true James's powder, which kept up the action of the skin, without producing nausea so often attending the exhibition of other antimonials. Its operation is certain. In cases in which the hot stage was disposed to be protracted, and the patient was weak, quinine was given with the James's powder, to obviate too much exhaustion from sweating. With quinine the medicine seemed to be more gentle and uniform in its operation, an advantage that will be obvious to all who have witnessed the debility and languor often caused by profuse cutaneous discharges in tropical climates.

Quinine. In general when the tongue began to clean, and the other symptoms indicated that the

functions were returning to their normal condition, quinine was given in large doses with great benefit. But it was not to this period alone that the use of this valuable remedy was restricted, for there were many cases in which, from the tendency to sinking from the very beginning, it was necessary to commence with quinine, wine, and light soups. In a disease like the Niger fever, so little amenable to treatment, no rule can be laid down for the exhibition of a particular remedy; but no medicine was found so efficacious as quinine in diminishing the severity of the paroxysms. In some of the more protracted cases, the red tinge over the sharp features would occasionally indicate that whatever power of reaction remained in the wasted system, was exerted to establish a feeble exacerbation, the exhaustion following which was often lessened by the liberal use of quinine.

Brandy, wine, camphor, opium, and ammonia were freely given when the pulse began to flag, and when the symptoms generally denoted depression of vital energy; and often with almost miraculous effect, as in Case XIII.

Sponging the body with tepid water and vinegar, in general afforded relief, but I never could carry the cold affusion further than the application of large wet clothes to the head. The warm bath was not much used, and in those cases in which it was tried the benefit obtained was only temporary, the relax-

ation and exhaustion produced by it, contraindicated its general use in a disease which was marked by debility and tendency to sinking ; tenderness at the epigastrium was, however, often relieved by applying to it a japanned case filled with hot water, and concave so as to fit closely to the abdomen. A large oblong case of similar construction was advantageously applied to the feet during the low stage of the disease ; and at earlier periods, when the nervous depression retarded the development of the stage of reaction, in which case the extremities often continued cold after the chest and abdomen had become quite hot.

The period of convalescence, under any circumstances, requires much care, especially if the chief remedy—removal from the climate—be impracticable. We have then, while cautiously conducting a tonic plan of treatment, to be in constant apprehension of ague, dysentery and other diseases, depending upon the various lesions of the mucous lining of the bowels. I found sago, arrow-root, and fowl-soup, with a small allowance of wine, the best diet during the early period of convalescence. Quinine is indispensable in the event of intermittent supervening, and the solution of iodide of iron given at the same time twice a day, during the intervals, had a marked good effect. When rheumatism followed, which was sometimes although not very often the case, colchicum and hydriodate of

potash were of most service. Unless when there was great debility, dysentery yielded to calomel and opium more readily than to any other remedy we tried.

But as the fever itself is rarely combated with success, so long as the patient continues within the pale of malarious influence, so during convalescence little permanent benefit is to be expected without a change of climate. How many naval medical officers on the African station have witnessed their sick daily wasting and pining, and all their endeavours to relieve them unavailing, so long as the vessel remained on the coast; and what a salutary change have they seen to result after even a short residence at Ascension. The south-east trade wind blows perpetually over this island, and there is a freshness of atmosphere singularly exhilarating to an invalid from the coast. In the lower districts the heat is considerable during the summer months, but the green mountain, the peak of which is at an elevation of 2870 feet above the level of the sea,* possesses a climate whose average temperature is at least nine degrees of Fahrenheit under that of the plains below.†

* See communications on the Island of Ascension in part 2, vol. v, of the Journal of the Royal Geographical Society of London.

† By burying the thermometer in the ground, I ascertained the average heat of the plains at the town to be 81·5; and that of the mountain near the quarters to be 72·0.

There are doubtless many cases to which so great a change of temperature, with considerable alteration in the barometric and hygrometric conditions of the atmosphere would prove anything but beneficial. But a proper selection of cases can on all occasions be made, and I feel assured that, with moderate caution, the greater number of invalids from the coast will be found to mend in the mountain. I can speak from experience in my own case, as well as in others. On my arrival at Ascension in the *Albert*, I was subject to severe attacks of intermittent, (following the adynamic remittent of the Niger,) which tormented me for nearly six weeks while I remained on board the ship in the roads. I then went up to the mountain quarters, and after one fit of ague, was rid of every symptom of the disease as long afterwards as I continued on the island, nearly eight months.

A convalescent hospital, or sick quarter, established at the mountain, would greatly enhance the value of Ascension to the cruizers on the west coast of Africa.

The best site for such a building appears to be on the flat land under the ridge on which the present quarters are situated. It would there be easily accessible, and the air in this situation is much drier than that of the more elevated grounds immediately surrounding the peak.

As happened in some instances among the convalescents of the expedition, cases will from time to time occur which admit of no amelioration, except by a total change from the tropics to native climate; and it will be always well to bear in mind that the warmer the period of the year in which the patient arrives in England, the less likely will he be to suffer from the transition.

SECTION IV.

Illustrative Cases of the Fever.

CASE I. *Iddah, in the kingdom of Eggarra, River Niger.*

Sept. 4th, 1841. John Peglar, Stoker, anno ætatis 22. Complained yesterday of general uneasiness, for which he had a dose of calomel and James's powder, which afforded him some relief; but he was lying on the lower deck during part of the night, his hammock having accidentally got wet. To-day has headach and heat of skin. Eyes suffused. Pulse 100, rather full. Tongue moist, loaded, reddish, and indented round the edges. Bowels open.

Emittr. statim sanguis e brachio.

Postea sumat pilulam calomelanos, gr. iij.

opii, gr. $\frac{1}{4}$, omni horâ.

11 P.M. Partial syncope was induced by the bleeding. Inclines to sleep. Skin clammy. Headach easier. Eyes less suffused. Complains of thirst. Tongue foul. Pulse less frequent, still firm.

Contin. pil. calomel. et opii.

Sept. 5th, 3 A.M. Has slept at intervals during the night. The bowels have been purged. There is no complaint of pain, but he is drowsy and not easily aroused. Pulse softer.

9 A.M. Has been quiet and easy since last visit. Slight mercurial fetor of mouth. Bowels again opened, stools dark, scybalous. Pulse small, soft, and regular. Tongue loaded in the centre, moist round the edges, less red. The

blood drawn yesterday exhibits a small proportion of crassamentum, and is neither buffy nor cupped.

Omittr. calomel. et opium.

R. Quinæ disulphatis, gr. iij.

Julepi camphoræ, ℥j. M. Sumat omni horâ.

M. Has been in low state for the last hour. He is now very restless and falters in his speech. Muscles of the pharynx convulsively affected on his attempting to swallow. Complains of spasms of the abdominal muscles. Pulse small, soft. Skin moist, clammy. Tongue moist, protruded from the mouth with difficulty.

Abradatur capillitium. Applicr. emplast. lyttæ nuchæ.

Contr. quinæ disulphas cum camphorâ.

Capiat vini rubri ad libitum.

8 P.M. The power of articulation is nearly gone. The motions of the pupil are languid. Perception remains, without the power of expressing his desires, further than opening the mouth when he wishes to drink.

Contin. omnia.

Sep. 6th, 3 A.M. Takes wine when given him, but he seems to be quite insensible.

Rept. vinum.

8.30 A.M. Wine has been continued all night. Blister has risen well. He seems to possess consciousness, but has no power of expression. Arms are spasmodically extended, and he moves them about with a sawing motion. Deglutition very difficult. Pulse small and thready. Respiration short and frequent. Has vomited some bile of a green colour. Hands rather cold, feet warm.

Continr. vinum.

Vespere. Continued in a low state all day, wine was given every hour, which in all probability protracted his existence. He died, however, at seven this evening.

Sectio Cadaveris.

The examination of the body was conducted by Dr. Stanger and myself. With the exception of the mark of the blister, the exterior of the body presented no unusual appearance.

Abdomen. Peritoneum sound. The stomach contained an ounce of yellow-coloured fluid. There was a yellowish tinge over the whole of the viscera. The mucous lining was generally softer than natural, and near the pyloric orifice there were small patches of effused blood, and minute points of ulceration. The upper end of the duodenum exhibited marks of inflammatory action. The lower part was deeply tinged with a yellowish-green colouring. No unusual appearance in the ileum, except near its lower end, where points of ulceration again occurred. As also in the colon, patches of Peyer distinct, but not otherwise altered. Liver natural. Gall-bladder filled with tar-coloured bile. Spleen, pancreas, and kidneys healthy. No unusual appearance in the chest. Head not examined.

CASE II. *At Iddah, River Niger.*

Sept. 4th, 1841. William Oakley, Gun-room Cook, anno ætatis 38, a Negro, born on the west coast of Africa, but he has been several years in England. Was placed on the sick list yesterday with symptoms of bilious dyspepsia, for which a purgative was given him. He has had shivering, followed by heat of skin and diaphoresis. Complains now of severe headach. Vomits ingesta. Pulse frequent, soft, full. Bowels open. Tongue foul, moist.

Admov. emplastrum lyttæ nuchæ.

Sept. 5th. Febrile accession, which commenced yesterday afternoon, subsided about one this morning. Blister rose well. Has no complaint. Pulse 90, soft. Bowels open.

Capiat pulveris Jacobi veri, gr. iv. secundâ quâque horâ.

Sept. 6th. Slept occasionally during the night. No return of fever, headach gone. Complains much of debility. Tongue loaded in the centre, moist, and red round the edge. Bowels have been opened this morning. Pulse 100, small, regular.

Omittr. pulv. Jacobi.

7 P.M. A febrile paroxysm came on about two hours ago, which, however, has only caused slight headach. Bowels have been again freely opened.

Abradatur capillitium.

Lotio frigida capiti.

Sept. 7th. Slept well. Fever subsided during the night, slight headach continues. Countenance improves. Has no local pain, but complains of general soreness, which he attributes to being confined to bed. Tongue still foul. Skin rather hot, dry. Pulse 100, small.

R. Aquæ ammoniæ acetatis.

Mucilaginis acaciæ, āā ʒiij.

Spts. ætheris nitrosi, ʒij.

Tincturæ opii, ʒj. M.

Fiat mistura, cujus capiat æger cochleare magnum omni horâ, donec ciet diaphoresin.

Sept. 8th. Rigors returned last night, and were followed by calm and placid sleep. Skin moist. Pulse 90, soft. Bowels open.

Maranta arundinacea pro prandio.

Contin. mistura pro re natâ.

Sept. 9th. Complains to-day of pain along the spine. No fever. Slept well. Tongue foul, moist. Bowels open. Is very weak and giddy on attempting to rise.

Contin. maranta arundinacea.

Habt. jusculum gallinæ pro prandio.

Omittr. mistura.

Sept. 11th to 24th. Slight returns of fever, after long

intervals, were experienced during this period. Debility continued until within the latter three or four days, after which he returned to his duty.

CASE III. *At Iddah, River Niger.*

John Robertson, Stoker, anno ætatis 30, of stout, muscular form, temperament phlegmatic. Complains of intense headach, pain along the spinal column, heat of skin, nausea, and a sensation of fulness about the stomach. Countenance anxious. Tongue moist. Pulse small. States that he has been unwell for the last day or two, but not sufficiently so as to cause him to apply for medical assistance.

Abradatur capillitium.

Lotio frigida capiti.

Capiat pulveris Jacobi veri, gr. v. omni secundâ horâ.

Bibat aqua hordei, pro potu ordinario.

9 P.M. Diaphoresis general over the body. Headach and other symptoms much relieved. Bowels have been opened. Pulse softer, less frequent. Temperature in the axilla, 101 Fahr.

Contin. lotio capiti.

Rept. pulv. Jacobi verus pro re natâ.

Sept. 6th. By reason of an increase of headach during the night, a blister was applied to the nape of the neck, which has not yet risen. He slept at intervals and still inclines to dose. Countenance improves. Tongue dry in the centre, moist at the edges. Pain of legs only complaint. Bowels slow. Pulse 80, soft.

Capiat magnesiæ sulphatis, ʒj. in aquæ puræ, ʒiij.

Omittr. pulveres Jacobi.

Vespere. Rigors, with heat of skin, towards the evening. Bowels have been freely opened. Is thirsty; has a strong

desire to sleep, but is restless in bed. Headach relieved, but he complains of irritation from blister sore, and of slight strangury.

Rept. pulv. Jacobi.

Sept. 7th. Slept at intervals during the night. In consequence of nausea, with epigastric uneasiness, a blister was applied to the epigastrium in the morning. Complains of pain of the back part of the head. No oppression of eyes. Countenance improves. Is troubled with occasional spasms of the lower extremities. Pulse 80, soft and regular. Bowels opened several times. Stools dark and watery. Has a desire for food, and has taken a little tea with relish.

Capiat maranta arundinacea pro re natâ.

Omittr. pulveres.

Sept. 9th. Did not sleep well, not owing to any local pain, but to a feeling of general uneasiness. Is oppressed. Countenance pale. Tongue cleaning. Pulse soft, regular. Bowels open.

Continr. maranta arundinacea, cum vino.

Sept. 10th. Very slight fever; was somewhat incoherent on one or two occasions during the night, but that symptom has completely disappeared. Has no complaint of pain, and has taken his arrow-root with relish. Bowels opened once this morning. Pulse soft, regular, 84. Slight yellowness of conjunctiva.

Rept. maranta arundinacea.

Sept 11th. Had a dose of muriate of morphia last night, after which he slept well. Skin dry. Bowels opened this morning. Pulse 90, soft, regular. Tongue dry in the centre, moist round the edges.

Capiat pulv. Jacobi veri, gr. iv. omni secundâ horâ.

Habeat jusculum gallinæ.

Sept. 12th. There was a very slight febrile exacerbation yesterday, attended by low delirium, small sharp pulse. Wine was given at short intervals with marked benefit. To-day he is somnolent. Skin is cool. Has no complaint of pain. Urine copious, and high coloured. Pulse small. Conjunctiva tinged yellow.

Continr. jusculum et vinum.

Sept. 13th. Occasional incoherence during the course of yesterday, with somnolency. Countenance pale and languid. Pulse irregular.

Continr. eadem.

Sept. 14th. The pulse, which had been low during the day, sunk considerably last night. Ammonia and wine were freely given. Frictions and hot applications to the stomach and feet were also resorted to, which had the effect of rallying him. He slept towards the morning. Skin is now moist. Tongue dry, parched in the centre. Pulse small.

Repr. ammonia et vinum.

Sept. 15th. Continued in a low quiet state during the whole of yesterday. He makes no complaint, but labours under great depression. Is more feeble than he was yesterday. Tongue moist. Pulse small.

Continr. vinum et ammonia.

Sept. 16th. Rallied for a little yesterday afternoon, after repeated doses of wine and ammonia, aided by friction over the surface of the body, and warm applications to the feet. Pulse 110, small. Tongue loaded, moist. Countenance pale. Bowels opened this morning.

Repr. eadem.

Sept. 17th. Has been gradually sinking since yesterday morning. Countenance cadaverous. Pulse irregular; low delirium.

Continr. omnia.

4 P.M. Expired at the confluence of Niger and Tchadda.

CASE IV. *At Iddah, River Niger.*

Sept. 5th, 1841. John Burgess, Seaman, anno ætatis 24, of a plethoric habit, temperament sanguineous. Complains of headach, with which he has been troubled for the last day or two. Pulse small, frequent. Skin hot. Bowels opened yesterday. Tongue foul in the centre, clean and indented round the edges, and tremulous when thrust out of the mouth.

States that the headach came on when he was employed in the hold two days since, but, thinking that he would soon get rid of it, did not complain until now.

Abradatur capillitium.

R. Calomelanos, gr. iij.

Opii in pulvere, gr. $\frac{1}{6}$, omni horâ.

Aqua hordei pro re natâ.

Lotio frigida capiti.

Sept. 6th. Pain of head much relieved, but there is still slight vertigo on rising. Complains of a sense of heaviness and oppression. Countenance flushed. Skin moist. Pulse 90, soft, regular. Tongue foul, indented at the edges.

Emplast. lyttæ nuchæ.

Continr. calomel et opium.

Sept. 6th. Vespere. Has been troubled with uneasiness at the pit of the stomach, and slight vomiting. Experienced a febrile accession in the afternoon, preceded by shivering. Pulse soft. Ptyalism has been produced. Tongue moist. Bowels open.

Applicr. cataplasma sinapeos epigastrio.

Omittr. calomel et opium.

Sept. 7th. The epigastric uneasiness was relieved by the sinapism, but returned towards the morning, and again disappeared after taking some arrow-root. Odour of skin offensive and peculiar.

Slept indifferently. Countenance now rather flushed. Skin dry and hot. Vertigo on raising the head from the pillow, but there is no actual pain of the head. A full inspiration is made with ease. Pulse 90, full, soft, easily compressible. Bowels open during the night. Stools watery. Tongue white in the centre, moist round the edges.

Repr. calomel et opium.

Sept. 8th. Passed a good night. No increase of febrile action since last report. Tongue foul, moist. Pulse 80, soft and regular. Bowels freely opened. Has taken some arrow-root with relish. Six pills have been swallowed. Skin moist, moderately warm.

Continr. pil. calomelanos et opii.

Sept. 9th. Fever, in a low form, returned this morning at three o'clock. He has been troubled with vomiting, and has been occasionally incoherent. Countenance confused. Eyes languid. Perspires on the upper part of the body. No complaint, except of slight headach. Tongue moist. Pulse 100, small. Mercurial fetor of mouth.

Emplastrum lyttæ nuchæ etiam epigastrio, et nisi alvus plene soluta fuerit post horas duas, injicr. statim enema emolliens.

Horâ decubitus capiat solutionis morphiæ muriatis, gtts. xxx. in aquæ puræ, ℥ss.

Omittr. pil. calomelanos, &c.

Sept. 10th. Had a restless night, in consequence of irritation from blisters. Skin cool. Pulse 90, soft. Urine copious, easily coagulable. Has no pain, except from strangury. Tongue cleaning. Expresses a desire for food. Bowels opened by enema.

Hab. juscul. gallinæ pauxillum.

Sept. 11th. Slept well: experienced a feeble exacerba-

tion of fever this morning, unaccompanied by shivering or pain. Bowels open. Tongue moist. Skin rather dry.

Capiat pulveris Jacobi veri, gr. iij. quâque secundâ horâ.

Sept. 12th. Is quite rational and free from pain. Has had no return of fever. Slept well. Debility only complaint. Pulse 90, small, regular. Skin and tongue moist. Countenance rather pale.

Continr. maranta arundinacea cum vino.

Capiat mist. camph. cochleare magnum omni horâ.

Sept. 13th. Slept badly. Is quite coherent. Voice tremulous. Skin slightly tinged yellow. Tongue foul, moist, and indented at the edges. Bowels opened yesterday. Pulse irregular.

Continr. camphora et vinum.

Sept. 14th. Rested very indifferently during the night. The surface became generally cold about one in the morning, but the heat was restored by warm applications to the abdomen and feet. The incoherence returned. The pulse became low and irregular; wine and other stimuli were given without producing reaction, and he gradually sank. At 6.30 A.M. he expired.

Sectio Cadaveris.

The examination of the body was conducted on shore, at the confluence; but we were obliged to hurry over the latter part of it, as some of the natives from the neighbouring village began to look into the tent.

The exterior of the body was plump, limbs well developed, the countenance shrunk. The features were not otherwise altered.

An incision was made from the chin to the symphysis pubis. The thorax and abdomen were laid open at the same time. The peritoneum was not altered further than a yellow tinge imparted to the omentum; and there was

general congestion in the portal system. Considerable arborescence over the exterior of the stomach. On opening it, four ounces of yellow-greenish bile were found. The mucous coat generally was softened, and there were several dark livid patches, more especially near the pyloric orifice, where they were arranged in parallel streaks. Liver of a pale gray colour; and little blood appeared in cutting it into slices. Gall-bladder distended with bile, of the colour and consistence of tar. Spleen large, soft, and congested. Several livid spots were seen in the duodenum, as also in the lower portion of the ileum. Peyer's glands were enlarged. The kidneys and urinary bladder were natural.

Lungs crepitous. Heart flabby, with masses of coagulable lymph occupying the cavities. Valves sound.

Dura mater sound. Ramollissement observed only in the corpus callosum. There was a small quantity of serum in the base of the brain, and an unusual proportion of fluid in the ventricles. No subarachnoid effusion.

CASE V. *At Iddah, River Niger.*

Sept. 6th, 1841. James Worwood, Quarter-master, anno ætatis 28, of a robust habit of body, temperament sanguineous, states that for the last four or five days he has had an attack of intermittent once during every forty-eight hours; and that he was so well during the intervals that he did not think of complaining until now. He further states, that he suffered from tertian ague, for two years, when he was about twelve years of age, at which time, he was employed in a barge on the river Thames. Greenhithe, in Kent, was then his usual place of residence.

Capiat quinae disulphatis grana. decem bis in die.

Sept. 8th. The period of the paroxysm, 11 A.M. has been

anticipated by the quinine. No complaint, except of slight headach.

Capiat pilulas purgantes, ij.

Sept. 10th. Had a rigor of more than usual severity last night, the approach of which he felt at noon. He now perspires gently. Slight headach, with a sense of debility at the pit of the stomach. Bowels opened. Tongue white. Skin cool. Pulse 80, soft.

Continr. quinae disulphas.

Sept. 18th. Paroxysms at least every alternate day, increasing in duration, of a lower type, and merging into the form of remittent. He was therefore discharged to H.M.S. Soudan, at the confluence, for a passage out of the river. This man recovered shortly after leaving the river, and rejoined the Albert in October, at Fernando Po.

CASE VI. *At Iddah, River Niger.*

Sept. 7th, 1841. James Sims, private Marine, anno ætatis 26, complains of headach, with intolerance of light, and heat of skin. These symptoms were preceded, in the forenoon, by a sense of heat and uneasiness in the epigastrium. Countenance anxious. Tongue foul, moist. Has vomited occasionally.

Abradatur capillitium.

Applicr. lotio frigida capiti.

R. Pulveris jalapæ ℥j.

Potassæ supertart. ℥ij. calomel. gr. vj.

Fiat mistura statim sumenda.

Sept. 8th. Slept at intervals during the night. Had again an attack of headach with general fever during the early part of this morning, which are now subsiding. Complains of thoracic pain, increased by a full inspiration. Bowels have been freely opened. Pulse 90, small, regular. Res-

piratory murmur clear, and distinctly heard all over the chest.

Admovr. emplast. lyttæ thoraci.

Sept. 10th. The fever remitted yesterday forenoon, but again came on in the afternoon, followed by uneasiness of the chest and cough. The latter symptom has yielded to ipecacuan and henbane combined; was restless in the night, but slept during the latter part of the morning. Has no complaint of pain, skin cool. Pulse 84, somewhat firm. Bowels opened during the night. Tongue dry in the centre, moist round the edges. Skin moist.

Continr. pil. hyosciami et ipecacuanhæ.

Capt. marantæ arundinaciæ pauxillum.

Sept. 12th. The fever continued throughout a great part of yesterday, and towards the evening there was an exacerbation, followed by symptoms of sinking with incoherence. Wine was freely given with decided benefit. Continues in a somnolent state. Countenance pale. Skin cool, rather dry. Pulse 84, small. Tongue brown and parched.

Continr. vinum pro re natâ.

Sept. 14th. Suffered from an increase of symptoms on the evening of the 12th, and also yesterday evening. On both occasions he was much troubled with spasms of the legs. Rested badly during the night, but had no pain. Moans incessantly. Pulse 90, small, soft. Tongue moist, clean. Slight yellowness of skin. Bowels open.

Continr. vinum.

Habt. jusculum gallinæ pro re natâ.

Sept. 15th, 16th. Slight febrile accession on the evening of the 15th, and in consequence he slept badly; was quiet during the day on the 16th, with general diaphoresis over the body. Tongue still cleaning. Pulse regular, soft.

Continr. vinum et jusculum gallinæ.

Sept. 17th. Return of fever during the night, and there is still slight headach. Countenance improves. Tongue cleaning. Bowels open. Pulse regular, small.

Continr. eadem.

Sept. 18th. Improves; but as he is likely to be for some time longer unwell, and consequently unserviceable to the expedition, he was this day discharged to the Soudan for a passage out of the river.

This man improved rapidly when the Soudan left the river, and rejoined the Albert at Fernando Po in October. He was, however, occasionally troubled with intermittent several months afterwards.

CASE VII. *Iddah, River Niger.*

Sept. 7th. Henry Gibson, private Marine, anno ætatis 22, of a slight make, and has sometimes complained of his chest. Was attacked last night with epigastric uneasiness, attended with giddiness and general listlessness. A purgative was then given, which has acted well. Tongue is now white, moist. Pulse 82, regular.

Quiescat.

Sept. 8th. No complaint. Pulse small. Seems indifferent about everything, and answers questions in monosyllables. Skin moist. Tongue tremulous. Eyes wild. Bowels reported slow.

Capiat pilulas purgantes ij.

Abradatur capillitium.

Sept. 10th. Bowels opened by the pills. Continued in the same indifferent state during yesterday, and says he is quite well. Pulse small. Countenance languid.

Sept. 22d. Up to this period he has been considered convalescent. In the morning, however, he had rigors,

followed by general fever and headach. Skin hot. Pulse small, frequent. Bowels slow.

℞ Pulv. jalapæ, ʒj.

Potassæ super tart. ʒij. M. ft.

Pulvis statim sumendus.

Sept. 23d. Improves.

Habt. jusculum gallin. pro prandio.

Sept. 27th. Fever in a low form, returned in the course of the night; symptoms are now subsiding.

Continr. jusculum.

Capiat quinæ disulph. gr. viij. bis in die.

Oct. 4th. Has had occasional returns of low febrile action since last report, but the accessions are less intense and shorter than before the exhibition of the quinine. Pulse small. Complains of debility.

Rept. quinæ disulphas etiam jusculum gallinæ.

Oct. 5th. Rested badly during the night, having an exacerbation of fever, which has not yet abated. Tongue foul. Bowels regular.

Admovr. emplast. lyttæ nuchæ.

Omittr. quinæ disulphas.

Oct. 7th. Blister rose well, and he remained quiet and easy during the whole of yesterday. Headach, however, returned towards the evening. He was restless and occasionally incoherent towards the morning. Tongue foul. Bowels open.

Capiat pulv. Jacobi veri, gr. iv. Omni secundâ horâ.

Oct. 9th. Diaphoresis, with general abatement of symptoms, followed the exhibition of the James's powder, and yesterday evening there was a decided improvement. Last night, however, he has not slept well. The countenance

is anxious; there is no complaint of pain, but muscular tremors are general over the body.

R Camphoræ, ʒj.

Opii, gr. iij. M. bene et divide in pil. vi.
quarum capiat æger unam omni secundâ
horâ.

Oct. 12th. The muscular tremors subsided on the 10th, and he has been again quiet and quite easy, having no complaint but of debility.

Repr. quinae disulph.

Oct. 14th. Has been quite easy, but was occasionally incoherent during the early part of the morning. Bowels have been opened. There are yellowness of skin and great debility. Pulse small, irregular.

Capt. vinum album pro re natâ.

Repr. camphora et opium.

Oct. 16th. Incoherence and restlessness continue. Evinces great disinclination to take wine or medicine. Slight febrile blush of countenance. Pulse small. Tongue loaded, moist.

Admovr. emplastra lyttæ pone auris.

Oct. 17th. Blisters rose well. Symptoms improve. Bowels freely opened during the night. Countenance still anxious. Says he is much better; and he is much more coherent. Pulse small, more regular.

Continr. jusculum et vinum.

Oct. 27th. Gradually getting stronger; although he has had occasional returns of fever, his appetite improves; but the debility is still very great.

Continr. vinum, jusculum, et quinae disulphas gr. x.
bis in die.

Nov. 10th. Has been troubled with intermittent, which prevents his gaining strength. It has assumed the tertian form.

Continr. quinae disulph. cum gentianæ infuso bis in die.

Nov. 30th. Intermittent gradually abating. He continues, however, very weak, and has no inclination to move about. Pulse small.

Continr. eadem.

Dec. 6th. Has been troubled for some days with a diarrhœa. He looks thin and emaciated.

Continr. omnia.

Jan. 29th, 1842. Continues weak, and has had two or three dysenteric attacks; he is therefore discharged to the hospital at Ascension.

This young man rallied considerably after he had been in the hospital about six weeks. Unfortunately symptoms of abdominal dropsy appeared during the month of May, for which he was once tapped. Dysentery supervened early in June, and soon proved fatal. The following is the report of the *post-mortem* examination, in which I assisted Mr. Robert Fairservis, the surgeon of the hospital:

The exterior of the body presented extreme emaciation. Tension of the abdominal parietes, with distinct fluctuation perceptible on handling.

An incision was made, extending from the chin to the symphysis pubis. Eight pints of straw-coloured fluid escaped on the peritoneal sac being opened. In this fluid large flakes of coagulable lymph were found floating, and bands of the same product were adhering to the inner surface of the membrane itself. Adhesion had taken place at various points.

The stomach contained a quantity of fluid tinged with bile. Mucous tunic softened, livid. *Duodenum* livid and ulcerated in one point. Brunner's glands not altered.

Ileum. The lower, foot and a half reddened, tunic soft, small ulcerated patches increasing near the caput cæci. Peyer's agminated glands enlarged. Mesenteric glands indurated and enlarged.

The colon, particularly the arch, exhibited several ulce-

rated masses, with rough and elevated edges. This appearance was less marked near the sigmoid flexure, but again increased at the upper part of the rectum.

The liver was shrivelled, hardened, and covered with deposits of lymph, and on slicing it only slight bloody oozing followed. Spleen enlarged, soft. Pancreas small and shrivelled.

Chest. Extensive adhesions between the pulmonary and costal pleuræ of both sides. Slight effusion in both sacs of the pleuræ. Lungs tubercular. The small masses in the upper part of the right side were passing into the condition of softening. The lower parts of both lobes were hepatized.

Heart was small, flabby. Valves sound. No other unusual appearance in the chest.

CASE VIII. *On the passage from Iddah to the Confluence of the Niger and Tchadda.*

Sept. 8th, 1841. William Merriman, Gunner, anno ætatis 32. Complained yesterday of general coldness and a creeping sensation over the body. Rested indifferently during the night. Bowels have been opened by a gentle dose of medicine. He now has slight headach. Skin moist. Pulse 80, soft.

Capiat pulv. Jacobi veri, gr. iv. omni secundâ horâ.

Sept. 14th. Diaphoresis, followed by a remission of all the symptoms, followed the exhibition of the James's powder; and for the last three days he has felt quite well until now; he is restless and uneasy. Complains of thirst. Countenance anxious.

Capiat quinquæ sulph. gr. x. bis in die.

Sept. 25th. After having been quite free from fever since the 16th, he experienced a relapse of fever last night.

His countenance is languid and heavy, and he is indifferent in his manner, and has no local pain. Pulse 80, soft, regular. Bowels slow.

R Pulveris jalapæ comp. ʒj.

Calomelanos, gr. vj. M.

Ft. pulvis statim sumendus.

Sept. 26th. Bowels have been freely opened; stools reported of dark colour. Has a feeling of general soreness, but there is no local pain. Passed an indifferent night. Complains of coldness along the spine. Pulse 80, regular, small. Skin cool.

Sept. 27th. Headach having come on about midday yesterday, a blister was applied to the nape of the neck, which has risen well with relief to pain. A purgative was given, which has acted freely. Pain supervened upon the cold sensation along the spine. The abdominal uneasiness also increased, but gave way to the application of a sinapism. Has a feeling of general exhaustion, but is comparatively easy. Skin moist, cool. Pulse 66, of good volume, regular. Conjunctiva jaundiced. Tongue foul, indented round the edges. Is inclined to sleep.

Capiat marant. arund. pro re natâ.

Sept. 28th. Was troubled with frightful dreams, and slight return of the headach and spinal pain during the night. Complains of slight pain in the region of the kidneys. Urine copious, high coloured. Conjunctiva yellow. Skin dry. Tongue foul, moist. Pulse 90, full, soft. Bowels slow.

Capiat olei ricini, ʒvj.

Continr. maranta arundinacea.

Sept. 29th. Bowels were freely opened by the castor oil. He slept a good deal yesterday, but rested only indifferently during the night. Headach and spinal pain abated.

Pulse 80, soft. Tongue foul, moist. Skin and conjunctiva continue yellow. Is very weak. Skin dry.

R Pulveris Jacobi veri, gr. iij.

Quinæ disulphatis, gr. vj. M. Ft. pulvis sumendus ter in die.

Habt. jusculum gallinæ pro re natâ.

Hora decima, p. m. Capiat solutionis morphiæ muriatis, gtts. xxx. in aquæ menthæ, ℥j.

Sept. 30th. Gentle diaphoresis and general relief to symptoms produced by the medicine. A calm placid sleep followed the exhibition of the morphia. Skin moderately warm. Pulse 100, small, soft. Tongue still loaded.

Repr. quinæ disulph. &c.

Oct. 1st. In consequence of a return of headach during the night, a blister was applied behind each ear with good effect. To-day is less weak, and a gentle moisture is kept on the surface by the powders. Bowels open. Conjunctiva still yellow. Pulse 80, small. Tongue foul, moist.

Continr. quina, &c.

Capiat jusculum gallinæ pro prandio.

Oct. 2d. No fever since last report, but did not sleep well, possibly owing to the morphia having been omitted. Debility only complaint. Bowels regular. Tongue cleaning.

Continr. omnia.

Oct. 3d. Slept well, after having taken a dose of morphia last night. Has taken breakfast with relish. There is a gentle diaphoresis. Has no local pain, but is weak and giddy on attempting to rise. Pulse 80, regular. Tongue cleaning.

Omittr. pulvis Jacobi veri.

Capiat quinæ disulphatis, gr. viii. bis in die.

Oct. 23d. Continued improving slowly until to-day, when he complains of pain stretching from the right to the

left hypochondriac region. Countenance oppressed, yellow. Bowels rather slow.

R. Calomelanos, gr. iij.

Opii, gr. $\frac{1}{6}$ M. fiat pilula omni secundâ horâ sumenda.

Admovr. cucurbitulæ cruentæ lateri dolenti.

Oct. 24th. Slept well. Slight cough, with expectoration. Pain of sides a good deal relieved by cupping. Bowels open. Urine very copious, high coloured, and depositing much sediment. Tongue furred. Pulse 80, small.

Repr. calomel et opium.

Oct. 25th. Does not feel so well to-day, having passed a bad night. Complains of pain of both shoulders, and of headach. *Odour of the skin is strong and peculiar.* Countenance sallow and oppressed. Slight mercurial fetor of mouth.

Continr. calomel et opium.

Oct. 26th. Became restless, and was occasionally incoherent during last night. Complains of general soreness. The mercury has been discontinued on account of ptyalism having been produced. Bowels rather confined. Tongue covered with a brown fur, and rather dry. Pulse 108, weak. Skin moist.

Injiciatur statim enema domesticum.

Oct. 27th. The ptyalism is rather profuse, but there is a decided improvement in the symptoms. Complains of weakness. Bowels twice freely opened after the administration of the enema. Tongue foul.

Oct. 28th. Seems better. Has no local pain. Countenance sallow. Conjunctiva also deeply tinged. Mouth still tender, but improves under the use of the alum gargle. Bowels confined. Tongue coated, moist. Pulse 110, weak.

Repr. enema domesticum.

Habt. jusculum gallinæ pro re natâ.

Capiat vini albi $\bar{3}$ j. bis in die.

Nov. 4th. Ptyalism disappearing. Has been annoyed by general pain, which attacked him last night about ten P.M. Complains again of a dull pain of the right hypochondrium, stretching upwards between the scapulæ. Great depression of spirits. Bowels slow. Tongue furred. Pulse 96, very feeble.

Rept. enema. Continr. vinum.

Nov. 8th. Bowels were opened after the enema was given, but considerable exhaustion followed, requiring the exhibition of brandy and water, with camphor and ammonia, which relieved him. He has gained a little strength within the last day or two. Countenance still sallow. Pulse 100, small. Bowels opened this morning by castor oil. Appetite improves.

Capiat acidi nitrici, gtts. vj. in aquæ puræ cyathoter in die.

Nov. 11th. Complains of uneasiness of abdomen, which is distended; but there is no evidence of the presence of a fluid. Bowels slow. Urine copious. Tongue dry, brownish. Has vomited a quantity of bile.

Reptr. enema domesticum.

Continr. omnia.

Nov. 22d. Continued to progress very slowly, and as there was little probability of any amelioration as to the state of his health taking place in this climate, he was this day sent on board of the Warree schooner, for a passage to England under the care of Dr. Stanger.

This man ultimately got well, and is now serving as a gunner on board one of Her Majesty's ships.

Had there been an opportunity to send him out of the river after the first relapse, he would not in all probability have experienced any more return of the fever; or, at all events, the type of the relapses would have been less virulent, and would have assumed at an earlier period the form of ague.

CASE IX. *On passage from Iddah to the Confluence of the Niger and Tchadda.*

Sept. 9th. William Moffatt, anno ætatis 27, Sapper; was received from the Amelia tender, with general symptoms of the prevailing fever. He states that he has been overwhelmed by a feeling of general oppression for the last twenty-four hours. Complains now of nausea, and of very slight headach. Had some uneasiness of the abdomen during the night, which has however disappeared. Pulse 100, small. Bowels slow.

R. Calomelanos, ʒj.

Opii, gr. iij. fiant pil. x. quarum capiat æger, i. omni tertiâ horâ.

Sept. 10th. Slept well. Bowels not yet opened. Has no complaint of any kind. Pulse 72, regular, soft.

Continr. pil.

Capiat magnesiæ sulphatis, ʒvj. in aquæ, ʒiv.

Sept. 11th. Bowels have been opened during the night, and he slept indifferently. Slight rigors towards the morning. Skin dry, yellow. Pulse 100, small. Tongue loaded. No pain. Vertigo on rising from the pillow.

Omittr. pil. calomel. et opii.

Capiat pulv. Jacobi veri, gr. iv. omni secundâ horâ.

Sept. 12th. Has been restless during the night. No complaint of pain. Countenance yellow. Extreme indifference to everything. Pulse 88, of moderate strength. Tongue foul and tremulous. Skin again dry.

Repr. pulv. Jacobi.

Capiat jusculum gallinæ pro re natâ.

Sept. 13th. Countenance improves. Skin moist, cool. Slept well. Tongue cleaning, still tremulous. Pulse regular, small. Bowels open.

Omittr. pulvis Jacobi.

Continr. jusculum gallinæ et maranta arundinacea.

Sept. 15th, 16th. Does not sleep well, but makes no complaint. Is extremely indifferent; and evinces a disinclination to take anything. Countenance placid and natural. Skin yellow. Tongue cleaning.

Continr. omnia. Hora decima.

P. M. Capiat haust. morphiæ muriatis, gtts. xxx. in aquæ menthæ, ℥j.

On the 18th he was discharged to Soudan. He continued free from pain; but was described by Mr. Loney, the assistant-surgeon of the Dolphin, as in a sinking condition when he was received on board that vessel, at the mouth of the river. He sunk gradually, and expired at sea, on the 26th September.

CASE X. *At the Confluence of the Niger and Tchadda.*

John Langley, First Engineer, anno ætatis 36, of a full habit of body, temperament phlegmatic. Has never been in a warm climate before.

Sept. 20th. Has been unwell for a day or two, having had occasional headaches, and a sensation of cold over the body, with flushings of the face. His tongue is foul and tremulous; thirst urgent. Pulse small, frequent.

Abradatur capillitium.

R. Calomel. gr. iij.

Opii, gr. $\frac{1}{6}$. M. Ft. pilula omni secundâ horâ sumendâ.

Sept. 21st. Although he slept indifferently, he feels much relieved this morning; headach and the other disagreeable symptoms having disappeared. Skin moist. Tongue foul, but moist. Pulse 90, soft. Bowels slow.

Capiat pilulas purgantes duas, et nisi alvus plene soluta fuerit, post horas quatuor magnesiæ sulphatis, ℥j.

Sept. 22d. Bowels have been freely opened, and, in consequence, his rest was interrupted. The countenance is more anxious and flushed. Pulse excited. Tongue the same.

Repr. calomel et opium.

Sept. 24th. Fever remitted, after lasting twelve hours; and ptyalism was produced yesterday afternoon: the mercury was therefore omitted. He did not sleep well last night, by reason of a return of headach, which however was relieved in the morning by a dose of opening medicine. Pulse 80, soft. Conjunctiva yellow. Stools dark. Urine of a high colour. Skin moist. Tongue foul, moist, and indented at the edges.

Jusculum gallinæ pro re natâ.

Sept. 27th, 28th. No return of fever since last report; but he is extremely pale and weak. Pulse and skin natural. Bowels regular. Tongue cleaning. Has a strong desire for a glass of beer.

Hab. cerevisiæ, Hss.

Oct. 2d. Complains of vertigo, with oppression about the forehead and pain of the eyes. Tongue foul. Skin dry. Bowels slow.

Capiat pilulas purgantes, ij.

Omittr. cerevisia.

Oct. 3d. Bowels only once opened. Slight accession of fever during the night. Complains of headach. Skin moist. Pulse 80, moderately firm. Tongue moist, cleaning

Admovr. emplastrum lyttæ pone auris.

Capiat magnes. sulph. ʒj.

Oct. 5th. Bowels were opened by the salts, and yesterday forenoon was passed in comparative comfort, after the blisters were dressed. The fever, however, returned towards the afternoon, and subsided early this morning.

No symptom remains, except a confused feeling of the head, without pain.

Admovr. emplast. lyttæ nuchæ.

Oct. 7th. Blister rose well, and the oppressive feeling in the head was thereby removed. Countenance improves. He has no complaint of pain, but sleeps badly. Skin moist. Tongue cleaning.

Horâ decimâ, P.M., capiat sol. morphiæ muriatis, gtt. xxx. in aquæ puræ, ʒj.

Oct. 9th. He was much excited by an accident that happened yesterday. He, however, passed a good night, after taking a dose of morphia. Urine copious, of a high colour. Tongue cleaning.

Hab. jusculum gallinæ pro prandio, et vini albi, ʒj. bis in die.

Oct. 18th. Continued gradually to improve, but was somewhat excited on leaving the ship this morning. He sleeps indifferently, and the skin is dry. Tongue foul.

R. Calomel. gr. iij.

Pulv. Jacobi veri, gr. iv. M. ft. pulvis quâque tertiâ horâ sumendus.

Oct. 20th. Diaphoresis general over the body. Complains now only of weakness. Stomach was irritable during the night, but was stayed by the application of a sinapism.

Oct. 24th. Sleeps well, and improves generally. He complains of pain in voiding the urine, which is copious. Appetite good. Tongue cleaning. Bowels slow.

Magnes. sulph. ʒj.

Capiat quinae disulphatis, gr. x. bis Indies.

Nov. 30th. Throughout the month he has been slowly progressing in convalescence, but has occasional attacks of ague.

Continr. quina.

Dec. 5th. Discharged to duty.

Mr. Langley was for many months afterwards afflicted with ague, especially during the early age of the moon. He is now first engineer in H.M. S. Thunderbolt.

CASE XI. *At the Confluence of the Niger and Tchadda.*

Sept. 21st. Daniel Carlton, Sapper, anno ætatis 34, well formed, temperament leuco-phlegmatic. Has always up to this period enjoyed good health.

While dressing for divisions yesterday, was seized with pain of head and limbs, and general prostration. He had a purgative, which has acted freely. He slept badly by reason of headach. This morning his countenance is dejected. Tongue foul, moist. Skin moist, hot. Has vomited bile.

R. Calomelanos, gr. iij.

Quinæ disulph. gr. iv. quatër in die.

Sept. 22d. Passed a restless night, in consequence of headach, heat of skin, and dyspnœa. At present there are general febrile symptoms, without local pain. Bowels open.

R. Calomelanos, gr. viij.

Quinæ disulph. gr. vj. M. statim sumend.

Sept. 23d. Rested indifferently, not from any particular pain, but from general uneasiness. Headach returned late in the morning. Pulse 80, small, soft. Tongue white, tremulous. Bowels freely opened.

R. Pulveris Jacobi veri, gr. iv.

Calomelanos, gr. ij. M. ft. pulvis sumend. omni secundâ horâ.

Capiat morphiæ muriatis solutionis, gtts. xxx. H. S.

Sept. 25th. Was quiet and easy during the greater part of yesterday. No return of dyspnœa. Slight fever in the evening. Had a dose of morphia last night, and rested well after it. Tongue cleaning. Skin moist and cool. Pulse 74, regular.

R. Pulv. Jacobi veri, gr. iv.

Quinæ disulphatis, gr. vj. M. ft. pulvis sumend.
omni quartâ horâ.

Sept. 26th. Experienced an exacerbation of fever towards last evening, followed by headach, which is however now abating. Bowels slow. Tongue foul, indented at the edges.

Continr. pulveres.

Sept. 27th. Remission of febrile action followed early in the forenoon of yesterday. Countenance improves. Skin moist, yellow. No complaint but of debility.

Omittr. pulvis Jacobi veri.

Continr. quinæ disulphas.

Jusculum gallinæ pro prandio.

Sept. 28th. No return of fever since last report. Has had refreshing sleep at intervals. Countenance improves, as also the state of the tongue. Bowels have been opened. Pulse 72, soft and regular. Skin cool and moist. Some scalding in making water.

Capiat nitratis potassæ, ℥j. in aquæ cyatho parvulo
ter in die.

Oct. 6th. After an absence of a week, the fever again returned slightly yesterday; the paroxysm was however only of slight duration, and to-day all the symptoms have disappeared.

Omittr. vinum.

Oct. 7th. Headach came on early this morning. Slept badly, and in consequence he feels to-day a good deal exhausted. Pulse very feeble. Tongue loaded. Bowels rather slow.

Oct. 9th. During the whole of yesterday he was free from complaint of any kind, except debility. An accession of fever is just coming on, attended by headach, and considerable heat and dryness of the skin. Bowels slow.

Capiat calomelanos, gr. viij. et postea infus. sennæ cum magnesiæ sulphate donec alvus plene respondt.

Continr. quina.

Oct. 12th. Bowels copiously moved. No return of fever, but complains of want of sleep and great debility. Tongue moist, cleaning.

Continr. quina.

Capiat cerevisiæ, Hj. in die et H. S. morphiæ muriatis solutionis gtts. xxx. in aquæ, ʒj.

During the latter part of October and the whole of November, he continued slowly to gain strength, under quinine, wine, and beer, with fresh food. During December he was much troubled with intermittent, which however disappeared towards the beginning of the year 1842.

CASE XII. *On the passage from the Confluence of the Niger and Tchadda to Egga, in the Nufi Country.*

Sept. 23d, 1841. Mr. W. H. W——, Clerk, anno ætatis 19, of a slight form, and nervous temperament. Felt the approach of fever yesterday, denoted by languor, slight headach, occasional chills, and desire to expose himself to the sun. To-day there are heat of skin, eyes suffused, tongue foul, tremulous. Bowels have been freely moved by a laxative given last night.

R. Quinæ disulphatis, gr. iv.

Pulv. Jacobi veri, gr. iij. M. ft. pulvis sumend. quâque tertiâ horâ.

Abradatur capillitium.

Emplast. lyttæ nuchæ.

Sept. 24th. Headach relieved by blister. Skin moist. There is still considerable febrile action. Is restless. Tongue moist. Pulse regular, soft.

Repr. pulveres.

Sept. 25th. The fever abated about mid-day yesterday, but returned early this morning. He slept at short intervals, and was much disturbed by dreams; awaking in a chilly state. Pulse soft. Bowels slow.

Repr. pulveres.

Sept. 26th. Bowels opened. Was talking in his sleep. There is considerable heat of skin. Tongue foul. Complains of vertigo and indistinct vision. Pulse small, feeble.

Applic. lotio frigida capiti.

Repr. pulv. Jacobi cum quina.

H. S. capiat morph. muriatis sol. gtts. xxx. in aquæ, ʒj.

Sept. 27th. Slept well during the night. Skin cool, moist. No pain of head, but he is giddy on attempting to rise. Pulse 80, small, soft.

Repr. morphia.

Omittr. pulv.

Oct. 3d. Only slight return of febrile action for three days, and for the last forty-eight hours there was a complete intermission. Last night, however, he was suddenly struck, as if by an electric shock, with tremors, followed by vertigo; and he was occasionally talking during sleep. Complains of weakness. Bowels slow.

Capiat pilulas purgantes, ij.

Oct. 4th. Is quite coherent, and says he slept well during the night. To-day he has only slight headach. Tongue foul. Skin cool. Bowels well opened.

Repr. pulv. Jacobi et quinae.

Oct. 5th. During the night delirium came on most suddenly: a blister was applied to the nape of the neck,

which has risen, and he is now calm and soothed. There is considerable heat of skin, and the pulse is small and frequent.

Capiat misturæ salin. diaph. ʒj. omni horâ donec ciet diaphoresin.

Oct. 7th. Fever considerably abated. Skin moist. Was talking during sleep in the night; but he soon afterwards was quiet, having taken a dose of morphia.

Continr. mist. salin. ut antea.

Oct. 8th. Delirium returned yesterday afternoon. He persisted in reading aloud, and two nurses were in close attendance upon him. At twelve P. M. he cautiously opened the window of the cabin and jumped overboard. Two of the Africans followed him, and succeeded in saving him, although the current was strong and the night extremely dark. He was well rubbed and enveloped in warm flannels; an opiate was then given, and he fell into a calm and placid sleep. To-day he is somnolent, but is easily aroused.

Oct. 14th. Fever has quite left him, but he is very weak, and still occasionally incoherent. Bowels rather slow. Takes arrow-root and other nourishment.

Capiat magnesiæ sulphatis ʒj.

Oct. 20th. Is still very weak, and is occasionally incoherent; but he answers questions in general in a rational manner. A blister was applied to the head last night, and he has in consequence slight strangury this morning. Bowels open.

Capiat nitratis potassæ, ʒj. bis in die.

Oct. 23d. Return of delirium; no fever. Blister re-applied to the nape of the neck. He is now quite cool and calm. Bowels regular, pulse small.

R. Camphoræ, gr. iij.

Opii, gr. ss. sumend. ter in die.

Oct. 26th. Half a grain of the muriate of morphia has been given nightly, with a good effect. To-day he is restless and sometimes incoherent. Bowels open; tongue clean. Pulse 100, small and weak.

R. Infus. gentian. comp. Hj.

Quinæ disulphatis, ℥ij. M. Sumat cochleare magnum ter in die.

Capiat vinum et jusculum gallinæ pro re natâ.

Nov. 4th. Up to this period he continued quiet, but his strength gradually diminished. At 4 P.M. yesterday, his respirations were hurried, but neither percussion nor pressure on any part of the chest produced pain. In short, he declared himself quite easy, and that he only suffered from what he styled a "general botheration." During his mental aberrations he has always spoken of some previous misfortunes or unheard of disease. Bowels have been opened by a dose of castor oil. Tongue furred. Pulse frequent, small. Appetite indifferent for the last two days.

Nov. 5th. 3 A.M. On Mr. Thomson being called up this morning he found him labouring under difficult and short breathing. But he made no complaint except of pain from blister sores. Pulse weak.

3:30 P.M. Gradually sunk, and expired at this hour.

CASE XIII. *On the passage from the Confluence of the Niger and Tchadda to Egga.*

John M'Clintock, Stoker, anno ætatis 23. Complexion fair, temperament leucophlegmatic. Is well formed, and has in general enjoyed good health; has never before been in tropical climates.

Was yesterday affected with the usual symptoms of the prevailing fever, which he says remitted towards the evening, but have returned this morning with severity. He has now headach and pain of back; tongue foul, indented

at the edges. Has vomited a quantity of bile. Bowels slow. Eyes suffused; heat of skin with dyspnœa.

Totum corpus aquâ tepidâ cum aceto abluatur.

℞. Calomelanos, ℥j.

Opii, gr. iv. M. que divide in pilulas decem, quarum capiat æger unam quâque secundâ horâ.

Sept. 25th. Passed a good night. To-day there is a decided remission of the symptoms. Skin cool. Pulse regular. Tongue loaded. Bowels freely opened. No complaint, except of the back, which is weak in the lumbar region.

Affric. spina ungu. antim. tart.

Hab. marantæ arundinacæ pro re natâ paucillum.

Sept. 26th. Return of febrile action yesterday forenoon, which remitted towards the evening. Was troubled with vomiting during the day. Slept badly from general uneasiness. Has no headach, but is giddy on attempting to rise. Countenance anxious; tongue furred in the centre, moist round the edges. Is thirsty. There is slight mercurial fetor of mouth. Pulse 88. Skin cool. Bowels have been freely opened.

Capiat pulv. Jacobi veri, gr. iv. omni secundâ horâ.

Capiat nitratis potassæ, ℥ss. ter in die.

Sept. 27th. There was no remission of symptoms until yesterday at noon. Pulse 76, of good volume, and regular. Slept well during the night. Has no complaint of pain, and the vomiting has ceased. Skin cool and moist; tongue cleaning. Bowels opened this morning.

Affric. spina in toto cursu ungu. antim. tart.

Abradatur capillitium.

Sept. 28th. Return of rigors yesterday at 4 P.M., the effects of which continued until early in the morning. Slept at intervals; was slightly incoherent during the night.

Pulse 90. Skin clammy. Bowels opened this morning. Tongue cleaner. Vomiting has returned.

R. Pulv. Jacobi veri, gr. iv.

Quinæ disulph. gr. vj, M. ft. pulvis sumendus
ter in die.

Sept. 29th. Was troubled a good deal with nausea and retching yesterday. To-day he has no complaint, but feels languid and weak. Countenance however improves. Bowels slow. Skin moist, clammy. Pulse 72, soft and regular. Tongue loaded in the centre; moist.

Capiat olei ricini, ʒvj.

In aquæ menthæ, ʒj.

Continr. pulveres quinæ.

Sept. 30th. Experienced an accession of fever last night of short duration. Had a dose of the muriate of morphia at 10 P.M., which produced sleep. Has no pain except from the eruption along the spine, caused by the ointment of tartarized antimony. Is giddy on attempting to rise. Countenance still oppressed. Conjunctiva yellow. Profuse diaphoresis. Bowels opened last night. Tongue clean but rather dry. Pulse 78, soft and of uniform strength.

Continr. pulv. quinæ, &c.

Hab. marant. arund. pro re natâ.

Oct. 1st. Had no fever yesterday, but he was restless during the night. No complaint of pain; feels weak. Pulse 70, regular. Tongue foul, moist. Skin clammy. Bowels slow.

Capiat pilulas purgantes, ij.

Repr. maranta arundinacea.

Omittr. pulveres quinæ.

Oct. 6th. General improvement, although he still continues very weak, and takes only a little nourishment.

Oct. 7th. Was suddenly seized last night with a fit of vomiting, which exhausted him much. The feet and hands became quite cold, and the pulse was scarcely perceptible at the wrist or temples. Warm applications were put to the feet. Brandy with hot water was given, and he rallied in the course of the night. To-day there is slight fever.

Repr. pulveres quinae.

Oct. 18th. Is still very weak, but is upon the whole improving, and takes nourishment with relish. Functions of bowels and bladder regular. Urine very copious.

Continr. pulveres.

Oct. 24th. Complains much of debility. Has no local pain. Skin cool and moist. Fainted this morning on attempting to rise from his hammock. Bowels open. Tongue clean. Pulse 80, moderate.

Capiat cerevisiae, Hj. in die.

Continr. maranta arundinacea et jusculum gallinae.

Capiat quinae disulph. gr. x. bis in die.

Oct. 30th. Gets strength daily.

Continr. omnia.

Nov. 20th. Was advancing rapidly in convalescence, having been in the habit of taking a short daily walk; on the 18th he was sent on board of the ship from the hospital at Fernando Po, and on the evening of the 19th I was horrified to hear that he had met with his death in a scuffle.

CASE XIV. *On the passage from the Confluence to Egga.*

George Syme, Quarter-master, anno ætatis 40, of a stout make; sanguineo-bilious temperament. Has been some years on the coast of Africa, and has suffered there from fever.

Sept. 25th. First felt the approach of fever yesterday after a heavy shower of rain. To-day he has heat of skin, foul tongue, headach, and a sensation of cold along the spine. Pulse small, hard. Bowels slow.

Capiat magnesiæ sulphatis, ʒvj, repetendas si opus sit.

Sept. 26th. Febrile accession yesterday of only short duration. Complains of slight epigastric pains. Tongue loaded in the centre, moist round the edges. Is restless.

R. Tinct. opii, gttss. xxx.

Spts. ætheris nitrosi, ʒss.

Aquæ menthæ, ʒj. M. ft. haustus statim sumendus.

Sept. 27th. Did not sleep in consequence of an accession of fever, which lasted until the morning. Complains of headach and a sense of heaviness about the stomach. Skin dry. Pulse 96, soft and regular. Tongue loaded in the centre, moist, and indented at the edges. Bowels slow.

Applic. sinapisma epigastrio; postea capiat pilulas purgantes, ij.

Sept. 28th. Slept well during the night, and has had no return of fever since last report. Has no complaint but of debility. Gentle diaphoresis. Bowels freely opened. Pulse 74, soft and regular.

Sumat jusculum gallinæ pro re natâ.

Capiat quinae disulphatis, gr. viij. bis in die.

Sept. 29th. Was disturbed during the night by one of the patients near him, therefore he did not sleep well. Countenance improves. Has no complaint of pain, but he is weak and giddy on attempting to rise. Tongue cleaning. Pulse 72.

Continr. jusculum.

Rept. quina.

Sept. 30th. Experienced a return of fever yesterday early in the afternoon, which lasted only three hours. Slept well; no complaint. Pulse 80, soft, of good volume. Skin cool. Bowels open.

R. Pulv. Jacobi veri, gr. iv.

Calomelanos, gr. iij. M. ft. pulvis statim sumendus.

Oct. 1st. Fever returned last night, and lasted until the morning with considerable severity. To-day he has no complaint. Pulse regular. Skin cool.

Reptr. quinae disulphas.

Oct. 2d. Was suddenly seized yesterday with general tremors followed by great depression. He is still low, and the surface of the body, particularly towards the extremities, became cold. The natural heat was restored by friction and hot applications, and the administration of internal stimulants. The pulse is now gradually rising. Has been troubled with diarrhoea.

Reptr. marant. arund. cum vino.

11 A.M. The feet and hands have now become of a livid colour, which is extending upwards. No complaint but of diarrhoea. Pulse small, feeble. Countenance cadaverous.

Contr. vinum, &c.

4 P.M. Continued sinking, the lividity continuing to extend until this hour, when he expired; declaring to the last that he felt well.

Sectio Cadaveris.

The examination of the body was conducted by Dr. Stanger and myself. As we were at Egga, and afraid of offending the prejudices of the people, the operation was gone through rather hurriedly.

The exterior presented no unusual appearance, except of lividity over the extremities and part of the chest.

The thorax was opened in the usual manner. There were considerable old adhesions between the pulmonary and costal pleuræ of both sides. Portions of the depending parts of the right lobes were indurated.

Abdomen. There was a biliary tinge over the peritoneum and the surface of the intestinal canal. Liver gray-coloured, of the usual size, anemious. Gall-bladder filled with bile, of the colour and consistence of tar. Mucous lining of the stomach softened and abraded; livid patches surrounding the pyloric orifice; some of inferior size were dispersed over the great curvature. The duodenum exhibited the same lesion and one ulcerated point. Ileum presented a livid dark appearance, about a foot in extent of its lower end. Several small bloody coagula under the mucous tissue near the cæcum. Some livid marks, with slight abrasion of surface, were also seen in the colon. Spleen was large, soft, gorged with blood. Kidney rather larger than usual, otherwise healthy.

CASE XV. *At Fernando Po.*

Dr. T.— V—, anno ætatis 36; a native of Germany, nervoso-bilious temperament. Left the river in the Wilberforce, labouring under the prevailing fever, and has been at Fernando Po ever since; and, although he has occasionally walked out, he has been in a state of considerable debility.

Nov. 30th, 1841. Complained to Mr. Thomson this morning of dysenteric symptoms, with which he said he had been troubled for a day or two previously. He has frequent desire to go to stool, with pain and heat at the rectum. Stools scanty and of a beefy water colour, with

small portions of scybala. Experiences pain along the colon, immediately before and after evacuation. Tongue covered with a brownish fur, edges red.

R. Olei ricini, ℥iv.

Tinct. opii, gttss. xxv.

Aquæ menthæ pip. ℥j. M. ft. haustus stat. sumend.

Dec. 1st. Was somewhat easier after the action of the castor oil; but there is still great irritability of bowels. Stools frequent; less tenesmus. Pulse small, feeble.

R. Calomelanos, gr. iss.

Pulv. ipecac. gr. ij.

Opii, gr. $\frac{1}{3}$. M. ft. hujusmodi pilulas duodecim, quarum sumat æger j. ter quaterve in die.

Dec. 2d. No alteration.

Continr. Pil.

Dec. 5th. The disease advancing and the stools becoming bloody; half a grain of the acetate of lead was added to each of the pills; still experiences uneasiness along the colon, before and after the stools; the pain, however, is not increased by pressure. Pulse small, feeble.

Repr. pilulæ.

Dec. 7th. Bowels were opened only four times yesterday; motions scanty, and not bloody. Skin hot and feverish. Tongue coated, margin red. Pulse 90, full.

Continr. pilulæ sine plumbi acetate.

Dec. 8th. Frequent attempts at stool, attended with much pain and tenesmus. Strains much. Pulse small.

Capiat olei ricini, ℥vj.

Dec. 10th. Bloody stools returned yesterday; and the acetate of lead was again added to the pills, with the effect of restraining the hemorrhage. Is very feeble.

Reptr. pil. pro re natâ

Capiat marant. arund. cum vino pro re natâ.

Dec. 11th to 14th. Stools less frequent, but still very bloody. Extreme weakness. Emaciation of features, and the voice is feeble.

Omittr. pil.

Injicr. enema emolliens cum opii tinct.

Dec. 15th, 16th. Stools frequent, scanty, bloody. Extremities have been getting cold for the last twenty-four hours. Warm applications have been had recourse to without effect.

Continr. marant. arund. cum vino.

Dec. 17th. Gradual sinking during the night: fæces passed involuntarily. At 11·35 A. M. expired.

Sectio Cadaveris.

The exterior presented general emaciation, and shrinking of the muscular system.

Thorax. On raising the sternum and opening the left pleural sac. a pint of straw-coloured serum was found. On slicing the lungs tubercles were seen, some in the stage of induration, and others had so far advanced as to form a degree of softening around them. None had coalesced. Lower margins of the lobes indurated.

Stomach. Lining membrane soft, with patches of chronic inflammatory action. The same pathological appearances in the duodenum. The lower end of the ileum, throughout an extent of twelve inches, was in a state of complete ulceration. Peyer's elliptical patches were enlarged, elevated in the edges, and ulcerated. The colon exhibited a mass of ulcerations, with elevated edges; which, in some points, had penetrated to the peritoneal coat. Nothing unusual was observed in any of the other viscera.

CASE XVI. *On passage from Confluence to Egga.*

Sept. 22d. Mr. W. H——, Mate, anno ætatis 28, form slight, temperament phlegmatic, was received yesterday from the Amelia tender, with the general symptoms of fever. He complained of vertigo, restlessness, heat of skin, and general uneasiness, with great debility. Pulse 80, soft. Tongue foul. Bowels had been opened during the day. A dose of quinine and James's powder was given, which produced diaphoresis and general relief.

Capiat jusculum gallinæ pro re natâ.

Repr. pulveres quinæ et Jacobi ter in die.

H. S. capiat morphiæ muriatis sol. gtts. xxx. in aquæ menthæ pip. ʒj.

Sept. 23d. Slept well. No return of headach. Took some breakfast this morning with relish. Pulse 80, soft, small. Debility only complaint.

Continr. pulveres quinæ, &c.

Repr. jusculum gallinæ.

Oct. 1st. The debility has continued. During the night he has had shivering, and complains this morning of headach. Is so weak that he cannot turn himself in bed.

Repr. pulv. quinæ et Jacobi.

Oct. 2d. Perspired freely. Fever has remitted, leaving him in a state of extreme weakness. Has a desire for drink. Tongue loaded, rather dry. Bowels open.

Continr. eadem.

Oct. 3d to 8th. Is quite easy, but the debility is very great. The skin is abraded over the sacrum. Bowels rather slow.

Capiat olei ricini, ʒiv. in aquæ menthæ, ʒss.

Continr. quina et nutrimenta.

To Oct. 21st. Gets strength very slowly, notwithstanding he has a most nourishing diet, with wine and beer. Sore on the sacrum in a sloughing state.

Reptr. nutrimenta et quinæ disulphas.

To Oct. 30th. Improves slowly. Slight heat of skin and flushing of face yesterday after dinner, which continued until the evening. Sore on the sacrum looks healthy. Tongue foul. Pulse 92, feeble.

Capt. infus. gentian. $\bar{3}$ j. bis in die.

Nov. 20th. Gradual improvement, although he experiences occasional flushings over the body, which however do not in any material degree interrupt his progress in convalescence.

Dec. 20th. Discharged to duty.

CHAPTER III.

SECTION I.

State of Medicine in the Niger.

THE practice of medicine throughout Africa, although in the lowest state of degradation, and clouded with superstitious bigotry, obtains for its professors emolument, respect, and even veneration. In the Nufi, Eggarra, and Kakanda countries, the Mallams, chiefly from Rabba and Sokatoo, travel about teaching Mahomedanism, and practising the healing art. Charms, consisting of scraps from the Koran, are resorted to in all cases of great difficulty. There are certain operations which the religion and custom of the country enjoin, and for which the Mallams are remunerated according to the circumstances of their patients. Circumcision being nearly universally adopted throughout the Niger must alone afford considerable employment. At Egga I was informed that a sheep, a goat, and several thousand cowries, were not unfrequently the "fee" for one operation of this kind. At Iddah, in the kingdom of Eggarra, the principal officers of the Attah's household were eunuchs, who had been operated upon by

the Mallams. One of the eunuchs told me that the only instrument used on the occasion was a common razor-shaped knife, and that compression was employed to stop the bleeding. The Mallams make scarifications over the parts complained of during fevers. They all said that during the dry season bad bellies (dysenteries), fevers, and smallpox proved extremely fatal, and were beyond all measure delighted when the protective power of vaccination was explained to them.*

At Aboh all curative means are performed through the influence of Fetiches or *Jū Jūs*. I have seen very few people in England submit so willingly and quietly to medical or surgical treatment as the Africans do. Ajimba, the son of the chief of *Muyé*, the owner of the slave canoe taken by us on the passage to *Egga*, came on board the *Albert*, accompanied by two Mallams. One of their boys had cataract of the right eye, which I had no sooner offered to remove, than he sat down and submitted without murmur to the operation of depression: he was astonished at being able to count his fingers with an eye which had previously been of no use, and after it was bandaged up he walked coolly into the canoe, as if nothing had happened.

* In the river Congo, or Zaire, the native doctors scarify in fevers, and in many local affections. When the incisions or punctures are made, a large horn with a niche cut in its side is applied over them, and the operator exhausts the air by applying his mouth to the opening, and thus forms a tolerable substitute for the cupping-glass.

Previous to the sailing of the expedition from England the medical officers were well supplied with vaccine lymph, for which they were indebted to the National Vaccine Institution, to Dr. George Gregory, to Mr. Ceely, of Aylesbury, and to Dr. Tripe, of Devonport. At St. Vincent, in the Cape de Verds, upwards of forty children were vaccinated. At Cape Coast Castle we remained sufficiently long to enable me to obtain fresh lymph from a child vaccinated on the first day of our arrival, which was in about a fortnight afterwards transferred to the infants of Emmery's village, on the left bank of the Niger. At Egga, Muyé, and other places, the Mallams were shown the operation and instructed how to perform it. Lancets and lymph were also given them, and Mamansa, the son of the chief of Muyé, vaccinated several children himself in our presence. Had it not been for the disasters that befel our expedition, I had great hopes of the extension of vaccination throughout the Niger, by means of the Mallams. Desirous as they no doubt are to add to their importance, they will ever be found ready to practise a new operation which is in itself so simple. In process of time the people themselves will become convinced of its beneficial effects.

It is true that when I first proposed vaccination to the Africans as a remedy for one of their most direful scourges, many of the mothers listened with doubt, and some of them, on witnessing the opera-

tion, even ran away with their children ; but at the same time we must not forget the bitter animosity that was entertained by enlightened men of the day in our own country against one of the greatest medical discoveries ever promulgated to the world. Nearly half a century has since passed away, and the prejudice against vaccination has not wholly disappeared with time. I have said that many of the African mothers were suspicious of this new remedy, but on the other hand great numbers staid and cheerfully submitted themselves and children to the operation, when its simplicity and after-benefits were clearly explained to them.

While on this subject I may state the result of vaccination on Africans, which fell under my own observation while in charge of the Royal Hospital at the island of Ascension, in August and September, 1842.

The benefits of vaccination may be extended to the Africans along the whole line of coast visited by H.M. cruizers on the west coast of Africa, by establishing a depôt for lymph at one of the principal places of resort. Ascension is pre-eminently that best fitted for this purpose : the vessels of war refit there ; it contains an hospital ; and its comparatively cool climate is more favorable to the preservation of the lymph than other parts of the station ; and as there are constantly a number of unvaccinated blacks being brought to the island, a means of

increasing the quantity of matter to any desired amount is thereby afforded. Thus a store of vaccine lymph may always be kept up, sufficient to enable the medical officers of the ships to vaccinate the Kroomen and other Africans on board, by which means the lymph could be conveyed to the various parts of the coast in the living subject, and its prophylactic power communicated to thousands of the natives of Africa.

June and July are perhaps the best months for the arrival of lymph from England at Sierra Leone, whence it could be sent to Ascension in H.M.S. Prompt, which nearly constantly runs between the two places.

The surgeon of the hospital at Ascension, and the surgeons and assistant-surgeons of Her Majesty's ships on the coast, will, I am assured, feel amply compensated for their trouble, by the conviction of the vast benefit which the diffusion of vaccination in Africa is calculated to bestow upon her people.

In the month of August, H.M.S. Prompt brought a supply of vaccine lymph from Sierra Leone to Ascension, which was said to have been very recently sent from England by the National Vaccine Institution. As a great proportion of the white children, and the whole of the Africans, on the island had not been vaccinated, I at once commenced by inserting the matter into the arms of six children, and in due time beautiful pearly vesicles

were produced on all of them. The rest of the children, all the Africans on the island, and several from the ships, were now infected with vaccine matter fresh from the vesicle, with only a single instance of failure. The white children experienced the usual slight fever attending vaccinia, which in all cases yielded to a little mild medicine. The white adults complained only of itching round the vesicle while it was in the stage of decline. But among the whole of the blacks the disease assumed a more decided form, and run a regular course; the eruption was preceded by severe headach, pain of back and loins, and general fever, which did not disappear for several days. The eruption in several cases was dispersed over the neck, chest, and abdomen, and the bases of the vescicles were, in general, much inflamed. All of them were confined to bed for some days, and several required rather active treatment.

The NUMBERS VACCINATED were as follows :

WHITES.

Adults, male	-	-	-	7
Children of both sexes	-	-	-	19 = 26

AFRICANS.

Adults, male, including convalescents, in hospital	-	-	-	27
Adults, female	-	-	-	3
Children, female	-	-	-	1
Adults, H.M. B. Dolphin	-	-	-	12 = 43

Grand total 69

I am not aware that this greater severity of the vaccine disease in blacks has been elsewhere or generally observed. If such is the case, the fact that the fever consequent upon vaccination assumes a decided and sometimes active form among them, while its effects are little if at all manifest in the white race, is worthy of note; inasmuch as it furnishes another link in the chain of analogical evidence, proving that smallpox and other eruptive diseases act with more energy, and consequently are more destructive of life among the former than the latter.

The direful ravages committed by smallpox among the Africans are but too well known, and call loudly upon us to extend to them, by all possible means, the protective power of vaccination.

SECTION II.

On Ventilation.

THE system of ventilation adopted in the vessels of the Niger expedition, according to the plans proposed by Dr. Reid, presented the first systematic attempt that had been made to place every compartment of a ship under the immediate and direct control of a ventilating power: it may be proper for me therefore to give a separate notice on this subject, particularly as so much attention is now directed to this department, as a means of improving health in the navy.

The leading principle which has been advocated by Dr. Reid, in respect to the ventilation of ships, is, that a system of tubes should be formed in every ship, and so connected together, and placed under the operation of a power that can always be depended upon, that under any circumstances, fresh air can be infused into, or vitiated air extracted from any compartment of the vessel, whether in the hold, or on any of the decks, the amount of power placed upon the ventilating apparatus being proportional to the service in which each ship may be engaged, and the number of people crowded in a given space. Dr. Reid's estimate of the amount of air required

for ventilation, being far above that which had been previously adopted, his arrangements necessarily were on an extensive scale, and formed a marked feature in each of the steam-ships.

Special arrangements were also introduced with the view of endeavouring to combat some of the evils that were known to prevail in the atmosphere of African rivers; but in respect to these Dr. Reid remarked, from the commencement, that they would only be viewed in the light of an experiment, or as he stated in the "Friend of Africa," "It must be obvious, that it will be impossible to estimate precisely the extent to which such an apparatus may prove beneficial until some specific information as to the peculiar chemical qualities of the atmosphere of the Niger shall have been obtained."

In ordinary circumstances when windsails, fanners, or other powers have been introduced with the view of promoting ventilation, they have in general acted locally, with various effect, influencing powerfully the state of the atmosphere at one place, while in others it remained comparatively unaffected. But the great object of the system of tubes introduced, was to produce a precise effect, wherever the power of the ventilation was most essential, the valves regulating, according as they were set, the amount of power brought to bear at a given time, upon any individual compartment.

In the accompanying woodcuts, an illustration is

given of the system adopted, excluding the minutiae of the arrangement of the individual tubes, as were they shown in the form in which they had to be made, from the progress in the building of the ships before the introduction of ventilation was decided upon, they would not communicate so distinct a view of the system.

In addition to the ventilation that could be commanded by the apparatus now referred to, every compartment of each of the ships had two communications with the external atmosphere, capable of being opened or shut as might be required, and of affording accordingly independent ventilation. One of these communications conveyed fresh air to the lower part of the cabins, and the other, being placed above, allowed the warm and vitiated air to escape. A connexion was also established between the paddle-box and the general system of ventilating tubes, so that on extreme occasions the power of the paddle could be brought into operation in calm weather, with the view of removing vitiated air. It was also intended to have made the chimney available for this purpose, but the progress made in building the ships before the ventilation was begun precluded this arrangement from being carried into effect. FIG. 1 gives a profile illustrating more particularly VENTILATION ON THE VACUUM PRINCIPLE. This mode of working the apparatus was generally adopted in the *Albert*, until the vessel

FIG. 1.

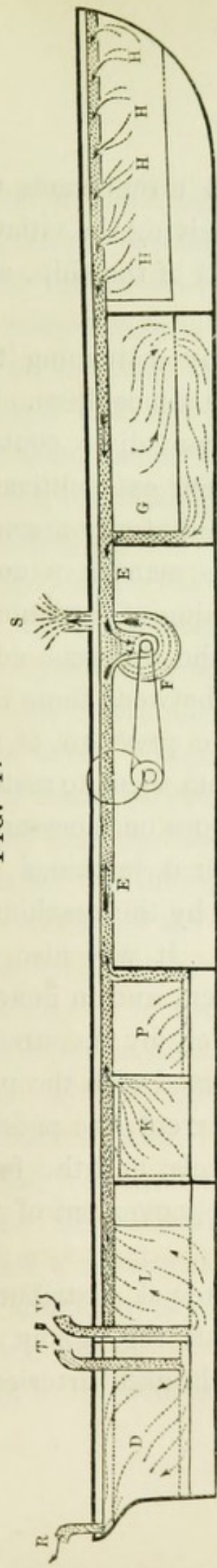
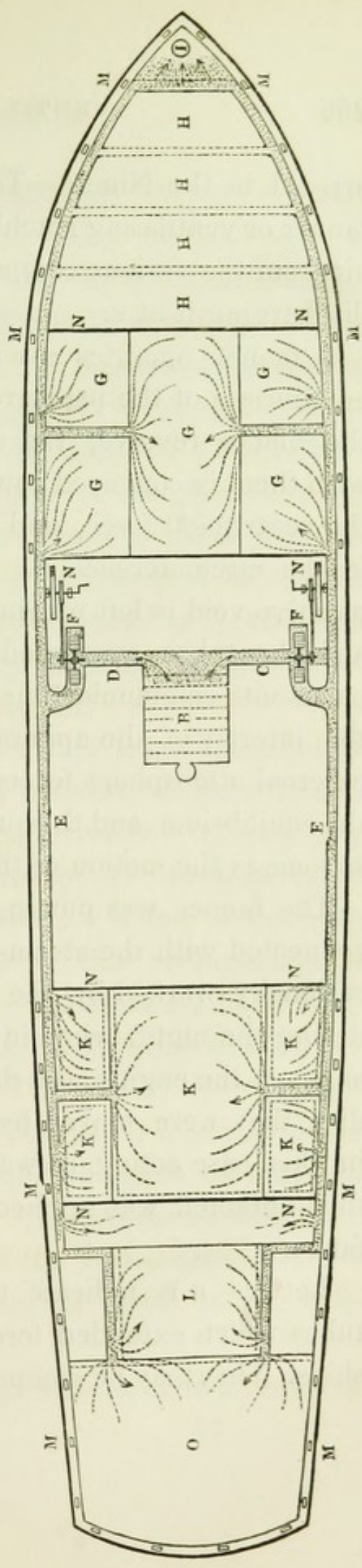


FIG. 2.



arrived in the Niger. The letter F represents the fanner or ventilating machine, receiving the vitiated air from the various compartments of the ship, and discharging it at s.

A fanner operates essentially by disturbing the equilibrium of the pressure of the atmosphere. As the blades revolve, the air in immediate contact with them is conveyed towards their extremities by the centrifugal force, and propelled at any opening in the circumference s. In this manner a comparative void is left within the casing of the fanner, and the tubes connected with the different compartments communicating freely between them and the interior of the apparatus, the pressure of the external atmosphere forces air from them to restore the equilibrium, and this process goes on incessantly so long as the motion of the fanner is sustained.

The fanner was put in motion by the machinery connected with the steam-engine. It was also occasionally worked by the Kroomen, and in general during the night, when in the river, by the stream, as when the engine was disconnected with the paddles they were moved by the current, the paddles in this case acting as water-wheels, and the force thus obtained was applied to the movement of the fanner.

Letters E E indicate the principal distribution tubes which extended fore and aft throughout the ships. They may be compared to the great arteries or

veins of the body, establishing a connexion and circulation throughout the whole system. HHHH point out the lower deck, and the manner in which air passed from it to the distribution tubes. When the valves abaft were shut, the ventilating apparatus worked with much more power forwards; and in the same manner, when the forward valves were closed, its influence was correspondingly felt in the principal cabins. It was always a great point to adjust the valves in such a manner that the power of the ventilation should work proportionally throughout the whole ship, according to the wants in each individual compartment.

In every compartment of the ship, communications could be established between the distribution tubes and the hold, so as to remove directly any vitiated air there, and prevent its affecting those who occupied the decks above. Thus, in the midshipmen's berth, division G, this arrangement is represented in operation. The same could be done in the lower deck, HHHH, by altering the adjustment of the valves; and in short, in the midshipmen's berth, and in the other compartments of the vessel, the air could be made to move in either direction as might be considered desirable. P and K represent some of the varied arrangements for diffusion adopted below or above in the individual cabins.

In L a peculiar arrangement is shown, such as

could be put in operation when the hold produced no offensive atmosphere. By this mode, when the external atmosphere was very warm and the water cold, the air could be conveyed in the first place to the hold, and cooled there to a certain extent, by impinging on the iron bottom in contact with the water before passing to the compartment which it was intended to supply. T R and v illustrate the action of the gunwale-tubes on the after-cabin D, the influence of the other ventilating arrangements there being suspended by closing the valves. Such was the system adopted for the extraction of air by exhaustion: and extensive as the arrangements may appear, still when the steam-vessels arrived at the Niger, more rather than less ventilation was desirable. Dr. Reid has remarked, "Few individuals, excepting those who have visited warm climates, are ready to credit the great supply of air that is indispensable for health and comfort in such countries, the all-subduing influence to many constitutions of sudden or extreme changes in respect to the quality of the air that surrounds the person, and the extent to which the mental faculties as well as the bodily strength are often prostrated by such causes. Proceeding on the assumption that no supply of air that was likely to be provided by artificial means would exceed the wants of the system in the Niger expedition, the demand made in respect to the power of the apparatus was limited solely by

the opportunities afforded for giving effect to the arrangements proposed; and when their extent became the subject of special remark, my reply on board these ships while they were still at Liverpool, was "that even if the whole ship were appropriated for ventilation alone, it would not be possible to guarantee a certain result, as the quality of the atmosphere of the Niger had never been made the subject of experimental examination, and still less the precise nature of the evil which proved so fatal in former expeditions."

The second figure gives a plan of the apparatus to illustrate its action, when it was worked on the **PLENUM PRINCIPLE**. In working by exhaustion in the manner already described, all the vitiated air was received at the centre of the fanner, and discharged at the circumference. But in propulsion the fresh external atmosphere was connected with this centre, and the air so received was blown from the circumference into the distribution tubes, and supplied from them to the several compartments of the vessel; and as the medicator (the special arrangement for purifying the air already alluded to,) **B** was interposed between the windsail which received the external air and the fanner **F**, it is obvious that any materials placed in **B**, and capable of influencing the condition of the air, must have been modified in its passage to the decks below. Further, as there was thus induced a plenum within the vessel, the air so

introduced escaping by the hatches and by the gunwale-tubes, this discharge, or escape of the air propelled, necessarily tended to prevent the ingress of any air, except what had passed through the medicator in proportion to the amount infused.

But the nature of the poison to be combated was unknown, and therefore it was impossible to predict what the effect of various materials might be. Such materials, therefore, were provided as were known to be most powerful in acting upon those poisonous bodies that have been found in the air, more particularly acids, lime, and chlorine; and to these were added substances capable of influencing the hygrometrical condition of the atmosphere. I do entertain the opinion that had we been fortunate enough to discover the precise nature of the poison, and had it been confined to no very extended district, that by keeping the white men below as much as possible, and steaming rapidly through that situation the medicator might have been brought into much more efficient operation than was possible when, with every attention to experiment that circumstances permitted, no clue as to the constitution of the virus was obtained.

Under the circumstances of the case, however, there was reason to believe that the influence of the poison extended much more widely than had been anticipated, and, as has been already stated, the men were, from unavoidable causes, much exposed

on deck; and I must also remark that the emanations from the green wood for the fires were to some constitutions peculiarly offensive.

The medicator consisted essentially of a large iron chest, which could be divided into different compartments by iron shelves or frames of iron wire or other materials, and was capable of acting upon the air supplied to the various sections and cabins of each ship, filtering it from impurities that might be mechanically suspended, and affecting it further by heat, or by the materials with which it was charged. These were placed upon frames or in the cistern below the frames, and the filtering cloths could also be impregnated with various solutions.

Having described briefly the ventilating apparatus, I might now enter into various details connected with its action. But as the manner in which it was worked has occasionally been alluded to elsewhere, it will be sufficient in this place if I now append a copy of the Report presented to Sir William Burnett, the Inspector-general of Naval Hospitals and Fleets, in which I have stated the results to which I was led after a careful consideration of the effects which it produced.

Remarks on the system of ventilation, and on the means adopted to purify the air on board H.M.S. Albert. The power of the fanner in renovating the air, in the compartments below, was abundantly manifest during the passage from England to the coast of Africa. By reducing the diameter of the drum connected with the axis of the blade-wheel within the fanners, 260 revolutions were performed in a minute when the vessel was at full speed, and a proportional number as her progress was slower. Thus a current of fresh atmospherical air was constantly propelled below, capable, by proper adjustment of the valves, of having its force concentrated in one compartment, or even in any one cabin of the ship. When we were at St. Vincent, in the Cape de Verds, the whole of the compartments were cleared and thoroughly cleansed. The process of drying the holds was much accelerated by throwing the whole force of the plenum impulse exclusively upon one division at a time. Under ordinary circumstances, the vacuum impulse or exhaustion from below was sufficient for the purpose of common ventilation.

The medicator or purifying chamber. In reporting upon the use of the medicator I shall confine myself to the results of the experiments made on board of the *Albert* when in the Niger. These experiments, from circumstances that could not be controlled, were rather limited, but sufficient in my

opinion to establish the medicator as a most useful, elegant, and economical medium for subjecting the external atmosphere to the action of chemical and other agents, whether with the view of absorbing carbonic acid and other deleterious matters, as by lime; of chemically decomposing it under certain circumstances of impregnation, as by chlorine; of arresting bodies mechanically suspended in the air; or of altering its hygrometrical condition, by substances capable of removing moisture from, or of imparting humidity to it.

The *Albert* entered the Nun branch of the Niger on the morning of the 13th of August, 1841, and was anchored for several days just within the bar. From the extreme fineness of the weather, the clear state of the atmosphere, the strong sea breezes, and the height of the river rendering emanations from its banks little likely, it was not considered necessary to open the lime-tanks, or to employ any other substance for the purification of the atmosphere by means of the chamber. Chlorine was, however, diffused over the vessel, from the chloride of lime in plates. When the ship was in the middle stream, the paddles were disconnected from the engines, and the action of the current was sufficient to produce from forty-eight to sixty revolutions of the fanner blades per minute. The valves were adapted to the vacuum impulse until the afternoon of the 19th, when we ascended the river. The arrangements

were now as follows. The windsails were hoisted to a height of about fifty feet from the deck, and their lower ends were attached to the inferior lateral openings in the medicator: the upper openings were connected with the deck-tubes by means of air-tight canvass hawses. By these means the air circulated below was obtained from a considerable elevation: it was conducted first into the lower compartment of the chamber, and successively through the others, four in number, filtered through fine bunting, first at the lateral openings, and then through a sheet of the same material stretched across the top tray, next transmitted by the canvass hawses to the deck-tubes, from which it passed into the fanners, whence it was distributed throughout the ship. Within the medicator, chlorine was evolved in the lower compartment, by disengaging it from the chloride of lime, by means of sulphuric acid. On the second tier above there were two hundred weight of fresh lime. The atmosphere between decks was not only impregnated with chlorine, but, as I shall endeavour to show, it was also sensibly drier, and proved to be so by actual hygrometrical observation.

We anchored the first night at the top of Lewis's creek, which is densely wooded all around. The mangrove abounds, and the distance from the sea is between five and six miles. The sea breeze was still strong.

Aug. 20th. Friday. Plenum impulse all day, chlorine evolved from the lower division of the medicator. The third tier trays were filled with fresh-burnt lime, and in the range above this there were ten pounds of the chloride of calcium. Anchored in the evening near a village: the ship was about 150 yards from the banks on each side, which were thickly wooded.

	Therm.	Dry bulb.	Wet bulb.	Differ.
<i>Aug. 20, in mid-stream, 11 P.M.</i>				
On the upper deck - - -	78·00	77·50	75·00	2·50
In the captain's cabin - - -	83·00	83·00	79·50	3·5
In the gun-room - - -	82·00	82·00	78·00	4·00
On the lower deck - - -	84·5	84·50	81·00	3·50
<hr/>				
<i>Aug. 21. 1 A.M. Plenum movement with evolution of chlorine. In the evening anchored (to avoid a swamp) below a village on right bank</i>				
On the upper deck - - -	77·0	77·00	75·00	2·00
In the captain's cabin - - -	80·5	80·00	76·40	3·60
In the gun-room - - -	80·5	80·00	76·40	3·60
On the lower deck - - -	84·5	84·50	81·00	3·50
<hr/>				
<i>Aug. 22. 2 A.M.</i>				
On the upper deck - - -	78·00	78·00	76·00	2·00
In the captain's cabin - - -	81·50	81·00	77·00	4·00
In the gun-room - - -	81·50	81·50	78·00	3·50
In the midshipmen's berth - - -	83·00	83·00	79·50	3·50

Aug. 23d. Monday. Evolution of chlorine in minute quantity, chloride of calcium, and dry lime on the trays; anchored at 9 P.M. in the middle of the river, about two hundred yards from the banks on each side. Results as before.

Aug. 25th. Chlorine being evolved, dry lime on the third tier of trays. The chloride of calcium being in a state of liquefaction was removed.

August 25th, 9 A.M.	Therm.	Dry bulb.	Wet bulb.	Differ.
On the upper deck . . .	78·5	78·0	76·0	2·0
In the captain's cabin . . .	79·0	79·0	76·0	3·0
„ gun-room . . .	81·0	81·0	77·5	3·5
„ lower deck . . .	84·0	84·0	81·0	3·0

At 12·30 P.M. The filter was removed from the lower lateral openings on each side of the fanner, and found covered with dust, which, examined through a microscope, was found to consist of small vegetable fibres, particles of black matter, fibre from cloth and portions of grass. Three P.M. during a heavy shower of rain when off the village Imbilamma, Mason's hygrometer indicated as follows. (At the time the experiment was made, the cabin and gun-room were almost wholly supplied with air that had passed through the medicator, the port slides being shut to exclude the rain.)

Imbilamma, August 25th, 1841.	Therm.	Dry bulb.	Wet bulb.	Differ.
On the upper deck	78·0	78·0	76·0	2·0
Captain's cabin	82·5	82·0	78·0	4·0
Gun-room	82·0	82·0	78·0	4·0
Stirling Island.				
On the upper deck	78·0	78·0	76·0	2·0
Captain's cabin	82·5	82·5	78·0	4·5
Gun-room	82·5	82·5	78·0	4·5

On our arrival at Aboh on the 26th, the same mode was adopted, and the effects were fully as evident as in the former experiments. The fanner was kept going night and day until we reached the town of Egga, where, from the engineers being all sick, there was no one to disconnect the paddles from the engines. On our return down the river, and thence to Fernando Po and Ascension, the exhausting impulse was put on.

As regards the supply of purified air, I would say that, as a general rule, it will be found sufficient in the captain's cabin and gun-room where there are comparatively few individuals. On the lower deck, however, where there are so many constantly rendering the air unfit for respiration, the quantity of pure air will not be found adequate to the demand. During the medication of the air in the chamber, the closure of the lower-deck hatches

could not be tolerated, and the heat was so oppressive at Egga, that we were necessitated to allow the men to sleep on deck.

The air on the lower deck, from the cause mentioned, always contained a proportion of the common atmosphere. How far beneficial were the means adopted for its purification, I do not pretend to determine, but we have every right to presume, from the acknowledged properties of the chemical agents used, that a vitiated atmosphere could not fail to be materially improved by an admixture with air which had been previously subjected to their influence.

SECTION III.

Meteorology.

THE following tables comprise the monthly means of the daily meteorological observations that were made on board the *Albert*, as nearly as circumstances allowed, according to the ample register-forms provided by the Royal Society.

Owing to the great risk from exposure at night, the three A.M. observations were not taken regularly after the 19th August, 1841, when the vessels commenced the ascent of the Niger: therefore, from that time the barometric column contains only the mean results of the two maxima periods of nine A.M. and P.M., and the minimum period of three P.M.

The dew point as obtained by the method of Daniell; and the difference between the dry and wet bulb thermometers was registered at the same periods.

As some of my readers may not be fully acquainted with the principle upon which hygrometers act, I may here be allowed briefly to describe those that were used in the expedition.

Daniell's hygrometer. When air is saturated with vapour, and a colder body is brought in contact with it, a deposition of moisture immediately takes place.

The Florentine academicians first endeavoured to ascertain the hygrometric state of the air on this principle. It was afterwards adopted in a much improved form by Le Roi, and its application has of late years been brought to perfection by Professor Daniell.

The instrument of Daniell consists of two glass bulbs, free from air, and connected by a tube bent twice at right angles. The bulb which is at the end of the most depending limb is blackened, is filled three fourths with sulphuric ether, and has a delicate thermometer inserted within it, the scale of which projects a considerable way up the tube. The rest of the tube, and the other bulb (which is covered with gauze or fine muslin,) are filled with ethereal vapour.

When ether is dropped upon the muslin, the inclosed vapour is condensed, evaporation takes place rapidly from the ether in the blackened bulb, and *cold* is generated. Now, if there be much vapour in the air, a moist ring will at once appear on the blackened bulb; but if the air be comparatively dry, then the temperature of the bulb must be reduced by the addition of ether until the film of moisture is deposited.

The degree of temperature of the interior thermometer is to be noted the instant the moist ring is formed. This is called the *dew point* at the temperature of the surrounding atmosphere, which

is indicated by a thermometer placed in front of the stand of the instrument.

Wet-bulb hygrometer. The rapidity of evaporation as a measure of the dryness of the atmosphere was the invention of Dr. Hutton, of Edinburgh, and the principle upon which Sir John Leslie's hygrometer was constructed.

Those supplied to the expedition (*Mason's*) consisted of two delicate thermometers, placed upon a graduated scale of ivory with two arms, supported by a stand of brass upon a wooden rest. The bulb of one of the thermometers was covered with floss silk, which was kept moist by communicating with a water-holder, with which each instrument was provided. The amount of cold consequent upon the evaporation was indicated by the fall of the mercury in the tube of the moist-bulb thermometer: while the thermometer on the other arm of the scale showed the temperature of the ambient air. The difference of temperature between the two thermometers was noted, and a comparative estimate of the hygrometric condition of the atmosphere was formed; upon this principle "a thermometer having a thin film of water surrounding it will take a temperature depending on the following circumstances:—the air in contact (whether it move quickly or slowly) gives to the film of water, which is converted into vapour sufficient in quantity to saturate the space which the air occupies, just enough of heat to vaporize that water, and the re-

duction of temperature will be accordingly. Thus if the air (or space) be very dry, it will take up much vapour, but that vapour must have combined with much heat, in order to change its state from water, and the temperature of the air in the (now) saturated space is lowered accordingly.”*

COMPARISONS with the STANDARD BAROMETER of the Royal Society.

Dr. M'William's		Royal Society's		
Barom.	Therm.	Flint.	Crown.	Therm.
29.550	46.8	29.820	29.814	45.0
29.760	52.3	30.076	30.070	51.3
29.800	52.4	30.144	30.136	51.3
29.780	52.6	30.090	30.082	51.3

At Plymouth. Passage to Madeira, and at Madeira: Passage to Teneriffe, and to the Island of St. Vincent in the Cape de Verds group. May 12th to 31st, 1841.

29.910	Barom.	Temperature and Dew Point.								Therm.	Winds.	Remarks.				
		3 A.M.			9 A.M.			3 P.M.					Maximum.	Minimum.	Temperature of Sea.	
		Air.	Dew.	Differ.	Air.	Dew.	Differ.	Air.	Dew.							Differ.
62.780	59.700	3.080	68.737	64.000	4.737	66.612	61.020	5.592	63.666	59.233	4.433	76.00	44.5	63.800	S.W. Vble. N.E.	Beautiful parhelion on 6th; halo, a distinct circle 18° from the sun. Variable to the middle of the month: afterwards very fine.

* See Supplementary Report on Meteorology for 1840, by Professor Forbes, of Edinburgh. Pp. 97, 98.

Island of Saint Vincent, in the Cape de Verds, until the 16th.
 Passage to Sierra Leone, and at Sierra Leone to the end. June, 1841.

29·818	Barom.		Temperature and Dew Point.								Therm.	Winds.	Remarks.				
			3 A.M.			9 A.M.			3 P.M.					9 P.M.			
			Air.	Dew.	Differ.	Air.	Dew.	Differ.	Air.	Dew.				Differ.	Air.	Dew.	Differ.
72·860			78·865	72·223	6·642	79·500	72·615	6·885	76·944	72·018	4·926	96·000	64·500	77·706	N.E. until the 22d : on 23d s.w. and to the end. Fine while at St. Vincent. Encountered a volcanic cloud off Fuego : on the 17th blew hard : tornado on the 28th at Sierra Leone.		
											Maximum.	Minimum.	Temperature of Sea.				

Passage from Sierra Leone to Monrovia in Liberia ; to the river Sinoe. At Sinoe, Cape Coast Castle and Accra, West Coast of Africa.

29·847	Barom.		Temperature and Dew Point.								Therm.	Winds.	Remarks.				
			3 A.M.			9 A.M.			3 P.M.					9 P.M.			
			Air.	Dew.	Differ.	Air.	Dew.	Differ.	Air.	Dew.				Differ.	Air.	Dew.	Differ.
77·741			79·755	74·080	5·675	81·138	74·938	6·200	79·707	75·677	4·030	87·000	74·000	79·950	s.w. occasional calms Rainy, with heavy squalls in the early and middle part of the month. Fine about the end. Hazy in the mornings.		
											Maximum.	Minimum.	Temperature of Sea.				

At Fernando Po from October 17th to November 23d. Observations made by MR. ROSHER *on shore*. Sailed on the 23d to Prince's island, St. Thomas's island, and Rollas in the Bight of Biafra, and returned to Fernando Po December the 3d, 1841. Sailed again on the 18th for Ascension by way of Prince's island, St. Thomas, and Rollas.

Nov. 24 to Dec. 31.		Nov. 1 to 23, October 17 to 31.		Dry and Wet Bulb Thermometer.				Therm.		Winds.	Remarks.		
(Barom. marine.)		(Barom. Newman's.)		3 A.M.		9 A.M.		3 P.M.				9 P.M.	
Dry.	Wet.	Differ.	Dry.	Wet.	Differ.	Dry.	Wet.	Differ.	Dry.	Wet.	Differ.	Maximum.	Minimum.
29.758	71.441	''	29.888	''	''	80.030	80.000	''	82.870	82.307	''	87.000	66.000
''	''	''	''	''	''	73.950	''	''	75.650	''	''	''	''
''	''	''	''	''	''	6.080	''	''	7.220	''	''	''	''
83.866	''	''	80.030	80.000	''	84.566	''	''	82.870	82.307	''	87.000	66.000
74.800	''	''	73.950	''	''	75.200	''	''	75.650	''	''	''	''
9.066	''	''	6.080	''	''	9.366	''	''	7.220	''	''	''	''
84.566	''	''	82.870	82.307	''	79.150	''	''	''	''	''	''	''
75.200	''	''	75.650	''	''	75.103	''	''	''	''	''	''	''
9.366	''	''	7.220	''	''	4.047	''	''	''	''	''	''	''
79.150	''	''	''	''	''	91.000	''	''	''	''	''	''	''
75.103	''	''	''	''	''	68.000	''	''	''	''	''	''	''
4.047	''	''	''	''	''	84.500	''	''	''	''	''	''	''
w.n.w. w.s.w. and calms. Towards latter end variable.		Land and sea breezes.		Temperature of Sea.		Maximum.		Minimum.		Remarks.		Some very heavy rain fell during October, in general beautiful towards evening.	
												Some heavy rain with occasional tornadoes. Hot during the day: hazy in the morning and towards evening.	
												At Fernando Po, hot, sultry, and hazy, the period of the "smokes." No rain. Occasional showers on the passage to Rollas, but in general it continued fine.	

AT THE ISLAND

	WET BULB THERMOMETER.								
	9 A.M.			3 P.M.			9 P.M.		
	Dry.	Wet.	Differ.	Dry.	Wet.	Differ.	Dry.	Wet.	Differ.
<i>Marine Barom.</i> , April, 1842, 1st to 12th at the mountain.	72·250	70·916	1·334	73·915	71·333	2·582	72·272	70·818	1·454
13th to 30th on board,	83·029	73·676	9·353	83·941	74·250	9·691	78·844	73·353	5·491
May, 1842, on board,	82·643	72·978	9·665	82·574	73·203	9·371	77·240	72·240	5·000
June, 1842, on board.	79·339	71·089	8·250	79·224	70·689	8·535	75·964	70·696	5·268
July, 1842, on board.	78·120	69·706	8·414	77·388	69·340	8·048	73·942	69·480	4·462
Aug. 1842, from 16th, obs. on shore at the hospital.	77·200	67·550	9·650	78·354	67·742	10·612	74·666	68·150	6·516
Sept. at hospital.	75·200	68·283	6·917	77·750	69·133	8·617	74·766	68·766	6·000
Oct. 1 to 14 at hospital.	75·454	68·591	6·863	77·888	69·388	8·500	74·055	68·888	5·167

OF ASCENSION.

Newman's Portable Barometer.	Thermometer.		Temp. of Sea.	Wind.	REMARKS.
	Max.	Min.			
27·835	74·813	67·000		S.E. Trade.	Continued showery in the mountain, attended with beautifully fine clear weather. Fine and dry about middle of the month.
29·809	89·000	72·000	82·500	Heavy Rollers on 20 and 21.	Mountain hazy, occasional showers with fine weather to the end.
29·822	87·000	72·000	80·954	S.E. Rollers on 11 and 12 up to 19.	Rain in the morning and fine in the afternoon until the 9th, fine until the 23d, from that period occasional showers were experienced.
29·986	85·000	66·000	76·530	S.E. Rollers on 8 and 9, and on 20 to 22.	Fine, with occasional rain, until the middle of the month, when it became quite fair, towards the end rain was experienced, with haze over the mountain.
30·025	82·000	63·000	76·272	S.E.	Showery for the first few days, with beautiful weather, very fine from the 7th to nearly the end of the month.
29·995	84·000	67·000	75·500	S.E. Rollers on 3, 4, and 5, also on 11, 12, and 13.	The whole of this month was beautifully fine, although there were slight showers about the middle, and towards the end, with mountain obscured by fogs.
29·938	80·000	71·500		S.E. Rollers from 16 to 19, from 24 to 27.	Rain early in the month, fine about the middle, violent and showery from the 24th, from which time to the end it was beautifully fine.
29·936	79·5	70·00		S.E.	Very fine up to our leaving the Island in the Dolphin.

Barometrical, Thermometrical, and Hygrometrical OBSERVATIONS, made on board and at the Hospital of Ascension, during the above period.

The Means of the Monthly Averages.

Barometer.	Dry and Wet Bulb Thermometer.									Therm.		Temperature of Sea.
	9 A.M.			3 P.M.			9 P.M.			Maximum.	Minimum.	
	Dry.	Wet.	Differ.	Dry.	Wet.	Differ.	Dry.	Wet.	Differ.			
29·907	79·292	70·666	8·626	80·370	70·971	9·399	76·184	70·601	5·583*	83·825	69·074	78·334

Mean barometric pressure	29·907
Mean temperature of atmosphere throughout the nine months	78·615
Maximum of atmospherical temperature	89·000
Mean of atmospherical maxima	83·825
Minimum temperature of atmosphere	63·000
Mean of minima	69·074
Mean temperature of sea	78·334

* The average difference between the wet and dry bulbs, as obtained by deducting the average wet from the average dry observations, does not correspond with the average of the difference column, in consequence of the wet bulb observations not having been taken in March.

The actual averages of difference are as follows :

9 A.M., 8·265. 3 P.M., 8·925. 9 P.M., 5·294.

The observations taken at the mountain are not included in the calculation of the averages.

Climate of Ascension. Ascension lies in latitude $7^{\circ}55'56''$ south, and longitude $14^{\circ}23'50''$ west, according to the chart of Lieut. Campbell, R.N. The island is about eight miles long and six broad, and is of the form of an isosceles triangle, the base extending from north and by east to south and by west, from which the sides run, the one south-east and easterly, and the other in an easterly and north-easterly direction.

The island is wholly volcanic. The green mountain, which is situated on the south-east side of the island, rises to the height of 2870 feet* above the level of the sea, the soil of the high lands round the peak is fertile, and is, to a considerable extent, under cultivation.

Vegetable life almost entirely disappears in the plains below, which present a scene of the most arid desolation, varied only by the unequal altitudes and changes of colour (from dark gray to deep red) of the old volcanic cones which are dispersed over them.

Although the seasons at Ascension cannot be distinguished by the usual tropical terms wet and dry, yet the warm period may be reckoned from the middle of December to about the same time in May; the rest of the year is comparatively cool.

The heat at the town quarter, which is on the north-west or lee side of the island, would be op-

* See Account of Ascension, in Journal of Geographical Society, vol. 5, by Captain Brandreth, R.E.

pressive during the summer months, were it not that the atmosphere is renewed by the south-east trade which constantly blows over the island.

My own observation assigns the highest temperature to the months of March, April, and May; gradually falling until the middle or end of December, when it again begins to rise.

The rapid advance in the growth of vegetation in the high lands surrounding the peak no doubt has tended to attract the clouds and vapours, and, consequently, to increase the precipitation of moisture in that district; but, independently of this cause, rains are, by all accounts, of much more frequent occurrence than they were ten or twelve years since, and add much to the coolness of the air by their quick evaporation from the porous surface of the cindery soil, as well as by the coldness due to the rain-drop itself.

The marines, of whom there are not less than between eighty or ninety,* are employed in quarry-

* Captain William Lee, Royal Marines, late acting-commandant of the Island, has kindly furnished me with the following list of the average number victualled at Ascension during the greater part of 1842.

Adult males, European	92
Ditto females, ditto	26
Children, ditto	37
Supernumeraries	44
Males, African	28
Females, ditto	3
	<hr/>
Total	230

ing, building, and other labours, exposed to the sun about eight hours daily, with the exception of Saturday; they are sometimes for months together without any other fresh provisions than an allowance of turtle, which is issued once a week, yet there is seldom one of these men to be found in the hospital: a fact affording strong evidence of the salubrity of the climate, and of the excellence of the discipline maintained on the island.

MEANS of METEOROLOGICAL OBSERVATIONS, made by Lieut. Webb in the river Niger, from 2d to 27th July, 1842.

Barom.	Dry and Wet Bulb Thermometer.								
	9 A.M.			3 P.M.			9 P.M.		
	Dry.	Wet.	Differ.	Dry.	Wet.	Differ.	Dry.	Wet.	Differ.
30.092	79.851	75.963	3.888	82.333	77.630	4.703	79.000	75.461	3.539

The weather was in general fine, although squalls from the s.w., with thunder and lightning, followed by heavy rains, were not unfrequent. The bed of the river presented a plain of sand, through which the river (now reduced to comparatively narrow dimensions) pursued a winding course. Snags (dead trees) abounded in the river: the stems of the trees and the bushes on the banks were covered with mud.

The following OBSERVATIONS made at Rabba, Lebba or Layaba, and Adda Kuddu, were kindly given me by Mr. William King, the intelligent Surgeon of the Ethiope, Mr. Jamieson's steam-vessel.

PLACES.	Means of Temperature. Fahrenheit Thermometer.				REMARKS.
	6 A.M.	Noon.	3 P.M.	6 P.M.	
At Rabba, river Niger, from 1st to 8th July, 1840.	70·875	82·062	87·000	83·000	Fine weather, with light breezes from westward. Rain on the morning of the 2d.
From Rabba to Lebba, 9th to 15th.	71·285	84·000	87·857	81·385	Generally cloudy in the early part of the day. P.M. fine.
Rabba, from 16th to 20th.	71·200	84·200	88·000	80·400	Tornado in the evening of 16th, rainy and cloudy afterwards.
Rabba, to and at Adda Kuddu from 21st to 30th.	72·000	85·450	88·100	83·000	Occasional rain, but weather generally fine. Heavy thunder on 27th. Afterwards very fine.
Average during the month.	71·340	83·925	87·739	81·946	

SECTION IV.

Geology of the Niger.

THE following account is condensed from the notes of Dr. Stanger.

The Delta of the river Niger is a flat tract, composed of clay and sand, in places containing minerals and much vegetable matter. It may be considered to extend to Aboh, a distance of 120 miles from the sea.* The banks of the river are elevated only a few feet above its level, and the interior is swampy. From the soil we prognosticated granite in the interior. The land gradually rises from Aboh to Iddah, but is still swampy, and there are no rocks: the cliffs at Iddah are 185 feet high, (barom. measure,) and are composed of sandstone, the strata of which are for the most part horizontal, but occasionally dip at an angle of three degrees to the south-east; this sandstone is fine, granular, and composed of transparent particles of white quartz; the upper beds are highly ferruginous; the strata are cut through by joints running in all directions.

* In the general narrative it will be seen that the Delta is supposed to extend to Iddah, where rocks first appear.

After the most careful examination, one fossil only, and that a very obscure one, was met with in the sandstone: it has some resemblance to *Pollicipes*. The cliffs at Iddah are formed by the outcrop of a ridge of hills running north-east and south-west. From Iddah to Ikori the country is composed of sandstone of the same character, more or less ferruginous in places; the character of the country is that of elevated table lands, edged by cliffs bordered by debris. At Ikori strata of mica slate, dipping eighty-five degrees due west, appear standing up in high masses on the right bank of the river, near which bank, opposite to Ikori, is the Bird rock, composed of a mass of quartz, evidently imbedded in the mica slate. The mica slate rests upon the granite composing Mount Soracte and the neighbouring hills, attaining a height not exceeding 1200 feet. Beaufort island is composed of granite, which is decomposed so as to leave the surface very rough, from the projection of felspar crystals; it contains little mica, and is composed of felspar and quartz, with a small quantity of hornblende. At Okazi the granite is more largely crystalline, and contains very beautiful opalescent felspar.

The granite extends to Adda Kuddu, and at that place it is mixed up and complicated with gneiss, which dips at an angle of sixty degrees to the south. The gneiss contains veins of granite running in all directions. Further on the granite again contains

imbedded masses of gneiss. From Adda Kuddu, up the river as far as was explored, the country is composed of horizontal sandstone, generally more highly ferruginous than lower down. At Mount Stirling the iron occurs in the form of pea-iron ore. The granite appears to be the central axis, mica slate and gneiss occurring on both sides, and dipping at great angles. The granite is the line of the so-called Kong mountains, which in no case were observed higher than 1200 feet: the sandstone lies unconformably on the mica slate.

THE END.

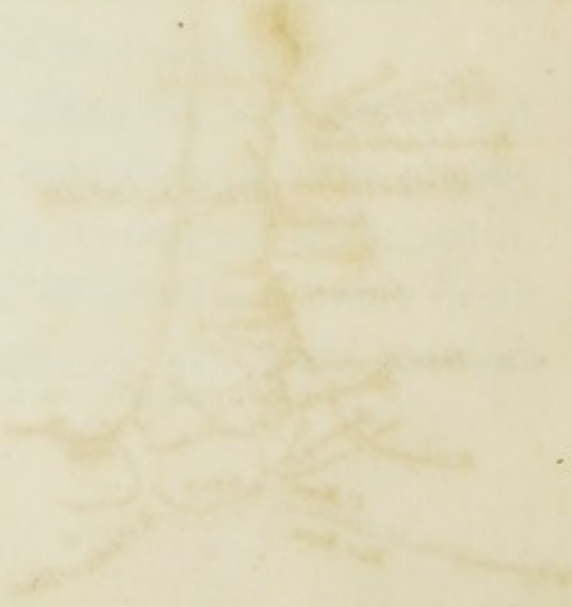
The first part of the river is a rapid descent from the mountains to the plain. The water is very clear and the banks are very high and steep. The second part of the river is a long and narrow channel through the plain. The water is very shallow and the banks are very low and flat. The third part of the river is a wide and shallow channel through the plain. The water is very muddy and the banks are very low and flat. The fourth part of the river is a narrow and deep channel through the plain. The water is very clear and the banks are very high and steep. The fifth part of the river is a wide and shallow channel through the plain. The water is very muddy and the banks are very low and flat.

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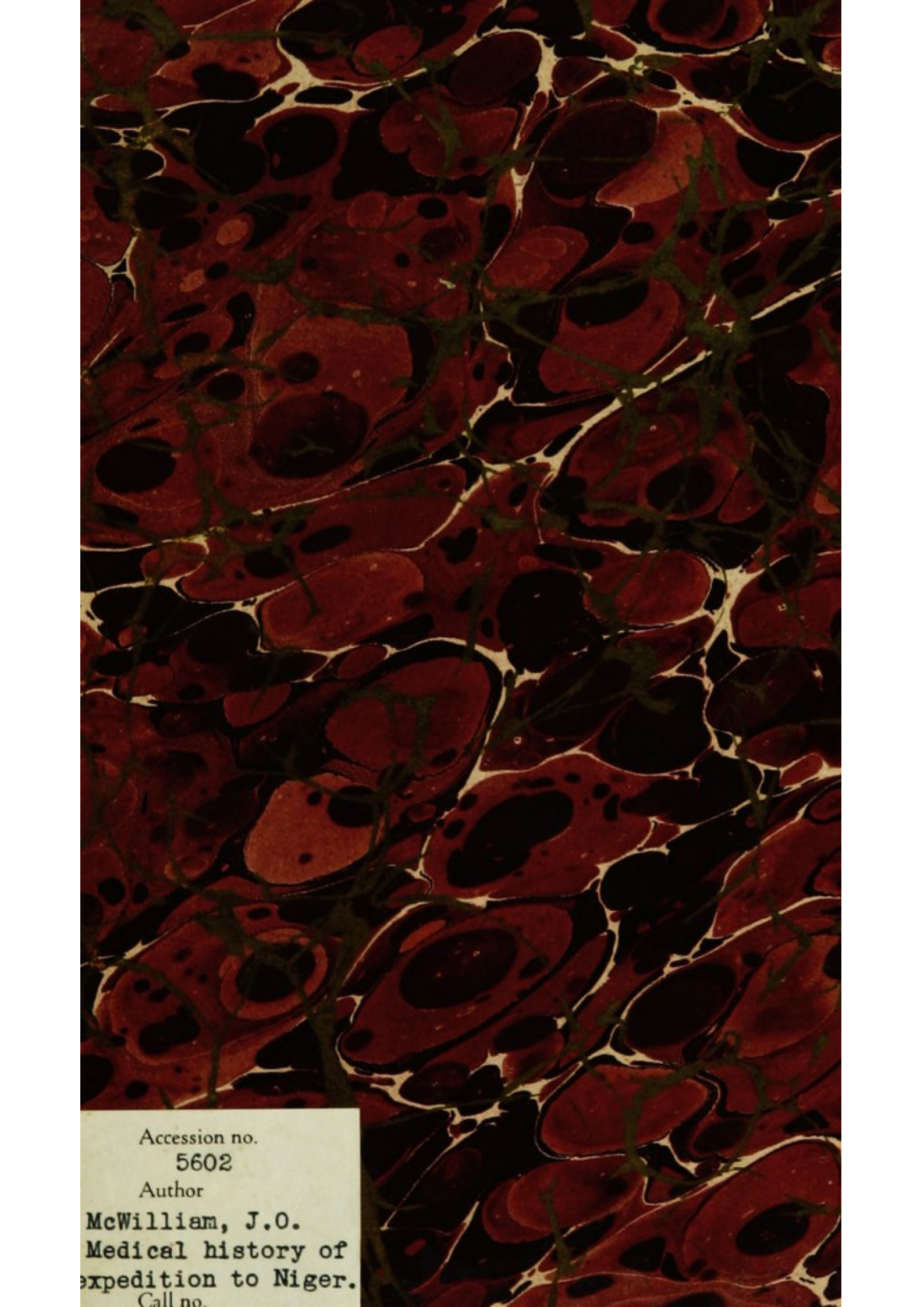
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