On Fever in the Zambesi, 28 November 1860

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1 ON FEVER IN THE ZAMBESI.

A NOTE FROM DR. LIVINGSTONE TO DR. M'WILLIAM. *[Note: James Ormiston McWilliam (1808-1862), Naval surgeon. Received his medical degree in 1840 and was appointed senior surgeon on the Albert, one of three ships on the Niger Expedition in 1841, the report of which was published in 1843. He was active in the formation of the Epidemiological Society and became its secretary.]*

Transmitted by Captain WASHINGTON, R.N., F.R.S., Hydrographer to the Admiralty.

Read June 3rd, 1861.

IN the typical cases given in Dr. M'William's *[Note: James Ormiston McWilliam (1808-1862), Naval surgeon. Received his medical degree in 1840 and was appointed senior surgeon on the Albert, one of three ships on the Niger Expedition in 1841, the report of which was published in 1843. He was active in the formation of the Epidemiological Society and became its secretary.]* "Medical History of the Niger Expedition" *[Note: James Ormiston McWilliam, 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 (London: John Churchill, 1843)]* , the gall-bladder was found distended with black bile; and, if my memory does not deceive me, most of the cases treated with quinine at an early period of the disease either recovered, or were subjected to the milder or intermittent form of fever *[Note: "[A]n ague or intermittent fever is a disease consisting of febrile paroxysms which completely subside, and return at stated periods. During the intermissions the patient is generally quite free from fever, but a degree of langour and inaptitude to exertion frequently remain. The febrile paroxysm of an ague consists of three periods or stages - the cold, the hot , and the sweating; and these follow in regular succession.
Robert Hooper, Lexicon Medicum; or medical dictionary, 7th edition, (London: Longman, Orme, and Co., 1839), p.54]* .

In 1850 I adopted the plan of giving quinine mixed with a purgative as the first step of the treatment, and was successful in the cases of two of my own children and an English party whom we found at Lake Ngami, and of whom one had died before our arrival. I have lost the notes of my reasons for adopting the practice, but I have been successful in every case I have met with since. The prescription employed is –Resin of jalap *[Note: Convolvulus jalapa is "a native of South America ... the active principle appears to be the resin and extractive matter...The root powdered is a very common, efficatious, and safe purgative, as daily experience evidences; but, according as it contains more or less resin, its effects must of course vary. In large doses, or when joined with calomel, it is an excellent hydrogogue and anthelmintic."
Robert Hooper, Lexicon Medicum; or medical dictionary, 7th edition, (London: Longman, Orme, and Co., 1839), p.453]* , and calomel *[Note: "This name was originally applied to the Aethiops mineral, or black sulphuret of mercury; it was afterwards very inappropriately applied to the protochloride, which is the only substance now known*

*under the name of calomel"
Robert Hooper, Lexicon Medicum; or medical dictionary, 7th edition, (London: Longman, Orme, and Co., 1839), p.303]* , of each eight grains; quinine and rhubarb, of each four grains; mix well together, and when required make into pills with spirit of cardamoms: dose from then to twenty grains.* *[Note: Since the paper was read, Dr. McWilliam has received through the Foreign Office the following amended formula of Dr. Livingstone\'s prescription–viz.: "Take of resin, of jalap, and of rhubarb, six or eight grains; of calomel and quinine four grains each: mix well in a mortar, and preserve for use." (The rest is correct.)]* The violent headache, pains in the back, etc., are all relieved in from four to six hours; and with the operation of the medicine there is an enormous discharge of black bile, – the patient frequently calls it blood. If the operation is delayed, a dessert-spoonful of salts promotes the action. Quinine is then given till the ears ring, etc. We have tried to substitute other purgatives instead of the resin, jalap *[Note: Convolvulus jalapa is "a native of South America ... the active principle appears to be the resin and extractive matter...The root powdered is a very common, efficatious, and safe purgative, as daily experience evidences; but, according as it contains more or less resin, its effects must of course vary. In large doses, or when joined with calomel, it is an excellent hydrogogue and anthelmintic."
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Robert Hooper, Lexicon Medicum; or medical dictionary, 7th edition, (London: Longman, Orme, and Co., 1839), p.303]* , but our experiments have only produced the conviction that aught else is mere trifling. No strength is lost in our march up the river of six hundred miles on foot. A European would be stricken down one day, and the next, after the operation of the remedy, would resume his march on foot. In some very severe attacks it was necessary for the patient to travel upon a donkey, but after two or three days he would prefer to tramp it.

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We tried Warburg's tincture *[Note: "A preparation containing quinine and many other ingredients, often used in the treatment of malarial affections. It was invented by Dr. Warburg of London"]* , which has a great reputation in India, but it causes profuse sweating, and does not cure the disease; the strength is also impaired. We had a good supply, by the kindness of one of our nobility, but I am compelled to say that it did not answer our expectations. The daily use of quinine is no preventive. We have seen many cases occur when the person was on the verge of cinchonism.

I employed the foregoing remedy with success on the west coast, but made no fuss about it more than make a general statement in the "Missionary Travels." I was not quite sure that our fever was identical with that Dr. M'William *[Note: James Ormiston McWilliam (1808-1862), Naval surgeon. Received his medical degree in 1840 and was appointed senior surgeon on the Albert, one of three ships on the Niger Expedition in 1841, the report of which was published in 1843. He was active in the formation of the Epidemiological Society and became its secretary.]* encountered in the Niger, but the melancholy fate of a party of mis-

sionaries at Linyanti, where six out of nine Europeans and four native attendants perished in the space of three months, makes me fear that it is the same complaint as that which destroyed the officers of Commodore Owen in the Zambesi, those of Captain Tuckey in the Congo, and the crews of the Great Niger Expedition in that river. My companions, Dr. Kirk and Mr. C. Livingstone, entertain the same opinion of the value of our pills as I do. We wrote a paper for one of the medical journals *[Note: David Livingstone and John Kirk, "Remarks on the African fever on the Lower Zambesi", Medical Times and Gazette N.S., v. 19, no. 489 (1859, Nov. 12, 473-474]* . But the above sad case makes us anxious that the remedy should become more extensively known than it has been, and I do not know a better plan for effecting this than by communicating it to Dr. M'William *[Note: James Ormiston McWilliam (1808-1862), Naval surgeon. Received his medical degree in 1840 and was appointed senior surgeon on the Albert, one of three ships on the Niger Expedition in 1841, the report of which was published in 1843. He was active in the formation of the Epidemiological Society and became its secretary.]* .

Those who may try the remedy will do well to remember that the above does are for strong adults.

I cured myself and native companions in this way during my long journeys between 1852 and 1856, and that the remedy has no bad effect on the system may be inferred from the fact that I have had no regular attack of fever since my return. I have had little illness, probably from exposure to malaria in its most intense forms, but nothing like what I formerly experienced; and I am of opinion that, what we were all taught, not to give quinine till we had used the preliminary measure of relieving the bowels was a mistake.

Query–Might not the remedy be applied to some of the fevers at home that arise in unhealthy localities? Around every village in this country there is a very large collection of human ordure during the dry season; this is swept into the rivers by the heavy rains, and you may guess the effect from hundred of thousands of villages. The natives here do not drink it, as the natives do on the banks of the Thames, but make holes in the sand to draw from. Possibly this has as much to do with the origin of fever as it has at home.

David Livingstone.

Tette, 28th November, 1860.

I give a specimen of the difference between dry and wet bulb, Victoria Falls, 24th September, 1860.

In Shade, 9 A.M.	{ Air .....87°	}	Difference, 28°

	{ Wet Bulb .. 59°	}
" 12 "	{ Air .....96·5°	} Difference, 33·5°
	{ Wet Bulb .. 63°	}
" 3 P.M.	{ Air .....96°	} Difference, 36°. Once the difference was 40°
	{ Wet Bulb .. 60°	}

The greatest difference, Dr. M'William *[Note: James Ormiston McWilliam (1808-1862), Naval surgeon. Received his medical degree in 1840 and was appointed senior surgeon on the Albert, one of three ships on the Niger Expedition in 1841, the report of which was published in 1843. He was active in the formation of the Epidemiological Society and became its secretary.]* observes, was I believe 16°; generally it was 6° or 7°. D. L.

The temperature of the dew point in the three observations respectively are, according to the formula of Glaisher, 42°, 50 ·2°, and 54°. [J. O. M'W.]

Dr. M'William *[Note: James Ormiston McWilliam (1808-1862), Naval surgeon. Received his medical degree in 1840 and was appointed senior surgeon on the Albert, one of three ships on the Niger Expedition in 1841, the report of which was published in 1843. He was active in the formation of the Epidemiological Society and became its secretary.]* observed that anything coming from Dr. Livingstone was sure to command attention and interest, and that he therefore had had great satisfaction in bringing his brief communication before the society. He (Dr. M'William *[Note: James Ormiston McWilliam (1808-1862), Naval surgeon. Received his medical degree in 1840 and was appointed senior surgeon on the Albert, one of three ships on the Niger Expedition in 1841, the report of which was published in 1843. He was active in the formation of the Epidemiological Society and became its secretary.]*) had not been in any of the rivers on the east coast; but he had treated fever off the coast of Mozambique, and at Madagascar, which he found of a much more tractable nature than that which he had encountered on the west coast, more especially in the Niger. But from what he had learned of the traders at Mozambique, he feared that the rivers on the east coast were not much less inimical to European life than those of the west coast. The Zambesi was about twenty-five degrees south of the Niger; but there seemed to be no defect of heat– that important element in the causation of fever–in the Zambesi, according to the day's meteorological observations which Dr. Livingstone had appended to his paper. The difference between the temperature of the dry and wet bulb thermometers was far beyond anything met with in the Niger, and was indicative of the unwonted dryness of the atmosphere in the Zambesi. With regard to the treatment so successfully employed by Dr. Livingstone, the principle was of course not new, although he was not aware that the precise formula of that eminent traveller had hitherto been used; and as other purgatives than jalap *[Note: Convolvulus jalapa is "a native of South America ... the active principle appears to be the resin and extractive matter...The root powdered is a very common, efficatious, and safe purgative, as daily experience evidences; but, according as it contains more or less resin, its effects must of course vary. In large doses, or when joined with calomel, it is an excellent hydrogogue and anthelmintic."
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1839), p.453] , calomel *[Note: "This name was originally applied to the Aethiops mineral, or black sulphuret of mercury; it was afterwards very inappropriately applied to the protochloride, which is the only substance now known under the name of calomel"
Robert Hooper, Lexicon Medicum; or medical dictionary, 7th edition, (London: Longman, Orme, and Co., 1839), p.303]* , and rhubarb, in combination with quinine, had failed in Dr. Livingstone's hands, it was desirable that the prescription he recommended should have further trial. To this end, he (Dr M'William *[Note: James Ormiston McWilliam (1808-1862), Naval surgeon. Received his medical degree in 1840 and was appointed senior surgeon on the Albert, one of three ships on the Niger Expedition in 1841, the report of which was published in 1843. He was active in the formation of the Epidemiological Society and became its secretary.]*) would endeavour to give it all possible publicity. Dr. Livingstone had alluded to the mortality in other African expeditions, and it might not be uninteresting to the society that he (Dr. M'William *[Note: James Ormiston McWilliam (1808-1862), Naval surgeon. Received his medical degree in 1840 and was appointed senior surgeon on the Albert, one of three ships on the Niger Expedition in 1841, the report of which was published in 1843. He was active in the formation of the Epidemiological Society and became its secretary.]*) should briefly recapitulate the losses sustained in the expedition to the Congo in 1816; to the Zambesi, from Captain Owen's ship, in 1823; to the Niger, under Laird,

 Lander, and Oldfield, in 1832; and to the Niger, under Captain Trotter, in 1841-32. He should also state the mortality of the *Eclair* in 1845, and, although not in chronological order, the dreadful loss sustained by two detachments of soldiery at the Gambia in 1825; as also that suffered by Mungo Park's party, in the last journey of that great traveller into the interior of Africa.

Tuckey's expedition to the Congo in 1816– Captain Tuckey in H.M.'s ship *Congo*, entered the river Congo, on the south-west, coast of Africa, in latitude 6° S., on the 6th of July 1816. His crew at this time consisted of–

Officers - - - - -	7
Naturalists, etc. - - - -	5
Petty officers, seamen, and marines -	40-52
Two natives of the Congo - -	2
	–
	54

After pursuing the voyage for some way up the river, a party of thirty proceeded on a land expedition beyond the cataracts of the river. Of this party, fourteen died of fever, and four died on board the *Congo*–all within the space of three months. One man also died from the effects of river fever after leaving the river. Total loss, nineteen.

Of 7 officers - - - -	3 died.
" 5 naturalists, etc. - - - -	4 "
" 40 petty officers, seamen, and marines	12 "

Mr. M'Kerrow, the medical officer, describes the weather as pleasant, the thermometer seldom exceeding 76° Fahr., or being lower than 60°, with scarcely any rain, and the atmosphere dry. He describes the fever as an intense remittent, with, however, black vomit in some cases. Bleeding (contrary to the accounts of the missions to the Congo by Carli, Merolla, and others) was unsuccessful as a remedy. Cathartics were useful; and calomel *[Note: "This name was originally applied to the Aethiops mineral, or black sulphuret of mercury; it was afterwards very inappropriately applied to the protochloride, which is the only substance now known under the name of calomel"
Robert Hooper, Lexicon Medicum; or medical dictionary, 7th edition, (London: Longman, Orme, and Co., 1839), p.303]* given so as to affect the constitution rapidly, was of great service, followed up by wine and bark.

The canoe expedition, from Captain Owen's ship, up the Zambesi, referred to by Dr. Livingstone, consisted of Lieut. Browne, MR. Forbes (midshipman), Mr. Kilpatrick (assistant-surgeon surgeon), and two black servants. They left Quilimane on the 23rd of July, 1823. On the 3rd of August, being then on the Zambesi, Mr. Forbes was taken with fever, and died on the 15th. On the 27th of August, Lieut. Browne was seized, and died on the 5th of September. Mr. Kilpatrick was attacked on the 1st of September, and was likely to recover; but some

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 imprudence caused a relapse, which proved fatal to him on the 28th of October. The blacks got out of the river safe.

Expedition to the Niger in 1832.–In the expedition to the Niger in the *Quorra* and *Alburkah* steam-vessels, under M'Gregor Laird, Lander, and Oldfield, there were in the first-named vessel, besides Kroomen engaged on the coast, a crew of twenty-six persons, while the *Alburkah's* crew consisted of fourteen only. After some delay at Sierra Leone and Cape Coast, both vessels entered the Nun branch of the Niger on the 18th of October, 1832. The captain and engineer of the *Quorra* died immediately after the vessel entered the river. The boat-swain of the *Alburkah* also sank under fever at the same time. On the 12th of November, when the vessels were at Damagû, some way above the delta, many in both vessels were laid down with fever; and on the 14th, one European only in the *Quorra* was fit for duty. On the 21st of November the *Quorra* had lost thirteen, and the *Alburkah* two men. On the 5th of December there remained alive in the *Quorra* four persons only, including Mr. Laird. This gentleman, after various re-lapses in his own person, and the loss of others of his crew, descended the Niger, and reached the sea on the 19th August,

1833. The *Alburkah* returned to the mouth of the river in November of the same year.

The total deaths in the *Quorra* were -	24
Survivors - - - - -	5
	–29
Deaths in *Alburkah* - - -	15
Survivors - - - - -	4
	–19

Besides these, eight or nine Kroomen died from poison.

The chief part of this mortality occurred within three months after the vessels began to ascend the river. Owing to the death of Dr. Briggs at an early period of the expedition, we have no account of his treatment on board the *Quorra*; but M'Gregor Laird acquaints us that Lander bled and blistered the sick, and gave emetics and purgatives at the outset of the disease. Blisters to the head appeared to do good service in some cases, as in Mr. Laird's own case. Mr. Oldfied administered purgatives, shaved the head, and applied cold lotions. He also used mercury until slight ptyalism was produced.

Expedition to the Niger in 1841-42.–In the expedition of 1841, under the command of Captain Trotter–consisting of the iron steam vessels *Albert*, *Wilberforce*, and *Soudan*–the vessels entered the Nun branch of the Niger on the 13th of August, 1841, and commenced the ascent of the river on the

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	Officers, Seamen, and Marines (Whites).	Men of Colour, various nations.	Blacks, entered on coast.
Albert	62	15	76
Wilberforce	56	7	39
Soudan	27	3	18

The expedition was at Ibu, below the apex of the delta and upwards of one hundred miles from the sea, on the 26th of August; and at Iddah, the capital of Egganah (where rock–ferruginous sandstone–was first seen), on the 2nd of September. Fever broke out in the *Albert*, and also simultaneously in the other vessels, on the 4th of September, and ceased not until it had paralysed the whole expedition. On the 10th, notwithstanding the persistence of the disease, the expedition was at the confluence of the Niger and Tchadda. Here, however, it was found necessary to despatch the *Wilberforce* and *Soudan* to the sea, with their own sick and those of the *Albert*, on the 19th. The *Albert* proceeded upwards on the 21st, and reached Egga, the Nufi capital, on the 28th of September. On

the 4th of October there remained fit for duty, one seaman two marines, Mr. Willie, mate, Dr. Stanger, and Dr. M'William *[Note: James Ormiston McWilliam (1808-1862), Naval surgeon. Received his medical degree in 1840 and was appointed senior surgeon on the Albert, one of three ships on the Niger Expedition in 1841, the report of which was published in 1843. He was active in the formation of the Epidemiological Society and became its secretary.]* . It was then resolved to return to the sea, which was reached with difficulty on the 14th, and Fernando Po on the 17th of the same month.

	White strength.	Loss
The *Albert*, which was sixty-four days in the river, lost by death, in the River, at Fernando Po, and Ascension, twenty-three persons	62	23
The *Wilberforce*, forty-five days in the river, lost by death on board and at Fernando Po, nine persons	56	9
The *Soudan*, which was in the river forty days, lost ten men from fever	27	10
	—-	—-
	145	42

Of the men of colour entered in England (twenty-five), eleven were attacked with fever in the river, but none died. Of one hundred and thirty-three blacks entered at Sierra Leone, not one was even attacked.

Every precaution which human ingenuity could suggest was taken to ensure the health of this expedition: provisions were of the best kind, preserved meats and vegetables, and medical comforts of every description were supplied. The ships were ventilated upon Dr. Reid's plan; coffee was supplied to the crews early in the morning, and quinine in wine was liberally administered. The treatment consisted of purgatives, diaphoretics, and quinine, the last often early in the disease, either combined

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241ON FEVER IN THE ZAMBESI with calomel *[Note: "This name was originally applied to the Aethiops mineral, or black sulphuret of mercury; it was afterwards very inappropriately applied to the protochloride, which is the only substance now known under the name of calomel"
Robert Hooper, Lexicon Medicum; or medical dictionary, 7th edition, (London: Longman, Orme, and Co., 1839), p.303]* or by itself; blisters to the nape of the neck were sometimes beneficial; general bleeding could not be tolerated.

Case of the "Eclair" in 1845.–The mortality on board of the *Eclair* in 1845 was as follows. Crew, one hundred and forty:–

	Deaths
From April 1st to June 30th, off the island of Sherboro, west coast of Africa, several of the boats having been up the river	10
From July 1st to Aug. 31st, at Sierra Leone, the Gambia, and Boa Vista, Cape de Verds	16

In a crew now reduced to 114, from Sept. 1st to the 21st, at Boa Vista and Madeira; or at the rate of about 29 per cent. in three weeks	33
From Sept. 21st to Oct. 3rd, between Madeira and England, and at the Motherbank and Standgate Creek	10
	—
	69

Dr. Baikie entered the Niger by the Nun branch in the *Pleiad* iron screw steamer, on the 12th of July, 1854.

The *Pleiad's* complement comprised–twelve whites and fifty-four people of colour, including thirty-three Kroomen: total sixty-six persons.

She remained in the river five months, employed in surveying and in other scientific pursuits; besides holding commercial intercourse with the natives. Dr. Baikie and some others had attacks of fever while in the river, which, in some cases, returned in the form of intermittent *[Note: "[A]n ague or intermittent fever is a disease consisting of febrile paroxysms which completely subside, and return at stated periods. During the intermissions the patient is generally quite free from fever, but a degree of langour and inaptitude to exertion frequently remain. The febrile paroxysm of an ague consists of three periods or stages - the cold, the hot , and the sweating; and these follow in regular succession.
Robert Hooper, Lexicon Medicum; or medical dictionary, 7th edition, (London: Longman, Orme, and Co., 1839), p.54]* , months after they had left it. There were also some scorbutic cases, but all came out of the river alive. Dr. Baikie attributed the comparative immunity of the crew to the use of quinine as a prophylactic, which, in accordance with his instructions drawn up by Dr. Bryson, and in conformity with the recommendation contained in Dr. M'William's *[Note: James Ormiston McWilliam (1808-1862), Naval surgeon. Received his medical degree in 1840 and was appointed senior surgeon on the Albert, one of three ships on the Niger Expedition in 1841, the report of which was published in 1843. He was active in the formation of the Epidemiological Society and became its secretary.]* *Medical History of the Niger Expedition* *[Note: James Ormiston McWilliam, 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 (London: John Churchill, 1843)]* , p. 188, he caused to be administered to the crew twice a day, and undoubtedly with good effect. Dr. M'William *[Note: James Ormiston McWilliam (1808-1862), Naval surgeon. Received his medical degree in 1840 and was appointed senior surgeon on the Albert, one of three ships on the Niger Expedition in 1841, the report of which was published in 1843. He was active in the formation of the Epidemiological Society and became its secretary.]* concluded by saying that, however unwilling he was to say a single word unfavourable to quinine as a preventive of fever, truth compelled him to state that, in this respect, it had not maintained its reputation in the hands of Dr. Livingstone– a circumstance suggestive of the necessity of caution in dogmatizing too hastily upon the powers of any remedy.

Summary of Mortality in the Expeditions respectively.– The mortality in the *Congo* within three months was 36·54

per cent.

In Lander and Laird's expedition of 1832, in less than two months, 81·25 per cent.

In the expedition to the Niger, under Captain Trotter in 1841-2, in which nearly the whole mortality from fever took

 place within two months, and all within four months, 28·96 per cent.

In the *Eclair* in six months, 49·28 per cent.

But these heavy rates of mortality are surpassed by what took place at the Gambia in 1825, where a detachment of one hundred and eight men (whites) arrived at the end of May, just as the rainy season commenced. Of this number there remained alive on the 21st of September of the same year, twenty-one, the mortality having been within the space of four months 82·85 per cent.

Another detachment of ninety-one men, which in the meantime had been on board of a transport at the anchorage, and which while there did not lose a man, was landed about the end of September, and made up the force to one hundred and twelve. Of this number, there had perished of fever, sixty-one; and of other diseases, includeding six from fever following punishment, twelve; total, seventy-three, or at the rate of 65·17 per cent. during less than three months.

During this fearful mortality, a detachment of from forty to fifty black soldiers of the 2nd West India Regiment lost only one man, and had seldom any in hospital.

To go back still further. Mungo Park, on his second journey to the interior of Africa, left the Gambia on the 28th of April, 1805, having with him, besides his brother-in-law–Mr. Anderson, Mr. Scott, and Lieut. Martin, thirty-four soldiers, four carpenters, and two seamen–in all forty-four Europeans. He did not reach the Niger at Bambakoo until the 19th of August, far into the rainy season, having had to traverse five hundred miles of country fertile of disease, and beset with danger. Dysentery and fever had by this time made sad havoc amongst his people, for there remained alive only eleven of the whole, and on the 11th of October all, save four, were dead. Whether any white, except Lieut. Martin, survived to perish with him under the rocks at Boussa some time in November, has not been ascertained. Park himself had severe dysentery, which he considered he cured himself of with mercury pushed to salivation.