

Answer.—The objection is serious, nevertheless the following remarks may lessen its force.

1st Remark.—There are many women, Sonars and Pariahs, (low castes) who wear the same cloth for six months of the year not only without giving it to the washerman, but even without dipping it once in water.

The high-caste women, on the contrary, first give the dirty cloth to the washerman several times a year, and even every month, and then in order to preserve its brightness they often dip it in the water of the well A, at the same time pouring water over themselves.

As to the men of all castes, they bathe often it is true, but whilst the men of low caste prefer doing it in their cholam-gard-ns. the high-caste men bathe habitually at their well A, around which they do not fail to cleanse their cloths.

2nd Remark.—The wells of the low castes at Vadaken-coulam are surrounded by a parapet like that of the high castes, but the water, which falls on the outside of these wells, can flow off freely on all sides, not being retained by any obstacle. With the high castes, on the contrary, a space around the well A, is enclosed by a masonry wall, which prevents the water from spreading out, and consequently from evaporating as quickly as elsewhere, not to mention that it (the water) is partly shaded by some cocoanut trees.

Finally, the base of the parapet-wall is so worn away that there is a big hole in it, through which the outside water can flow into the interior.

2nd objection.—Several high-caste families affirm that they used exclusively the water of the well B for everything connected with food and drink, and that they used the water of the well A only for necessities outside the house, which had no connexion whatever with food or drink.

Now, among these families there have been, as elsewhere, attacks and deaths. Nevertheless the well B is nearly in the same condition as the wells of the low castes; people rarely bathe at it, its waters do not stagnate around it, and hence it becomes necessary to seek a cause for the cholera other than the infection of the waters of the wells A and B.

Answer.—It is possible indeed that there may be other causes; nevertheless the following remarks are sufficient I think to justify the suspicion thrown upon the unwholesome infiltrations at the points A and B; but particularly at the well A.

1st Remark.—The well B is, it is true, nearly in the same condition as the wells of the low castes, nevertheless there is a difference, it is, that the parapet wall is pierced at its base by a big hole, by which the rain water of the street enters the interior.

2nd Remark.—The families who use the well B, state that they took some of the water A for external use. Now this is what may possibly have occurred: the two vessels containing, one the water B for cooking and drinking, the other the water A for purposes of cleanliness being set down at the house* in the usual way no doubt,

* i. e. without taking proper precautions to distinguish the vessel containing the water A from that containing the water B, or so arranging matters that children or others could not possibly use the water A for drinking or cooking. The vessels containing the different waters were probably alike.—W. J. H.

children, persons in a hurry and not thinking of what they were doing, may very possibly have drunk a certain quantity of the water A with so much the less scruple, seeing that a great number of other families used only that particular water.

Conclusion.—Whilst bowing humbly before the mysteries of Divine Providence, who makes use of secondary causes for the purpose of purifying and trying us, it is reasonable to search after these secondary causes. In the case which now occupies us, and its remarkable course, it seems reasonable to fix the cause on the unwholesome infiltrations of rain water into the well A, and perhaps also into the well B; for the extraordinarily heavy rains of 1877 might have produced two quite opposite effects, one amongst the high castes, the other amongst the low castes: whilst these rains by carrying the outside filth into the high-caste wells infected these wells; on the contrary, in the case of the low-caste wells, these same rains must have swept far away all the infected matter, or at least allowed them to infiltrate only little by little in quantities insufficient to produce the disease.

15th September, 1879.

NOTES ON EARLY SANITATION IN INDIA.

BY SURGEON-GENERAL C. A. GORDON, M.D., C.B.

(Continued from page 302.)

The following Regulations for a Camp Hospital bear date 1st December 1760.

In consequence of a Minute of Consultation held on the 7th of last month, for remedying the irregularities which have been introduced in the management of the Camp Hospital, the following regulations are now made and ordered to be observed for the establishment thereof:—

That after the rate of two pagodas a month be deducted from the pay of patients, and the Company to defray all the surplus charge.

The sick to be provided with such diet as the Surgeons shall think necessary for their case. If the victualling can be performed by contract on the same terms as in this garrison, it will be most agreeable in all respects.

Resolved, that Mr. Briggs be Surgeon-General to the Army, and that he be allowed ten shillings a day for that duty, which is to be as follows:—

He is not to be embarrassed with the charge of any particular corps, but to superintend the whole, as well the General Hospital as the sick in the field.

In the first place he is to take an exact account of all hospital stores, clothing and medicines belonging to the Company now remaining, and to indent from time to time to Madras for what further may be wanted, that so no stores, clothes, or medicines may be purchased in camp; and whenever he may have occasion to indent for new supplies, he must at the same time send in an account of what remains.

The Surgeon-General is to have under his charge

and direction all stores and medicines, and to issue them as occasion may require, and to take care that such servants as are really necessary for the duty of the hospital be employed at the Company's charge, and no more.

All the other surgeons to report to him the state of the sick and other occurrences in their several departments, and he only is to make general reports to the Governor and Commander-in-Chief.

He is to cause regular accounts to be kept in the hospital, expressing the name of the patient, his disorder, the corps to which he belongs, the day received,

and the day he died or is discharged, that so the contractor (supposing the hospital to be victualled by contract) may be duly paid conformably thereto at the end of every month.

He is also to cause a particular account to be drawn out at the end of every month for each of His Majesty's regiments, debiting the same for the charge incurred for victualling the patients and crediting for the sums received by deduction as above from the men's pay, which account must be certified in the following manner:—

Dr. **EYRE COOTE, Esq., OF H. M.'s 84th REGIMENT.** Cr.

To provision for the undermentioned soldiers of the said Regiment in the Company's Hospital at Waldour, in the month of December 1760, 4 fanams each per day, at 42 fanams per pagoda, viz.

Names.	Time admitted.	Time dead or discharged.	No. of days.	P.F.C.
John Oakes	1st December	Dis. 15th Decr.	15, at 4 fns. per day	0 60 0
Thos. Stiles	10th "	Died 20th "	10, at "	0 40 0
				2 16 0

WALDOUR; }
31st December, 1760 }

By Cash received by deduction from the pay of the several patients this month after the rate of Pagodas 2 per month, being at 42 fanams per pagoda.

Names.	Time admitted.	Time dead or discharged.	No. of days.	P.F.C.
John Oakes	1st December	Dis. 15th Decr.	15, at 2-64 pagodas	0 42 0
Thos. Stiles	10th "	Died 20th "	10, at "	0 28 0
By Balance advanced and paid by the President and Council of Fort St. George				0 30 0

(Sd.) STEPHEN BRIGGS,
Surgeon-General.

I do hereby certify the foregoing to be a just and true account, and that I will be answerable for and make good the balance thereof advanced by the President and Council of Fort St. George to the Court of Directors of the East India Company whenever they shall require the same.

(Sd.) EYRE COOTE.

Camp before Pondicherry, }
The 21st December, 1760. }

A like account is to be drawn out monthly for the men of the Company's corps, signed only by the Surgeon General, and the Paymaster at the camp is to pay the several balances to the contractor upon his producing the said accounts regularly signed and certified as above and not otherwise.

The Surgeon-General is to cause like accounts to be drawn out for the several regiments for the time past since the taking of Waldour in as exact a manner as possible from the accounts that have been kept, in order that the same may be certified by the Commandant of each corps.

If it should at any time happen that the victualling of the hospital should not be contracted for, the Surgeon-General is then to cause the patients to be victualled at the Company's charge, and the several accounts above mentioned are in that case to be debited for the real charge whatever that may happen to be.

The Surgeon-General is allowed a writer to keep the above accounts.

Agreed, that Mr. Briggs have the allowance of ten shillings a day from the time he was appointed to act as Surgeon-General, and that instructions be now prepared for him agreeably to the foregoing plan.

Ordered, that a copy of the above regulations be sent to Colonel Coote, and that he be desired to give the necessary orders that they may be complied with.

As a great charge will be incurred, besides that of victualling the hospital, and which on behalf of the Company we do take upon us to bear, it appears but reasonable that the medicines which His Majesty sends out yearly for his regiments be delivered to the Surgeon-General for the general service; and it is agreed to request of Colonel Coote to give orders accordingly.

(Signed) GEORGE PIGOT AND COUNCIL.

With reference to the above, let the circumstance be borne in mind that such was the first attempt made at organising a regular system of war hospitals in India. The defects and insufficiency of the establishments formed according to that plan gradually became apparent in actual work, and the whole was subsequently altered; the point, however, which now strikes us is that in 1878, by way of something new, and as a great advance, a plan is introduced precisely similar to the first crude attempt made in 1760, namely, one hundred and eighteen years previous. Of course history will repeat itself. It always does.

In 1765, the subject of pensions to widows and orphans of deceased soldiers was reconsidered. It was then agreed in Council that "the widow now applying be allowed one pagoda per month until she marries," also "to consider of providing some establishment for the relief of the families of deceased soldiers who are destitute of support."

The European Infantry in Bengal is at this time described as being weak and in a wretched condition, so much so that the success of the campaign against Suraj Dowlah was matter of surprise to Lord Clive and the Council of Fort William.

In 1766, Colonel Campbell was directed to consult with Mr. Pyne concerning the most convenient spot for *sheds* for sepoys and the least expensive method of building them. He is also to acquaint Mr. Pyne that we (the President and Governor and Council) would have him complete in the most frugal manner what may be necessary to be done in the hospital, the *elaboratory*, and the place for hospital clothing.

The manner of sending troops by coasting vessels was inconvenient. Reinforcements having been required in Bengal from Madras, troops were sent in small detachments of 27 and 35 privates with officers by the "Cuddalore" schooner, the "Royal Charlotte" and other vessels.

Punishments were severe, James Jolland, Joseph Swingler and Mathew Malone are sentenced to death for mutiny, John Lloyd to receive 1,500 lashes and Peter Murphy and Robert Mackenzie to receive 1,000 lashes each for the same crime.

Sick soldiers in hospital were dieted by contract; the allowance to the contractor 4 fanams per day, at 42 fanams per pagoda (Rs. 3); the hospital stoppages from the men at the rate of 2 pagodas per month.

In 1762, the force assembled to proceed to Manila was hampered by sick, there having been 898 in hospital out of an aggregate strength of all classes of 8,000. The surgeons of the ships conveying them were allowed at the rate of $\frac{1}{4}$ pagoda per month per man for medicines, &c., during the time they were on board.

At Trichinopoly it was considered necessary to keep a quantity of Batavian arrack in garrison "to encourage the men to do their duty the more cheerfully in case of a siege."

The custom of soldiers bathing in the trenches outside Fort St. George was forbidden. It was ordered that "any sentry who perceives any man, white or black, going to the trenches is to call them out, and at their refusal to take them prisoners."

In 1763, an order was issued authorizing the issue of lb. $1\frac{1}{2}$ of rice gratis to each soldier at Trichinopoly.

The sepoys at Manila having complained greatly of want of ghee, a supply of that article of their food was ordered to be dispatched to them.

In 1764, the Council of Fort Saint George expressed an opinion that all the recruits who arrived from England should remain a season on the coast before they proceeded inland, as the climate would in such a case not be so fatal to them.

At this time Hill stations had yet to be obtained possession of in India. Here, however, is an indication of what was considered the best thing to be done under the circumstances to acclimatise the troops, namely, to retain them for a considerable time on the sea coast. The circumstance may be mentioned in connection with this point that in 1848 a precisely similar method was followed by the Mission establishments on the coast of Guinea;

young missionaries were retained there for a longer or shorter period in fact until they had undergone "their seasoning," as the first attack of endemic fever was called, before being sent to stations situated inland.

The Bengal Government applied to that of Madras for assistance in men; the spirit of mutiny had broken out afresh among the Bengal sepoys; the greater part of the European troops were worn out by sickness and fatigues they had been subjected to from the length of time they had been in the field against Suraj Dowlah.

From a casual allusion to the circumstance in the records to which we have referred, it appears that at this time the passage home of time-expired men was not paid for by the East India Company, only that of invalids was defrayed by them. It does not appear in what manner soldiers whose period of engagement had expired were disposed of.

The Madras troops at Madura, like those in Bengal, were reduced by sickness and action, many were disabled and worn out by service, so much so that it was advised to wait the fall of that place by a close blockade, not thinking it prudent to make another attack.

A body of recruits for a new regiment of sepoys then raised having arrived at Vellore, Colonel Campbell reported to the Governor that he "cannot think it possible that they have been examined by any officer. Fifty-four of them are absolutely unfit to carry sticks, far less firelocks. I have turned them about their business, for it is better that the Company should lose fifty-four rupees than pay men who are incapable of ever rendering any service."

In 1767, Mr. Lucas, Surgeon, represented the great inconvenience and delays occasioned in long marches by the desertion of and want of coolies for carrying the sick. He was accordingly empowered to engage dooly coolies in monthly pay for the army at the rate of 2 pagodas per month each.

In 1767, not only were soldiers in England who enlisted for the local service of India accommodated, until required to embark for that country, in barracks specially erected for them, but on arrival at their destination they were immediately received into buildings of the same description. No doubt the circumstances of India rendered this measure a mere necessity; no doubt also the barracks, such as they then were, possessed few of the sanitary requirements as now recognised; it was not however until some years afterwards that definite instructions regarding the construction of barracks appear to have been issued.

In 1770 and 71, a kind of Municipal Commission or Board of Police was established at Madras, the members elected by the suffrages of the inhabitants. The duties of this Board were defined to be "to draw up regulations for the better supply of provisions, for lighting and paving the town, for the removal of public nuisances, the conduct of servants and their rates of wages, &c." These different points, be it observed, appertain to hygiene, which in those days was recognised under the more homely name of *Medical Police*; it is on record however that the efforts of the Board were so ill appreciated and resented that one by one its

members declined to serve upon it; nor were subsequent years to be without numerous examples of appreciation by the public of exertions for its welfare on the part of individuals.

In 1794, the subject of barrack construction appears to have been again discussed; thus by the following extract of a letter, dated at Pondicherry 15th August 1794, from Lieutenant F. Capper, Barrack Master, Centre Division, to Colonel John Braithwait, Commanding the Army, in reply to a reference regarding the demolition of all public buildings at Pondicherry excepting such as were required for quarters.

“It appears that quarters may without difficulty be provided for 2,720 Europeans and one battalion of sepoy, which far exceeds the present strength of the garrison; this calculation has been made upon the principle of allowing three feet to every man, which gives him sufficient space for his cot and a small interval between.”

Three running feet per man was thus allowed instead of nine as at present. Nevertheless there is every reason to believe that at that time the nature of accommodation provided for the soldier in India was superior to that which obtained in the United Kingdom. It does not appear that in the former soldiers were arranged in tiers of bunks as they were in England; at Dover the troops quartered in the castle had only 147 cubic feet of space per man; at Devonport, Portsmouth and Chatham the barracks were described by Dr. Brocklesby as sweeping off the troops like a perpetual pestilence. There is no evidence against the belief that in India each soldier was at least allowed to have a bed to himself in the then existing barracks, the material of which those buildings were composed being apparently wood and unbaked brick as we meet with in some so-called temporary barracks of the present time, or at least did a few years back. In Britain on the other hand, not only were the soldiers placed in bunks one above the other, but the bunks were so arranged that two and even three men slept in the same one; the soldier off guard taking the place of him who had just gone on duty, and in some instances those attacked by disease were left with their comrades. In the West Indies hammocks superseded bunks in barracks about the same date, the change being considered a great improvement.

Native dressers, or black doctors as they were called at the time, were appointed to each of the sepoy battalions with the pay of Havildar.

Some deserters having been convicted and sentenced to death or corporal punishment, the former were made to draw lots; and accordingly the two on whom the lots fell were shot. Four grenadiers at the same time received as much of their punishment of flogging as the Surgeon judged could be given without endangering their lives. They shall have their lives, said their Commanding Officer; they shall have the rest of their punishment when they are fit for it.

“I wish,” so wrote Brigadier-General Joseph Smith after the battle of Chengamah, “I wish on these occasions of service the hospital was amply provided with Surgeons; we could then afford some succour to the poor and brave sepoy who is wounded and loses a limb in the service.

It would be a great encouragement to them to do their duty with spirit.” Surgeons,—good Surgeons for troops on active service—was then the cry as it has often been since, although the force of the argument made use of by General Smith has not always been appreciated as he evidently felt it, namely, ample succour to the wounded and maimed soldier; also that the knowledge that such succour was at hand “would be a great encouragement for them to do their duty with spirit.” Many years after he thus wrote, the truth of his remarks obtained confirmation in accounts published regarding “The battle-fields of the South” during the American war of 1862-4; and with regard to the two first actions of the French against the Germans in the banks of the Rhine in 1870.

(To be continued.)

MEMORANDUM ON FAMINE DIETETICS.

BY SURGEON-MAJOR I. B. LYON, F.C.S.,

Professor of Chemistry and Chemical Examiner to Government, Bombay.

(Continued from page 307.)

Proceeding now a step further in the consideration of the question,—What are the conditions by which we should be guided in the construction of a famine wage or scale of wages? It is evident that the three main factors which may affect the sufficiency of a famine wage are—

1. The normal average weight of the famine-stricken population;
 2. The amount of work which it is proposed to exact from the recipients of relief;
 3. The price of grain;
- and these three I now propose to consider.

1st.—As regards the normal average weight for the famine-stricken population. It is, I think, clear from what was stated at the commencement of this memorandum, that an amount of food sufficient for the requirements, under certain conditions, as regards work, &c., of a body of individuals of low average weight is not sufficient for the requirements under similar conditions, of a body of individuals of higher average weight, and conversely. The amount of food required by a body of individuals of high average weight under certain conditions, as regards work, &c., is greater than that required by a body of individuals of lower average weight under similar conditions. Now seeing that the inhabitants of different Indian provinces differ greatly in average weight, it follows that no single famine wage or scale of wages can possibly be capable of universal application in India; a famine wage for example which will suffice in Bombay, will not suffice in Sind and the Punjab. Hence in framing a famine wage, the first point to look to is the normal average weight of the famine-stricken population.

2nd.—As regards the amount of work exacted. It may be taken as an accepted fact that within certain limits, the more work we exact from individuals the more food these individuals will require. Hence the