On Fever in the Zambesi, 28 November 1860

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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 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 His-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 dis-with black bile; and, if my memory does not deceive , most of the cases treated with quinine at an early period the disease either recovered, or were subjected to the milder 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 as the first step of the treatment, and was successful the cases of two of my own children and an English party we found at Lake Ngami, and of whom one had died our arrival. I have lost the notes of my reasons for the practice, but I have been successful in every case have met with since. The prescription employed is –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."
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 , of each four grains; mix well together, and when make into pills with spirit of cardamoms: dose from 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 , etc., are all relieved in from four to six hours; and with operation of the medicine there is an enormous discharge black bile, – the patient frequently calls it blood. If the is delayed, a dessert-spoonful of salts promotes the . Quinine is then given till the ears ring, etc. We have 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 con-that aught else is mere trifling. No strength is lost in march up the river of six hundred miles on foot. A would be stricken down one day, and the next, after operation of the remedy, would resume his march on foot. some very severe attacks it was necessary for the patient to upon a donkey, but after two or three days he would 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 India, but it causes profuse sweating, and does not cure the ; the strength is also impaired. We had a good supply, the kindness of one of our nobility, but I am compelled to that it did not answer our expectations. The daily use of is no preventive. We have seen many cases occur the person was on the verge of cinchonism.

I employed the foregoing remedy with success on the west , but made no fuss about it more than make a general in the "Missionary Travels." I was not quite sure 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.]* encoun-in the Niger, but the melancholy fate of a party of mis-at Linyanti, where six out of nine Europeans and native attendants perished in the space of three months, me fear that it is the same complaint as that which the officers of Commodore Owen in the Zambesi, of Captain Tuckey in the Congo, and the crews of the Niger Expedition in that river. My companions, Dr. and Mr. C. Livingstone, entertain the same opinion of the of our pills as I do. We wrote a paper for one of the 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 the remedy should become more extensively known than has been, and I do not know a better plan for effecting this 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 the above does are for strong adults.

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

Query–Might not the remedy be applied to some of the at home that arise in unhealthy localities? Around village in this country there is a very large collection of ordure during the dry season; this is swept into the by the heavy rains, and you may guess the effect from of thousands of villages. The natives here do not it, as the natives do on the banks of the Thames,

but holes in the sand to draw from. Possibly this has as to do with the origin of fever as it has at home.

David Livingstone.

Tette, 28th November, 1860.

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I give a specimen of the difference between dry and wet , 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 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 16°; generally it was 6° or 7°. D. L.

The temperature of the dew point in the three observations 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. was sure to command attention and interest, and he therefore had had great satisfaction in bringing his 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.]*) not been in any of the rivers on the east coast; but he had fever off the coast of Mozambique, and at Madagascar, he found of a much more tractable nature than that he had encountered on the west coast, more especially the Niger. But from what he had learned of the traders at , he feared that the rivers on the east coast were much less inimical to European life than those of the west . The Zambesi was about twenty-five degrees south of Niger; but there seemed to be no defect of heat– that element in the causation of fever–in the Zambesi, to the day's meteorological observations which Dr. had appended to his paper. The difference the temperature of the dry and wet bulb thermometers far beyond anything met with in the Niger, and was of the unwonted dryness of the atmosphere in the . With regard to the treatment so successfully em-by Dr. Livingstone, the principle was of course not , although he was not aware that the precise formula of eminent traveller had hitherto been used; and as other 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."
Robert Hooper, Lexicon Medicum; or medical dictionary, 7th edition, (London: Longman, Orme, and Co., 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 quinine, had failed in Dr. Livingstone's hands, it was that the prescription he recommended should have 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 to give it all possible publicity. Dr. Livingstone alluded to the mortality in other African expeditions, and might not be uninteresting to the society that he (Dr. '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 expedition to the Congo in 1816; to the Zambesi, from Owen's ship, in 1823; to the Niger, under Laird,

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238ON FEVER IN THE ZAMBESI Lander, and Oldfield, in 1832; and to the Niger, under Cap-Trotter, in 1841-32. He should also state the mortality the *Eclair* in 1845, and, although not in chronological , the dreadful loss sustained by two detachments of at the Gambia in 1825; as also that suffered by Park's party, in the last journey of that great traveller the interior of Africa.

Tuckey's expedition to the Congo in 1816– Captain Tuckey H.M.'s ship *Congo*, entered the river Congo, on the south-, 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 thirty proceeded on a land expedition beyond the cataracts the river. Of this party, fourteen died of fever, and four on board the *Congo*–all within the space of three . One man also died from the effects of river fever leaving the river. Total loss, nineteen.

Of 7 officers - - - -	3 died.
" 5 naturalists, etc. - - - -	4 "
" 40 petty officers, seamen, and marines	12 "
	–
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Mr. M'Kerrow, the medical officer, describes the weather as , the thermometer seldom exceeding 76° Fahr., or being than 60°, with scarcely any rain, and the atmosphere . He describes the fever as an intense remittent, with, , black vomit in some cases. Bleeding (contrary to the of the missions to the Congo by Carli, Merolla, and) was unsuccessful as a remedy. Cathartics were useful; 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 great service, followed up by wine and bark.

The canoe expedition, from Captain Owen's ship, up the , referred to by Dr. Livingstone, consisted of Lieut. , MR. Forbes (midshipman), Mr. Kilpatrick (assistant- surgeon), and two black servants. They left Quilimane on the
23rd of July, 1823. On the 3rd of August, being then on the , Mr. Forbes was taken with fever, and died on the
15th. On the 27th of August, Lieut. Browne was seized, and on the 5th of September. Mr. Kilpatrick was attacked 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 in the *Quorra* and *Alburkah* steam-vessels, under 'Gregor Laird, Lander, and Oldfield, there were in the first- vessel, besides Kroomen engaged on the coast, a crew of -six persons, while the *Alburkah's* crew consisted of only. After some delay at Sierra Leone and Cape , both vessels entered the Nun branch of the Niger on the
18th of October, 1832. The captain and engineer of the *Quorra* immediately after the vessel entered the river. The boat-of the *Alburkah* also sank under fever at the same time. the 12th of November, when the vessels were at Damagû, way above the delta, many in both vessels were laid down fever; and on the 14th, one European only in the *Quorra* fit for duty. On the 21st of November the *Quorra* had thirteen, and the *Alburkah* two men. On the 5th of there remained alive in the *Quorra* four persons , including Mr. Laird. This gentleman, after various re-in his own person, and the loss of others of his crew, the Niger, and reached the sea on the 19th August,
1833. The *Alburkah* returned to the mouth of the river in 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 after the vessels began to ascend the river. Owing to death of Dr. Briggs at an early period of the expedition, have no account of his treatment on board the *Quorra*; M'Gregor Laird acquaints us that Lander bled and blistered sick, and gave emetics and purgatives at the outset of the . Blisters to the head appeared to do good service in cases, as in Mr. Laird's own case. Mr. Oldfied adminis-purgatives, shaved the head, and applied cold lotions. 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 iron steam vessels *Albert*, *Wilberforce*, and *Soudan*–the entered the Nun branch of the Niger on the 13th of , 1841, and commenced the ascent of the river on the

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 19th. At this time the strength of the expedition was as :–

	Officers, Seamen, and (Whites).	Men of Colour, nations.	Blacks, entered 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 of one hundred miles from the sea, on the 26th of ; and at Iddah, the capital of Egganah (where rock– sandstone–was first seen), on the 2nd of Septem-. Fever broke out in the *Albert*, and also simultaneously the other vessels, on the 4th of September, and ceased not it had paralysed the whole expedition. On the 10th, the persistence of the disease, the expedition at the confluence of the Niger and Tchadda. Here, how-, it was found necessary to despatch the *Wilberforce* and
Soudan to the sea, with their own sick and those of the *Albert*, the 19th. The *Albert* proceeded upwards on the 21st, and Egga, the Nufi capital, on the 28th of September. On 4th of October there remained fit for duty, one seaman 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.]* . was then resolved to return to the sea, which was reached difficulty on the 14th, and Fernando Po on the 17th of same month.

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

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

Every precaution which human ingenuity could suggest was to ensure the health of this expedition: provisions were the best kind, preserved meats and vegetables, and medical of every description were supplied. The ships were ven-upon Dr. Reid's plan; coffee was supplied to the crews in the morning, and quinine in wine was liberally admi-. The treatment consisted of purgatives, diaphoretics, 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 beneficial; general bleeding could not be tolerated.

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

	Deaths
From April 1st to June 30th, off the island of Sherboro, west coast Africa, several of the boats having been up the river	10
From July 1st to Aug. 31st, at Sierra Leone, the Gambia, and Boa , Cape de Verds	16
In a crew now reduced to 114, from Sept. 1st to the 21st, at Boa and Madeira; or at the rate of about 29 per cent. in three	33

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 -four people of colour, including thirty-three Kroomen: sixty-six persons.

She remained in the river five months, employed in survey-and in other scientific pursuits; besides holding commer-intercourse with the natives. Dr. Baikie and some others attacks of fever while in the river, which, in some cases, 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 it. There were also some scorbutic cases, but all came out the river alive. Dr. Baikie attributed the comparative im-of the crew to the use of quinine as a prophylactic, , in accordance with his instructions drawn up by Dr. , and in conformity with the recommendation contained 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)]* , . 188, he caused to be administered to the crew twice a day, 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 saying that, however unwilling he was to say a single word to quinine as a preventive of fever, truth com-him to state that, in this respect, it had not maintained reputation in the hands of Dr. Livingstone– a circumstance of the necessity of caution in dogmatizing too upon the powers of any remedy.

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

In Lander and Laird's expedition of 1832, in less than two , 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

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

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

Another detachment of ninety-one men, which in the mean-had been on board of a transport at the anchorage, and while there did not lose a man, was landed about the of September, and made up the force to one hundred and . Of this number, there had perished of fever, sixty- ;

and of other diseases, includeding six from fever following , 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 black soldiers of the 2nd West India Regiment lost only man, and had seldom any in hospital.

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