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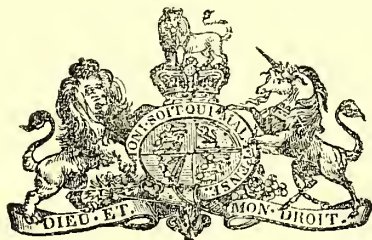
ON THE

CAUSES OF REDUCED MORTALITY

IN THE

FRENCH ARMY SERVING IN ALGERIA.

Presented to both Houses of Parliament by Command of Her Majesty.



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Carte générale de l'Algérie.
Environs de Boufarik.

40062

13.

Sir,

2nd January 1866.

With reference to my letter of the 11th November last on the subject of the appointment of a Committee of Inquiry into the sanitary arrangements in force amongst the French troops in Algeria, I am directed by Earl de Grey to enclose herewith instructions for the guidance of the Committee in their proceedings.

I have the honour to be, Sir,

Your obedient servant,

J. Sutherland, Esq., M.D.

EDWARD LUGARD.

INSTRUCTIONS FOR THE COMMITTEE ABOUT TO PROCEED TO ALGERIA.

Earl de Grey and Ripon having reason to believe that much useful information in regard to the sanitary arrangements for troops serving in hot climates, especially in the field, might be obtained from the experience of the French army in Algeria, you will proceed to that country, and place yourselves in communication with the military authorities there, who have received instructions to render you such information and assistance as may be necessary.

You will inquire into the nature and results of the sanitary arrangements referred to, and report on these, stating at the same time to what extent they will in your opinion be applicable to Her Majesty's troops serving in India and other hot climates.

To J. Sutherland, Esq., M.D.

J. Paynter, Esq., Dep. I.G. of Hospitals.

Major C. B. Ewart, R.E.

R. S. Ellis, Esq. C.B., Her Majesty's Indian Civil Service.

War Office,

29th December 1865.

REPORT
ON THE
CAUSES OF REDUCED MORTALITY
IN THE
FRENCH ARMY SERVING IN ALGERIA.

TO THE RIGHT HONOURABLE THE SECRETARY OF STATE FOR WAR.

IN compliance with our instructions, we met in Paris on the 4th January last, and proceeded to make arrangements for carrying out this inquiry. We placed ourselves in communication with His Excellency Lord Cowley, and through him with the "Ministère de la Guerre," where we were referred to the "Conseil de Santé des Armées," of which M. Maillot is President. We had the advantage of meeting several members of the Conseil, to whom we stated our object, and with whom we had an opportunity of fully discussing the various points of the inquiry committed to us. We also met by appointment M. Levy, Director of the Army Medical School at Val de Grâce, M. Boudin, and M. Mélier, Member of the Comité de Hygiène in the Ministry of Agriculture, Commerce, and Public Works; from all of whom we received valuable assistance and advice.

All the parties with whom we had the opportunity of communicating in Paris concurred generally in opinion as to the causes of the former high rate of mortality in the French army serving in Algeria, and also as to the measures which had led to so great a reduction in the death rates of recent years. But they, at the same time, considered it highly desirable that we should examine the facts for ourselves, and see with our own eyes the conditions to which troops serving in Algeria, as well as the civil European population, were exposed. In furtherance of these objects they supplied us with official documents containing a portion of the facts; they indicated to us certain other documents which we could obtain, they supplied us with the names of medical officers in Algeria, who could give us practical information, and pointed out the stations which we ought to visit.

The Government of His Imperial Majesty at the same time transmitted to Algeria the necessary instructions to the authorities in that country to render us every assistance we required.

Having completed our preliminary inquiry at Paris, we embarked at Marseilles on the 13th January, and arrived at Algiers on the 15th. Next day we placed ourselves in communication with Mr. Churchill, Consul General, who kindly afforded us whatever assistance we required. He accompanied us to His Excellency the Duke of Magenta, Governor General of Algeria, who received us in the most courteous manner, entering warmly into the object of our visit, and who at once issued the instructions necessary for placing us in communication with the authorities throughout the country.

In the course of our inquiry we received information and assistance from the governors of provinces, commanding officers, medical officers of various grades in the service, from civil authorities and other persons interested in our work, and we personally inspected the following places, which had been pointed out to us as affording illustrations of the local conditions which surround the European population, and to which the soldier is also exposed while serving in Algeria. It was also stated to us that several of the localities at the same time afforded remarkable examples of the influence of sanitary works in improving the public health.

In the province of Algiers we examined Algiers itself,

Boufaric,
Blidah,
Fondouk,

and the drainage works at

Lake Halloula.

In the province of Constantine we visited

Bona,
St. Charles,
Constantine,
Batna and Lambése,
Biskra,
Philippeville,

and several agricultural colonies. In the province of Oran we inspected the new military station of Sidi Bel Abess, besides the garrison of Oran itself.

At these places we entered into communication with the civil and military authorities; we had opportunities of examining the general sanitary state of the districts through which we passed, and of discussing our special object with various classes of officers on the spot.

We inspected the barracks, hospitals, stables, and other military establishments; we made inquiry respecting the state of health, past and present, of the troops and civil population, and at the same time inspected various classes of public works, of drainage, water supply, &c., as also the general sanitary condition of the towns themselves.

We completed our inquiry, as far as the time at our disposal admitted, in the last week of February, and left Algeria on the 28th of that month.

In dealing with the information we have obtained, we propose—

1st. To state the facts brought before us in regard to the mortality, past and present, of the French army in Algeria, in connexion with the health of the colonists:

2nd. We shall describe the causes to which the former unhealthy condition of troops and colonists is to be attributed:

3rd. The causes of diminished death rates, and the various measures which have been adopted for improving health and diminishing mortality; and

4th. We shall state to what extent improvements of the same kind would be applicable in India and in other warm climates generally.

*Mortality of
the Army.*

I.—PAST AND PRESENT DEATH RATE OF THE FRENCH ARMY AND OF THE CIVIL POPULATION IN ALGERIA.

There are no consecutive statistical data affording a precise comparison between the past and present state of health of the French army in Algeria. The death rates during the years immediately succeeding the conquest appear never to have been officially deduced and published; but for the last two or three years this has been done, so that the present state of health of the army can be ascertained.

The mortality for the earlier years of the occupation was published by M. Desjobert, in the *Annuaire de l'économie Politique* for 1851,* an extract from which will be found in Appendix No. 1. It appears from this document that the death rate in Algerian hospitals for the first five years succeeding the conquest amounted to nearly 79 per 1,000 per annum; that from 1831 to 1848 inclusive, the mortality in the hospitals of Algeria, excluding the deaths among men who died after their return to France, was 74 per 1,000; that out of a total aggregate effective of 1,019,392 men, there had been 1,142,632 admissions to hospital, exclusive of cases treated in barrack rooms and in regimental infirmaries, and that while the mean annual deaths in battle amounted to 190 men, the mean annual deaths from disease were 4,180 men.

In Appendix No. 2 we have given a return kindly supplied to us by M. Maillot, President of the Conseil de Santé des Armées, which contains the approximate death rate down to 1848.

It will be observed that the mortality for the period 1831 to 1846 is given, on the authority of M. Desjobert, at 80 per 1,000 per annum, and that the mean death rate for 10 years, 1837 to 1846, is stated at 77·8 per 1,000, while in 1847 the death rate was 30·79, and in 1848 35·77 per 1,000.

This table shows that the death rate has been subject to large variations in different years, in the same way as it has varied in India, and that while it was comparatively low in 1847–8, it had been as high as 74, 94, 108, and 140 per 1,000 during preceding years. It will, however, be sufficient for our purpose to assume 80 per 1,000 as representing the death rate of the earlier years of the occupation of Algeria.

* Documents Statistiques sur l'Armée, &c.

There is no available statistical account of the diseases to which the high mortality of the earlier years was due, but it will be seen from the official table, Appendix No. 2, that the order of frequency in which the different diseases occurred was as follows :—

1. Dysentery.
2. Diarrhœa.
3. Pernicious (malarial) fevers.
4. Typhoid fever.
5. Pneumonia.
6. Fevers without designation of type.
7. Pulmonary consumption.
8. Cerebro-spinal meningitis.
9. Small pox.
10. Hepatitis.
11. Bronchitis.

We have not been able to obtain statistical records for the 10 years succeeding 1848, and we can give no account of the movement of mortality during these years. For 1859, 1860, and 1861 there are certain data given in an official report on Algeria,* from which the following death rates have been abstracted :—

Years.	Effective on 31st December.	Number of Deaths.	Mortality per 1,000.
1859	83,970	4,763	56·7
1860	65,455	1,168	17·8
1861	69,471	785	11·3

For the years 1862-3-4 we have the first precise data in the published reports of the Conseil de Santé des Armées† showing the death rate and diseases for these years. The results are as follow :—

Years.	Mean Effective.	Deaths.	Mortality per 1,000.
1862	54,040	666	12·21
1863	53,772	661	12·29
1864	61,267	1,302	21·25†

The mortality from disease during 1864, a year of military operations was 14·48 per 1000. It hence appears that the death rates during recent years have been less than one sixth part of what they were during the years following the conquest of the country.

These main statistical facts, which we have to consider and for which we have to account, are striking enough, and it is not necessary to enter into any criticism to ascertain their value more precisely than we have done.

The question to which we are required by our instructions to furnish a reply is simply this: By what procedure has it been brought about that the death rate of the French army serving in Algeria has been reduced from 80 to say 13 per 1,000 per annum?

Before proceeding to discuss this question it is necessary to ascertain whether any change has taken place in the frequency and mortality of the more important diseases.

We have already given all the information at our disposal as to the nature of the fatal diseases during the earlier years of the occupation of the country. The following tables (Statistique Medicale de l'Armée, 1863, pp. 32-33,) show the relative proportions of the

* Tableau de la Situation des établissements Français dans l'Algerie, 1858-61.

† Statistique Medicale de l'Armée 1862-3-4.

‡ The year 1864 was a year of military operations, and of the 1,302 deaths occurring in that year there were 415 killed before the enemy. Deducting these deaths, the mortality from disease, including diseases contracted in the field, was 887 = 14·48 per 1000, an excess of 2·19 per 1000 over the death rate of 1863, and due apparently to field service.

principal diseases in 1863, and may be assumed as representing the movement of disease at the present time.

Diseases.	Admissions.	Proportion per 1,000 of all Diseases.
1. Simple intermittent fever - - - -	10,790	331
2. Primitive syphilis - - - -	2,693	83
3. Remittent fever - - - -	2,096	64
4. Acute dysentery - - - -	1,448	44
5. Acute diarrhœa - - - -	1,427	44
6. Acute bronchitis - - - -	1,245	38
7. Marsh cachexy and its accompaniments - -	656	20
8. Constitutional syphilis - - - -	624	19

The relative mortality of the principal diseases for the year 1863 is given in the same report as follows :—

Diseases.	Admissions.	Deaths.	Proportions of Deaths to Cases per 100.
Simple intermittent - - - -	10,790	9	0·1
Pernicious intermittent - - - -	224	72	32·
Remittent fever - - - -	2,096	10	0·5
Acute dysentery - - - -	1,448	30	2·
Chronic dysentery - - - -	129	13	10·
Acute diarrhœa - - - -	1,427	4	0·3
Chronic diarrhœa - - - -	99	5	5·
Acute bronchitis - - - -	1,245	10	0·8
Chronic bronchitis - - - -	256	8	3·
Marsh cachexy and its accompaniments - -	656	10	1·5

Besides the diseases in these tables there were 302 cases of typhoid fever, 85 of which, or 28 per cent., proved fatal, and 264 cases of eruptive fevers with 19 deaths; 15 of these deaths were from small-pox.

We have no means of comparing the proportionate mortality from different diseases in the earlier years with the mortality from the same diseases prevailing at the present time. There is, however, one interesting table, quoted from Dr. Lacger, showing the proportions for 1847–48 as compared with the proportions in 1863,* which appears to indicate that considerable change has taken place in the relative mortality from the more fatal diseases. It is as follows :—

Diseases.	Mortality per 1,000 of all Deaths in 1847–48.	Mortality per 1,000 of all Deaths in 1863.	Diseases.	Mortality per 1,000 of all Deaths in 1847–48.	Mortality per 1,000 of all Deaths in 1863.
Dysentery - - - -	224	92	Small pox - - - -	24	32
Diarrhœa - - - -	185	19	Hepatitis - - - -	20	21
Pernicious (malarial) fever - -	121	153	Bronchitis or pulmonary catarrh - - - -	14	38
Typhoid fever - - - -	82	180	Peritonitis - - - -	12	19
Pneumonia - - - -	62	68	Anasarca - - - -	12	13
Fevers without designation of type - - - -	44	42	Remittent fever - - - -	11	21
Pulmonary consumption - -	30	93		9	2
Cerebro-spinal meningitis - -	28	2			

The data contained in this table are too limited to enable us to arrive at accurate conclusions as to the extent of change of type in prevailing diseases.

So far as the data go, they indicate a considerable reduction in the deaths from bowel diseases, and a much higher proportion of deaths from fever, especially from typhoid fevers. The amount of fatal pulmonary disease has also largely increased. The data apparently indicate that from some cause diseases of the bowels have become more amenable to hospital management than they were formerly.

* Same Report, page 34.

One very important point established by these statistics is that whereas in 1847-48 the mortality among troops *in garrison* was 33 per 1,000 and among sick *in hospital* 41 per 1,000, in 1863 the mortality among troops *in garrison* was 10 per 1,000 and among sick *in hospital* 14 per 1,000.

The mortality among the civil European population in Algeria has followed a similar course of reduction to that which has occurred in the army. *Mortality of civil population.*

In Appendix No. 1. will be found a table showing the annual numbers of European population in Algeria, together with the births and deaths among them for the years from 1833 to 1847 inclusive.

It will be seen, from the notes appended to this table, that the general European death rate during the period amounted to 45 and 50 per 1,000, and that among the French settlers it was 60 per 1,000, while among Creole children living in Algiers the death rate under 15 years of age was 87 per 1,000, against 27 per 1,000 in France, and 26 per 1,000 in England.

An important fact is mentioned in the notes to this table, namely, that the soldier had hitherto been the chief agricultural labourer when he was not engaged in warfare, and that his death rate had been seven or eight times greater than among men of the same age in France.

In Appendix No. 3 is a table published by M. Boudin,* showing the mortality during six years (1845-51) in different towns and colonies in Algeria. The death rates, with few exceptions, were excessively high during these years. In several of the towns they exceeded 10 per cent; in one case, indeed, the deaths during one year were above 13 per cent, and during another year above 14 per cent. of the population. In the town of Chérchell nearly one-third of the European inhabitants died in 1849.

In the years from 1841 to 1851 the deaths were $44\frac{1}{4}$ per 1,000, in 1847 they were 50 per 1,000, and in 1849 above a tenth part of the population died.

During the years 1847-51 the annual mortality in the three provinces was as follows:—†

Province of Algiers	-	-	43 per 1,000
„ Oran	-	-	70 „
„ Constantine	-	-	38 „

As a general rule, during the earlier years children could scarcely be reared, and the deaths exceeded the births. The death rate among Europeans was likewise so high as to lead to a very general conviction that it would be impossible to colonize the country at all.

We have the means of comparing the death rates of these earlier periods of the colonization with those of more recent years.

In one group of localities, 10 in number (see Appendix No. 4), situated in the marshy plain of the Mitidja, the death rate during 10 earlier years was 48·44 per 1,000, while the annual death rate during 10 later years has been 33·51 per 1,000, showing a reduction of nearly 15 per 1,000.

In another group of 24 localities there was, during 10 early years, a death rate of 36·35 per 1,000, and in 10 recent years the death rate had fallen to 28·62 per 1,000, a saving of nearly eight lives per 1,000 per annum.

In a third group of three localities the death rate during seven early years was 38·22 per 1,000, and during seven later years it has only been 17·44 per 1,000, showing a saving of nearly 20 lives per 1,000 per annum.‡

The Mitidja plain contains some of the most unhealthy spots, naturally, anywhere to be found, and although much remains to be done before all the local causes of disease its presents are removed, the progress already made in improving the healthiness of this plain is most remarkable.

In other parts of Algeria the public health has also notably improved. Fatal epidemics are of much less frequent occurrence, and, as we shall afterwards show, the civil population generally has of late years benefited by the same improved conditions which have influenced the health of the army.

* "Histoire Statistique de la Colonization et de la Population en Algerie," 1853.

† Boudin, Histoire Statistique.

‡ M. Quesnoy, "Topographie Medicale de la plaine de la Mitidja," in the "Recueil de Memoires de Médecine, de Chirurgie, et de Pharmacie Militaire," September 1865.

11.—CAUSES OF THE FORMER HIGH DEATH RATE IN ALGERIA.

Before proceeding to discuss the causes to which the high death rate among the troops and civil population during the years succeeding the conquest of Algiers is to be attributed, it will be necessary to give a brief sketch of the topography of the country.

*Topography
of Algeria.*

Algeria extends from the frontier of Tunis to the frontier of Morocco, from both of which states it is divided by lines running nearly south from the Mediterranean.

Its length is about 550 miles, without including the numerous indentations and bays which are found along the whole coast. Its breadth is indeterminate, and has no natural or political boundary, on account of the character of the country and of the tribes which inhabit it from the borders of the table lands to the Great Sahara. Ouargla, the most southern town of the province of Constantine, is about 325 miles in a straight line from the nearest point of the coast, and 210 miles from the northern limit of the Algerian Sahara or date country.

Algeria is divided generally into two zones or regions, the *Tel* and the *Sahara*. The *Tel* extends from the sea coast to the margins of the desert, and is from 80 to 150 or 160 miles in breadth. It is a very irregular country, formed of plains, mountains, valleys, and plateaux, and is the seat of all the agriculture properly so called.

The sea side region of the *Tel*, which consists of lesser groups and chains with intervening valleys, is generally called *Sahel*, from its local position. South of the *Tel* is the Algerian Sahara.

The northern coast of Algeria consists of a succession of mountain chains or groups belonging to the secondary and tertiary formations, intermingled at various points with schists and erupted basalts and greenstones. These mountains vary in height from about 800 feet, near Algiers, to 6,800 feet, which is the altitude of the highest point of the Djerjera in the Kabyle country, east of Algiers.

In many places there are gaps in the chains occupied by deep, rather narrow alluvial valleys, receiving the mountain drainage of the slopes by which they are bounded. In these valleys is situated the principal arable land of the districts. In other places there are great alluvial plains, beginning between the mountain groups close to the sea level, and extending for many miles inland behind the sea coast chains, so as to isolate these mountains from the groups and chains of the Atlas which lie behind them. One of the most important of these plains, in its relation to the health of troops and colonists, is the Mitidja, already mentioned, which begins on the eastern side of the bay of Algiers, and thence proceeds inland to the south and west, between the hills of the Sahel and the chain of the Atlas for a distance of about 60 miles, and with a breadth of 10 or 12 miles.

Another great alluvial plain extends from the vicinity of Bona, southwards and westwards, for many miles behind the sea coast mountains. This plain contains an extensive shallow lake, the Fezâra, having an area of about 48 square miles.

A third similar plain, many square miles in extent, lies to the south-east and south-west of Oran, and contains a salt lake 20 miles in length by six or eight miles in breadth.

To the east of Mostaganem is the plain of Chelif, which also contains a lake.

Besides these there are several other large and fertile plains between the sea coast mountains, and the steppes.

The lakes in the plains are shallow, and have shelving margins covered with dense vegetation growing out of the watery bed of the lake. Their banks are extremely unhealthy at certain periods of the year, but all of them might be drained, and they probably will be drained eventually, as has been done with Lake Halloula.

On these plains, or in their immediate vicinity, many of the most important military operations were formerly carried on, and they were among the earliest seats of colonization. The plain of the Mitidja was formerly as proverbial for its fertility as it has been in modern times for its excessive unhealthiness. We shall state the cause of this afterwards. Its aspect, its relation to the surrounding mountains and the peculiarity of its meteorology, impress on it a striking resemblance to the fertile, unhealthy alluvial plains of India.

Still further inland are chains and groups of mountains whose general direction is from east to west, which must be crossed in order to reach the interior. At some points they approach close to the sea coast, but generally they lie 20 to 30 miles inland.

They are from 2,000 to 5,000 or more feet in height, and are the buttresses, so to speak, of the great table lands beyond. This mountain district contains numerous deep narrow valleys with small streams in them. The valleys are alluvial in character; they contain the chief groups of population and several considerable towns. There is a large

amount of arable land in them, and, from their peculiar local position, their inhabitants are all more or less exposed to malaria and its consequences.

This district of mountains and valleys is of various breadth, generally about 15 to 20 miles, and to the south of it and resting on its southern border are the steppes which extend southwards to the Sahara. These lofty table lands rise from 2,000 to 4,000 feet and upwards above the level of the sea. They consist of great secondary and tertiary plains, with hills, mountains, and mountain groups rising above them. They contain many salt lakes, but little good water.

The northern parts are more or less under cultivation, but the greater portion of their vast area consists of pasture land, or it is barren. The steppes are generally bare of wood. From their elevation they are exposed to great changes of temperature, and were it not for the excessive sun heat and dryness during a part of the year, the general aspect of the country would ally it more with the northern and less fertile parts of Europe than with the climate of Africa.

Heavy falls of snow sometimes take place on these steppes. A storm of this kind, as we shall state further on, occasioned great loss in an expeditionary corps, and was one cause of the high death rate among troops during that year. Generally speaking, however, these steppe lands, so far as we could judge from our short visit, are likely in the end to prove valuable both for cultivation and pasture, and there is no reason why, when improved, they should not be healthy. The steppe varies in breadth, but generally may be taken at about 40 to 50 miles or more. All expeditionary corps proceeding from the sea coast must cross the mountains and steppes before reaching the Sahara.

The southern limit of the steppe rests on the first mountain chains of the Sahara, which are its southern buttress, just as those of the Tel are its buttress on the north. These mountain groups and ranges, like those of the Tel, follow a direction from east to west and south-west.

After passing the water shed from which the streams and rivers flow towards the Sahara, the general aspect of the country undergoes a marked change. From the sea coast inland there are always more or less signs of fertility and of vegetation; the mountains, plains, and valleys are more or less covered with trees, underwood, grass or cultivation; but these begin to disappear as the desert is approached. The whole country becomes barren, the mountains rocky and bare, the plains and valleys covered with loose sandy soil and stones, interspersed with scrub bushes and a few oleanders and other shrubs near to watercourses. But the barrenness of the country is the result of want of water, or of want of economical use of existing water. The soil is a deep calcareous sand, and wherever water is applied by irrigation there are luxuriant crops. The great palm groves of the oases are all sustained by irrigation of the tree roots by water conducted from the rivers or from wells. This art has, indeed, been practised by the Arabs from time immemorial.

In the mountainous region of the Sahara the general level of the country begins to fall rapidly, and when the last ridges are left behind the barometer shows a difference of elevation between the table lands and the desert of above 3,000 feet. Where the steppes end the Sahara begins, and stretches away into the heart of the continent. The streams descending from the southern mountain ranges flow in a southerly course until they are lost in lakes or in the sands; good water is scarce, and supplies have sometimes to be carried for great distances over lines of communication which are rather traets than roads. It is to this district that the expeditionary movements of the French army are now mainly confined.

Appendix No. 5 contains a table of heights of the principal stations, from which it will be seen that many of them are at considerable altitudes, the highest station, Geryville, where military operations have recently been carried out, is situated in a region of lofty mountains and table lands in the south of the province of Oran, at an elevation of 4,461 feet above the level of the sea. With the exception of houses built on the sea shore, the lowest stations are those in the Sahara, of which Tougourt, one of the hottest spots in Algeria, is only 33 feet above the level of the sea, Biskra at the northern edge of the Sahara is 290 feet above the sea level.

It may give a better conception of the nature of the country to state the results of aneroid barometric measurements made both ways between the Mediterranean and the Sahara, and the following sketch section will give a good general idea of the singular configuration of this part of Africa.



Section Diagram of Algeria North to South from Phillippeville to Toucourt.

Starting from the level of the sea at Philippeville, the country rises gradually about 500 feet in a distance of 18 miles. There is then a rapid ascent across the first mountain chain towards the interior, until the ridge is crossed at an elevation of 2,000 feet above the sea level. The road then passes through an undulating country with deep valleys for a distance of about 26 miles, and crosses the river Roumel immediately below Constantine, after having descended about 1,000 feet. From the bridge, Constantine is seen on a rock 1,000 feet above it, and the road reaches the city, 2,000 to 2,100 feet above the level of the sea, by a very rapid ascent. Still proceeding southwards from Constantine, there is a descent of 600 feet into the upper valley of the Roumel, and after crossing the river by a bridge, the road rises towards the table land, attaining nearly the level of the city immediately after leaving Constantine. The road proceeds southwards across the steppe, attaining at the salt lake Mzouri an elevation of 2,700 feet; thence it proceeds still southwards to Batna, which is 3,600 feet above the sea. A few miles from Batna, but not on the road to the Sahara, is Lambése, where there is an agricultural colony and the great prison of Algeria, occupying the site of the Roman city and station of Lambessa. The altitude of Lambése is 4,000 feet.

The road to the Sahara attains an altitude of 4,000 feet a few miles south of Batna. This may be considered as the height of the southern margin of the steppe at the col where the road is carried; but the mountain chain rises to a much greater elevation. Forty miles S.E. from Batna is the Chelia, the highest summit in Algeria, 7,700 feet above the level of the sea. From the edge of the steppe the country begins to fall rapidly southwards to the Sahara.

In a distance of about 40 miles S.W. from Batna, El Kantra is reached. This is a cleft across the entire mass of the Aurés, through which the river Kantra leaves the mountain region to enter the Sahara. The chain at this point is simply an immense, nearly vertical, wall of rock, about a quarter of a mile thick at its base, with a narrow vertical cleft in it, spanned by an ancient Roman arch, under which the river passes. El Kantra is the real entrance to the Sahara, and the first oasis lies immediately outside it to the south. The arch is about 2,000 feet below the edge of the table land already mentioned. The descent from the table land takes place across a lower plain, and by steep roads among the mountains. The river Kantra is crossed many times by roads cut in its deep banks, in some places scarcely passable. From El Kantra the road descends still southwards, among bare hills and rocky ground, and crosses a comparatively level sandy plain, partly irrigated and under cultivation. It then crosses a range of low barren hills about 500 feet above the plain. These hills are the last offshoots of the mountains of the steppe, and from their summit the desert, with its oases, is seen stretching away in the distance as far as the eye can reach. The first station in the Sahara is Biskra, which is about 290 feet above the sea level.

Viewed in its relations to health, Algeria presents very various conditions. It is a country of mountain groups, table lands, deep valleys, extensive alluvial plains, burning desert on the south, the sea coast on the north, no very large rivers, all its rivers subject to overflow, and running between deep alluvial banks and over porous shingly beds. There are extensive lakes of brackish water, shallow in most parts, with reedy margins, which are hot-beds of fever in summer and autumn. Much of the land in the plains is more or less marshy, occasioned partly by the presence of impervious beds of clay below the surface, partly by filling up of ancient watercourses, and the result also of imperfect works of irrigation. In many parts of the country the ordinary water supply is scanty, and not good.

Climature.

It is only recently that a commencement has been made in obtaining a uniform series of meteorological observations throughout the country. This work is, however, in progress, and cannot fail to realize results beneficial alike to science and to public health.

Meteorological observers recognize two seasons in Algeria, a *wet or cold season* extending from November to April, and a *dry or warm season* from May till October. The local climates divide themselves naturally into four groups, depending on the configuration of the country; they are, 1st, sea coast climates, influenced by proximity of the Mediterranean; 2nd, climates of elevated plains, 50 or more miles inland, to a great extent beyond sea influence; 3rd, climates of lofty table lands further towards

the interior, influenced by elevation and exposure; 4th, climates of the Sahara. The climate of Algiers has, we believe, been ascertained by Dr. Bulard, the zealous director of the observatory there, but all the other climates are only in process of investigation. A few elements from some of the stations partly supplied by Dr. Bulard, partly observed by medical officers at stations, will give a general idea, at least, of the climatic influences to which troops are exposed on service in Algeria.

In Algiers the lowest mean monthly temperature takes place in January, and is between 48° and 49° Fahrenheit. The highest mean monthly temperature is experienced in August, and reaches 83.8° Fahrenheit for that month. The mean annual temperature is 66.5° Fahrenheit. The mean annual rainfall is 31 inches, and the degree of humidity varies from 51.5 to 75.5 .

At Oran in 1861 the lowest monthly mean was 37.4° Fahrenheit for January, and the highest 83.3° Fahrenheit for August; the rain fall was 13.9 inches.

In 1862 the coldest month at Bona was February, during which the mean minimum temperature was 44° Fahrenheit. August was the hottest month, its mean maximum temperature was $86\frac{1}{2}^{\circ}$ Fahrenheit.

Sidi Bel Abès, a new station between 40 and 50 miles inland and 1608 feet above the sea level, gave in 1861 as the mean minimum of January a temperature of 32° Fahrenheit, while the mean maximum of July was $101\frac{1}{2}^{\circ}$ Fahrenheit. The rainfall was 7.8 inches.

Tlemsin, about the same distance from the sea, and 2,624 feet above the sea level, had in 1861 a monthly minimum of 42.8° Fahrenheit in February, and a monthly maximum of 104° Fahrenheit in June. The rain fall of the year was 16 inches.

We have given in Appendix No. 6. a table of the approximate monthly temperatures and humidity for 12 of the leading military stations during the five less healthy months of 1865, from which it will be seen that the elements bearing on health are great heat, rapid changes of temperature, and little rainfall.

The climates generally are semi-tropical in character, and vary with the district, elevation, seasons, and direction of winds. Snow lies on the upper mountain ranges in winter. During summer there is a great difference between the day and night temperature, especially in the inland districts, and the depressing effects of the sirocco are more or less felt over the whole country.

The sea-shore climates are the least subject to variation. The temperatures of the table lands are higher and lower than those of the sea coast, and are subject to monthly variations of been 40° and 50° Fahrenheit.

The only information we were able to obtain regarding the climates of the Sahara is given in table 6, which contains observations on temperature and moisture at Biskra, and Laghouat. We were informed, however, that further south, at Tougourt, the temperature at night often descends to the freezing point after days of intense heat.

All the climates are subject to variation under the influence of winds, two of which are observed to exercise peculiar effects on vegetation as well as on the health and life of animals.

These winds are the sirocco and north winds. The sirocco blows more or less every month, but is most frequent in July, August, and September. Its temperature varies according to the mean temperature of the month. In summer it is as high as from 100° to 111° Fahrenheit, and in winter from 78° to 84° . This wind travels in straight lines, forming zones, extending from the desert to the sea, and reaching as far north as the centre of France. The zones are so narrow that they can be crossed in less than an hour. The wind carries with it a fine yellow sand, marking its course through the air. The point of the desert from which the wind proceeds can be ascertained by examining the sand under a microscope. In summer the advent of the sirocco is preceded by a great fall in the barometer.

This wind is most destructive to vegetation, especially to the vine, if it happens to blow when vegetation is active. Its effects on the human body are the same in Algeria as elsewhere.

Winds coming from the north sometimes lower the temperature to 35° Fahrenheit, while in localities sheltered from their action the temperature may be from 46° to 50° . These winds begin to blow at the autumnal equinox and continue more or less until the following May. At the middle of winter they are cold and dry, and they injure or destroy vegetation exposed to their action. The only means of neutralizing their effects is shelter, and it is not difficult to realize what their influence on health must be in troops exposed to them during the night after the hot sunshine of the preceding day.

There are other elements of climate besides mere temperature which it is necessary to

take into account in estimating the probable results of exposure on health. In many parts of Algeria the night dews are very heavy, and add considerably to the weight of tents, clothing, &c. The effects of exposure without shelter to night dews after the fatigues of a previous day's march need only to be alluded to, and yet this was formerly not an infrequent source of danger both with troops and colonists. The great plains are often covered in the morning with dense fogs, and all the vegetation is dripping with wet. Agricultural work has often to be carried on in these fogs while the workers are bathed in perspiration. The effect of this on health cannot be otherwise than injurious.

The long known influence of damp air in increasing the severity of endemic diseases has been observed also in Algeria. In an interesting note prepared for us by Dr. Mes-sager, of the Hôpital du Dey, at Algiers, he states that as soon as the first epidemic case of cholera appeared in 1866 sudden atmospherical change exercised a most unfavourable influence not only on patients under treatment, but on predisposed persons. The increase of attacks and deaths, he states, was greatest when the amount of moisture in the air had attained its maximum, which was 93 per cent. of humidity during the day and 95 per cent. during the night, and he argues from the experience that it is of great importance during all epidemic seasons to study meteorological changes with the view of adopting precautions for protecting health.

Some of the unhealthy conditions arising out of local climates can be modified or removed by drainage and agriculture and by attention to clothing, regimen, and times of work, but others belong to the natural position and configuration of the country.

When the French army and the colonists entered on possession of Algeria all the unfavourable local conditions had existed uncontrolled for centuries during the Arab and Turkish rule, and it need excite no surprise that the earlier death rates both among troops and colonists were so high as to suggest doubts, not yet entirely removed, as to whether the country could ever be permanently colonized by Europeans. The feeling on this point has been the same in Algeria as it still is in India. We shall afterwards show how far the French experience in Algeria has led to more enlightened views being entertained on the subject.

*Causes of
high death
rates.*

We next proceed to give some account of the causes to which the former high death rates in Algeria are to be attributed.

We received a large amount of information on this subject from military and medical officers and from civilians in various districts of the country which we visited. We found some slight difference of opinion prevailing as to the exact order of importance in which the causes of the high death rates should be arranged, but there was no difference of opinion as to the causes themselves, and, after examination and inquiry on the spot, we arrived at the conclusion that the views held on this subject were in the main correct. The evidence on which this conclusion rests is of two kinds—1st, the former existence of certain unhealthy conditions in the country itself, and in the mode of life of both troops and colonists, which were accompanied by a high death-rate; 2nd, the removal to a certain extent of these conditions, together with the introduction of improved habits and modes of life, being accompanied by improved health and lower death rates.

There are, besides, cases in which the evidence has been completed, so to speak, by a return to former unhealthy conditions having been attended by greatly increased mortality, which has disappeared on the removal of these conditions.

When the French conquered Algiers in 1830 the country was entirely new to them; most of it was in a state of nature, or rather, its natural capabilities had been neglected or abused by the tribes which occupied its surface, and all improvement had been checked by the rapacity of the Turkish rulers. The troops were strangers to the country, its climates, and the habits of life necessary to be followed in it.

The period, besides, was one during which hygiene could hardly be said to have had a practical existence either in the army or in civil life. Officers in command had to conduct expeditions through districts and to occupy localities whose probable influence on health they had no means of ascertaining except by experience.

To show the probable effect of want of experience in selecting positions on mortality, we may state that the influence of simple proximity to marshes and marshy ground in the plain of the Mitidja, as investigated by M. Quesnoy and given in Appendix No. 7, proves that in a district of country over which a generally malarious condition of the atmosphere prevails, as indicated by the existence of marsh fevers, the deaths have been 73 per 1,000 among the population close to the marshes, as against 40 per 1,000 among the population at a distance from marshes.

Besides exposure to local conditions, the effects of which on health had to be learned by experience, the troops were clothed as they would have been on service at home, without reference to the peculiarities of the Algerian climates; the ration was unsuitable, and consisted chiefly of biscuit; they had little or no fresh bread; there were few supplies of any kind to be obtained in the country; almost everything had to be imported. In occupied towns both troops and sick had to content themselves with any kind of accommodation procurable. Troops on service had at first little or no shelter, and were exposed to vicissitudes of climate in all seasons when military necessities rendered exposure necessary. There was no organized field transport and few roads; sick and wounded men had little chance of safe removal to the base of operations. Water supply was scanty and of inferior quality, and for a number of years there was almost constant service in the field. To these unfavourable conditions must be added a want of sufficient knowledge of the diseases of the country and of their treatment; and the condition of the country itself, without culture and drainage, generating deadly malaria in many districts which are now comparatively free from it.

It must be evident that military operations carried on under such disadvantageous circumstances must necessarily have resulted in a large loss of life and efficiency in the force engaged. In special cases, indeed, the losses were enormous, and went to swell the high death rates of the periods when they took place. As a general rule, also, years when expeditions have occurred have afforded higher death rates than years of peace, and this circumstance has led many persons to attribute the present lower death rate of the French army in Algeria mainly to the rarity of expeditions.

A few instances of the effect of exceptional conditions in raising the death rate will illustrate this point.

In 1837-38 a camp was established near the site of the present agricultural colony of Fondouk, about 20 miles S.E. of Algiers. The site where the troops were first placed was a marshy plain on the banks of the Khremis, a river liable to flood and overflow. The site was also exposed to cold malarious wind, blowing down the valley from the mountains beyond. So large was the amount of sickness and mortality among the troops that the camp had to be changed to higher ground, and it was eventually abandoned. In 1844 the present agricultural colony was founded about three-fourths of a mile from the original site of the camp. Next year nearly a fourth part of the inhabitants were swept away mainly by fevers and dysenteries, and during each of the two succeeding years nearly an eighth part of the survivors died annually. The cause of these immense losses of life among troops and colonists was malaria proceeding from marshy ground, to which were added, in the case of the colonists, malaria disengaged from ground newly turned over in the course of agricultural operations, want of knowledge and experience as to the kind of life which must be led to ensure health in a new country, and absence of the precautions necessary in commencing agricultural works in such a climate.

Similar losses were experienced at Boufaric, now an important agricultural colony in the Mitidja, about 21 miles S.W. from Algiers. In 1830 the site occupied by the colony was an uninhabitable marsh avoided even by the Arabs. In 1835 a camp was formed on the marsh, and the site of the town laid out. The result, both as regards troops and colonists, was most disastrous. Entire battalions were lost to the army, and the first inhabitants were almost swept away. We shall revert to this case to show how much may be done under circumstances so unfavourable as these to render even the most unhealthy districts not only habitable but comparatively healthy.

The town of Bona overlooks and was formerly exposed to the exhalations of an extensive swampy plain. In 1834 the town was considered scarcely habitable by Europeans, and entire regiments are stated to have been destroyed by death or inefficiency. For reasons to be afterwards stated Bona is now comparatively healthy.

These instances are sufficient to show the effect of unhealthy locality in apparently raising the death rate over the whole country. We shall next give one or two illustrations of the effects of climate on expeditions.

In the end of 1845 an expeditionary force, consisting of 2,800 men, left Setif for Bou Thaleb. Setif is situated in latitude $36^{\circ} 12'$ north, and at an elevation of 3,560 feet above the level of the sea. Bou Thaleb is on the table land still further south, and its mountain range reaches an altitude of 4,300 feet above the sea. On the 3rd January 1846 the camp then occupied by the troops between Setif and Bou Thaleb had disappeared under snow. Before the column returned to Setif 208 men had perished directly from cold, and 250 only escaped its effects. Twenty-two men subsequently died in hospital, raising the total mortality to 230, almost a tenth part of the force engaged.

The troops employed in the first expedition against Constantine (2,000 feet above the sea level), in November 1836, also suffered severely from the cold.

In 1859 an expeditionary force, consisting of two divisions of infantry and one of cavalry, was sent into Morocco against certain tribes which had invaded the French territory. The total deaths among troops in the stations of the province of Oran, to which the expeditionary column belonged, amounted to 3,270 for this year. The expeditionary force and its fixed ambulances yielded no fewer than 2,068 of those deaths. The reason of this great mortality was an outbreak of cholera among the troops.

These instances are sufficient to show that in comparing the past with the present death rates of the army allowance must be made for exceptional occurrences. It is true that unhealthy positions may be avoided, and that exceptional circumstances of service should, as far as practicable, be provided against.

We do not consider high death rates from disease during expeditions as inevitable; on the contrary, we believe that as the laws of health become better known, and their practical applications better understood by all officers having the charge and conduct of troops, so will the mortality from disease during expeditions, even under disadvantageous local circumstances, be gradually reduced.

The causes of early high death rates among troops were thus, malaria, general and local; unhealthy locality; want of shelter for troops and sick; want of suitable barracks and hospitals; insufficient rations and clothing; harassing expeditionary service; exposure to a strange climate by day and night; and want of knowledge of the habits of life required by the climate.

The civil population suffered from the same class of causes. The colonists were often persons of weak or enfeebled health, or persons of bad habits of life, who had been unsuccessful in their native country. They were suddenly thrown on a strange land, without any knowledge of its peculiarities or local conditions. They were brought into a new sphere of life, and into occupations to which they were strangers. They turned up the ground for the first time during unhealthy seasons and at improper times of the day, and they lived beside their work in inferior unhealthy dwellings. They were clothed unsuitably and fed badly, and as a consequence they perished by malarial diseases.

III.—CAUSES OF THE DIMINISHED DEATH RATE IN THE ARMY AND AMONG THE COLONISTS.

What we have already stated as to the causes of the former high mortality in the French army has prepared the way for a discussion of those measures to which the present reduced death rate is attributed. One prominent cause of the reduced mortality was pressed on our notice by a high authority, M. Boudin, who begged us to remember that the reduction in the death rate in Algeria had accompanied a reduced death rate in the army generally in France, and that one cause of this reduction common to both armies was generally improved administration*. Another prominent circumstance, which all persons with whom we held communication were unanimous in considering as of primary importance in diminishing the amount of disease and lowering the death rate in the army, is extended colonization and settlement of the country, together with the introduction of improved agriculture and drainage.

Improvements of this class have acted in two ways; first, by diminishing the general malaria of the country, and thus leading to improved stamina and better general health; second, by making supplies of all kinds easily accessible both for the use of the army and for the sustenance of the colonists themselves.

After careful inquiry on the spot, we are of opinion that the extension of colonization, agriculture, and drainage have exercised so important an influence on the whole question of public health that we consider it necessary to enter somewhat into detail in regard to the operation of these causes of improvement.

The colonization of Algeria may be divided into five distinct periods: *the first* period immediately succeeding the conquest, from 1830 to 1840; *the second* under Marshal Bugeaud, from 1840 to 1847; *the third* from 1847 to 1852; *the fourth* from 1852 to 1858; and the last from 1858 to 1862, up to which date statistics are available.

During the first period Algeria was the seat of constant warfare, the colonists not venturing to cultivate anywhere except under the immediate protection of the great military stations and a few outposts. The colonists, badly selected and unacquainted with the climate, died in great numbers; independent colonization was checked in favour of colonization by Government agency, which turned out to be at the same time expen-

* In Appendix No. 1, M. Desjobert gives the mortality of the French army serving in France 15 years ago, at 19 per 1000: while the present annual death rate of the same troops, as given in the "Statistique Médicale de l'Armée" is about $9\frac{1}{3}$ per 1000.

sive and unsuccessful. At the end of 1839 Abdel Kader declared war, in violation of the treaty of La Tafua, and attacked the camps of Oued el Hallery, Boufaric, and Blidah, burning and destroying the farm houses and crops in the plain of the Mitidja.

In spite of these difficulties, the civil European population in 1839 amounted to 25,000 souls, of whom 3,000 were agriculturists; the revenue, which in 1830 under the government of the Dey was only three millions of francs, had reached a sum of four millions and a half.

During the second period Marshal Bugeaud was Governor General of Algeria, and while military operations were vigorously conducted in the three provinces of Algiers, Constantine, and Oran, a great impulse was given to colonization by the establishment of sites of villages, or centres of population as they were called, on the sea shore and in the neighbourhood of large towns, so that at the close of Marshal Bugeaud's administration the European population had increased to nearly 80,000 souls, and the revenues to upwards of 20,000,000 of francs. There were formed during this period 19 towns, 45 villages, 26 hamlets and 1,257 farming establishments distinct from the villages. During the third period came the revolution of 1848, and a large number of colonists, upwards of 10,000, arrived in Algeria, the Constituent Assembly having voted 50,000,000 of francs for the establishment of these colonists; 42 centres of population were established in the three provinces; the colonists were provided with land, houses, and cattle. But the emigrants from France had been badly selected, for out of 10,450 of these colonists only 1,858 were acquainted with farming, the remainder being workmen at the trades required in a rich and luxurious capital, such as Paris. In 1852 the European population amounted to nearly 133,000 souls, upwards of 80,000 acres had been cultivated with cereals, nearly 2,000,000 of trees had been planted by the colonists, who had also begun to cultivate vines, tobacco, and potatoes. The agricultural European population possessed, according to official returns, 3,031 horses, 1,872 mules, upwards of 14,000 head of cattle, and nearly 17,000 sheep.

During the fourth period, from 1851 to 1858, Marshal Randon was Governor General, and colonization made rapid progress during his administration. The European population was, in 1857, 189,000 souls. Public works, civil and military, were actively extended throughout the three provinces; roads, harbours, and extensive drainage works were completed, and security prevailed over the dependency.

There were at this time 182 centres of population, and the rural population consisted of upwards of 80,000 souls.

There has been a marked and continuous improvement in the health of the civil population during the progress of later years. The death rate, which had at one time during the first occupation of Algeria been 8 per cent., had fallen in 1853 to 4.6 per cent., and in 1857 it was only 2.92 per cent.

The revenues and exports had doubled during this period, upwards of 200,000 acres had been brought under cultivation, and three millions and a half of trees had been planted.

At the commencement of the fifth period a special minister for Algeria was appointed, Prince Napoleon being selected; but the system of governing Algeria from Paris rather delayed than advanced the progress of colonization, and the present form of government was substituted.

The necessity of providing land for the increased number of colonists led, during this period, to a special study of the best means of making a definite settlement of the question as to whom the proprietary right in the soil should be conceded.

In spite of several bad seasons, the European population increases, having now reached 215,000, while their sanitary condition is nearly as good as that of the population of France.

The extent of territory occupied by the European population is upwards of a million acres, of which four-fifths are under cultivation.

Fruit and vegetables valued at 1,768,292 francs were in 1861 exported to France.

At the present time the total population of the French possessions, European (including the army) and native, is about three millions. In 1863 the births among Europeans exceeded the deaths by 2,184. In the same year there were upwards of four and a half millions of acres under crop by Europeans and natives. European culture is by much the most important element in the improvement of health, simply because its methods are better.

The culture is deeper, and more attention is paid to drainage. Mere scratching of the surface does little to improve the healthiness of a country; what is specially wanted in warm climates, such as Algeria, is deep ploughing, draining, and intelligent combination of works of irrigation with drainage works in cases where irrigation is necessary.

The extraordinary progress in prosperity which the colony has reached may be estimated when it is stated that Algeria occupies the sixth place, in relative importance, in the general commerce of France.

The extension of colonization and agriculture has thus been an important cause of improved health, and in those cases where the improvements in agriculture and drainage have been most prominent the effect on health has been very striking.

There has been great diminution both in the number of cases and severity of several diseases known to be occasioned more or less by marsh malaria. During the earlier periods troops and colonists used to be decimated year after year by dysenteries, pernicious malarial fevers, and the like.

In some of the districts where these maladies formerly prevailed drainage works and agriculture have been extensively carried out, and the diseases are stated to have become much less frequent and severe and to be more amenable to treatment.

For example, when Bona was first occupied the losses were very great from fevers and dysenteries, which were traced mainly to the malarial condition of the neighbouring plains. Bona itself is situated on a hill rising directly from the sea, and the plain which extends from it towards the south is very little raised above the sea level, and consequently there is very little natural outlet for the drainage.

The plain receives not only the rainfall on its surface, but also water flowing down upon it from the surrounding mountains.

The whole plain consists of a deep rich vegetable soil, which used formerly to be saturated with water, and all the population living on it, or exposed to its emanations, suffered intensely. It was at last determined to drain the plain, which was done by means of large deep main drains similar to those executed in marshy districts at home, and by forming a system of surface drains over the area leading into the main out-fall lines. The result of this large work was an immediate reduction in the sick and death rate.

It unfortunately happened that about 12 or 13 years ago one of the officials, whose duty it was to see to the drainage, allowed the drains to become more or less obstructed and inefficient. The result was a violent outbreak of fatal marsh fever, which carried off many, both of the civil and military population. The evil was traced to its source, and the drains were cleared and brought into efficient action; since that event they have been properly attended to, and now the town is stated to be healthy. At the same time agriculture and excellent market gardening have been extended over the surface of the plain, so that both improvements have no doubt co-operated in bringing about the present improved health of the town and district. The town has likewise been supplied with good water obtained by catch-watering the side of one of the mountains, and conducting the supply to filtering tanks between three and four miles from the town, whence the water is conveyed in earthenware pipes to the points of distribution at the top of the town. The death rate of Bona is stated now to be the same as in the more healthy towns of France.

We have already mentioned the case of Fondouk. This agricultural commune contains a population of 627 Europeans and 3,351 natives. When the district was first colonized by Europeans the death rate, as already stated, was very high. The village is situated on sloping ground immediately above the plain of the Mitidja, and has mountain ranges behind it. At the present time there are in the commune 1,350 acres under cultivation by Europeans, and 5,400 acres by natives. There are, therefore, 6,750 acres, or upwards of 10 square miles, under cultivation. There is no special drainage; good trenching, ploughing, and cropping, with irrigation, constitute the chief improvements. The products are cereals, cotton, tobacco, silk, lint, and the vine. It cannot be said that the village and houses are models of cleanliness, only there is no crowding on the surface, and the streets are large, open, and planted with trees, which are stated to have exercised a beneficial influence on the public health.

In a written communication (Appendix No 8.) with which he favoured us, the mayor states that during the first four years (from 1845 onwards) after the colony was established, the death rate among Europeans was nearly 10 per cent. For the next 10 years it was about 26 per 1,000, and during the last 8 years preceding the present time, the death rate has been 20 per 1,000 per annum. Fevers still exist, but they are mild in type, and in our opinion are mainly due to the absence of drainage in connexion with the irrigation works. Children can now be reared, although almost all died formerly within a year or two after birth. The great falling off in the mortality is the result of good agriculture, which, however, was fatal to the first colonists, scarcely any of whom are now alive, from want of knowledge of precautions required in cultivating a new country.

Boufaric presents by far the most remarkable illustration of improvement, because it exhibits the results of nearly every class of works, except house drainage, the execution of which, however, is at present under consideration. As already stated, the ground was originally a most dangerous marsh.

We saw specimens of the subsoil such as it was when the colony was first formed. It was black, oozy, rotten, and saturated with water, which also lay on the surface in pools. The drained and cultivated ground in the vicinity presents the aspect of a dry, rich, healthy soil.

The site occupied by the town is a quadrangle, laid out into squares by wide, open streets and roadways, bordered with fine trees. There are several large open spaces, and an admirable public garden, with a water fountain and flower beds near the centre of the town. The drainage works, which have been carried out are of two classes; those relating to the town and those in the surrounding country. The town drainage works consist of a series of subsoil pipe drains, carried at from 3 feet 6 inches to 6 or 7 feet below the level of the ground, the depth being given to ensure fall to the outlet. These drain pipes are laid in such a way as to enable the subsoil water to find a ready entrance into them. The drains are laid in the lines of the public streets.

The practical result of the works has been that whereas formerly the water level was at or above the surface of the ground, it is now 20 inches or more below the level of the surface.

A good water supply accompanies the drainage works. Water is brought from springs at a short distance from the town, but this water does not come from the marsh; it is conducted through the streets to hydrants and fountains by means of earthenware pipes laid in concrete.

The drainage works in the vicinity of the town are of a far more extensive character, and are intended to drain no less than 50,000 acres of wet or marshy land. The money devoted to this great improvement is considered to have been amply repaid by increase of produce, apart from the remarkable results which have accrued to the health of the population.*

The first thing that struck us on entering the town was the healthy aspect of the people, and especially of the children. Indeed, we did not see a single person bearing the marks of malaria, and some we saw would have been a credit to the healthiest spots in England, so far as appearance went.

The works are not yet completed, but already the statistical results to health are very apparent. Leaving out the earlier years of occupation, when the population was said to have been nearly swept away, but for which we have no statistical evidence, we find that during the four years, 1843-46, when the average population was 1,553, the annual death rate was 57 per 1,000, and that for the four years ending 1862, with a population of 2,756, the death rate was 24·8 per 1,000. Since the latter year there has been a continuous reduction in the mortality, and we were informed by the enlightened zealous mayor of the commune that last year (1865) there had been only 18 or 20 deaths.

Pernicious marsh fevers are said to have disappeared since the works were executed, and other milder types of fever are of rare occurrence.†

Another remarkable instance of improved health following on drainage works, is at Lake Halloula, at the upper end of the Mitidja plain, about 22 miles from the town and military station of Blidah in the province of Algiers.

This lake was of comparatively recent formation, and was, it is said, caused some 100 years ago by the overflow of the river Oued-jeu and the accumulation in the low lying lands of mountain streams. The lake, which has disappeared, owing to the works of drainage executed by the Government at the moderate cost of 10,000*l.*, was immediately below the mountains on which is built the monument known as the "Tombeau de la Chretienne," said to be the tomb of Cava, daughter of Julian, Governor of Africa, or more probably the burial place of the ancient Numidian kings.

In the neighbourhood of the lake are substantially built farm houses. On the higher ground the wild dwarf palm is frequent. This palm has deep spreading roots, which are

* The accompanying map of Boufaric is not a recent one, but it gives an excellent idea of the locality, and it also shows some of the agricultural drainage works. But up to the time of completing this Report we had not received the details regarding the works which were promised us.

† It may be interesting, by way of contrast, to cite the case of Batna, a considerable town and military station at the southern extremity of the steppes, and 3,600 feet above the level of the sea. This town, with the surrounding district, notwithstanding their elevation, suffer from pernicious fevers, on account of occupying a hollow, towards which the drainage of the surrounding districts gravitates.

These diseases could, no doubt, be banished by works such as those which have rendered the worst spot in the low, hot, damp, foggy Mitidja plain healthy. At Lambese, which is a few miles from Batna, about 500 feet higher, and out of the hollow altogether, there are cases of intermittent but none of pernicious fever. Persons suffering from fever at Batna often go to Lambese for the recovery of their health.

very troublesome in clearing. In the lower lands, which were formerly submerged, the wild palm has disappeared, and its place is taken by the wild tamarisk and rushes.

The Lake covered about 15,000 hectares of land, which is now redeemed and fit for cultivation.

The main drainage canal is about 5½ miles long, and has numerous smaller subsidiary channels.

To complete the work, a circular channel surrounding the cultivable area (canal d'enceinte) will be required to receive the rain water from the high mountains in the neighbourhood.

The work was principally done by parties of military prisoners aided by gangs of hired workmen, consisting of semi-nomad Arabs and hired labourers from Morocco, under a contractor, who paid for the labour of the military prisoners.

No careful account was kept of the sickness and mortality of the men engaged, but it was heavy, principally caused by the gangs drinking the stagnant water of the lake itself. They had to work up to their middle in water; but when experience had shown the necessity of providing a sufficient supply of good water, and of putting the workmen on the mountain side above the scene of their work, and of attending to diet, the mortality diminished. It was found necessary to stop the works from June to December.

The effect of the work has been to redeem 34,000 acres of land, some of which is already under cultivation. The soil is peculiarly favourable to cotton of the finest quality and of a very long staple.

The effect on the health of the neighbourhood has been decisive. The villages, which formerly suffered severely from intermittent fevers often taking the fatal form of pernicious fevers, are now healthy, and they have been freed from swarms of mosquitoes, which during a part of the year made life almost intolerable. The older colonists in the neighbourhood agreed that although the first work of clearance and cultivation is invariably attended by fever much of this sickness could be avoided by selecting the proper period for clearing and draining, namely, the colder season, leaving the land to be baked during the summer heats, previous to actual cultivation, and by sanitary precautions. These consist in avoiding commencing work till the sun has risen, the use of generous diet, careful selection of drinking water, good clothing, ablution, and change of clothing after work, not living in close vicinity to the work itself, and frequent use of coffee.

With these precautions, they asserted, that the clearance of waste land and bringing it under cultivation was not attended with serious risk to health.

Similar measures would, if carefully enforced, greatly reduce the sickness which accompanies the clearance of land in India, especially on hills and high plateaux suitable for cultivation of coffee, tea, chinchona.

Another instance of improved health following on improved culture is afforded by the village of Bou Medfa in the valley of Oued-jer, overlooking the Mitidja plain. This village was inhabited in April 1852, and by the end of that year, out of 194 inhabitants, 55 had died. In 1853, out of 144 inhabitants, 41 died.* During those years and the immediately following years clearing and cultivation were carried on, and for the time increased the mortality. From 1856 onwards the death rates have been as follows :*

Years.	Mortality per 1,000.					
1856	-	-	-	-	-	38·8
1857	-	-	-	-	-	18·2
1858	-	-	-	-	-	14·5
1859	-	-	-	-	-	24·3
1860	-	-	-	-	-	22·6
1861	-	-	-	-	-	18·5
1862	-	-	-	-	-	16·4

Similar cases might be multiplied, both from the past and present history of the colony; but those we have given are sufficient to illustrate this part of the subject. We shall only add the general results of statistical inquiry by M. Quesnoy into the effects of clearing and cultivation on the health of inhabitants settled in three groups of colonies at different elevations above the level of the sea. M. Quesnoy has compared the death rates in each group for a series of years during and after the clearing; and the following are the results. (Appendix No. 4.)

* M. Quesnoy; Memoire, cited above.

On the Mitidja plain, where the lowest group is situated, M. Quesnoy has shown that during 10 years of the clearings the death rate in 10 towns and villages was 48·44 per 1,000, and that for 10 years succeeding the clearing the death rate has been 33·51 per 1,000. As already stated, the Mitidja plain is not much raised above the sea level. Its principal town, Boufaric, is about 190 feet above the level.

In a second group of 20 colonies on the Sahel, to the south of Algiers, whose elevations may be taken at 700 to 800 feet, the death rate for 10 years during the clearings was 36·35 per 1,000, and for 10 years after the clearings it was 28·62 per 1,000.

In three colonies in the Atlas, at greater elevations, the death rate during 7 years of clearing was 38·22, and for 7 years after the clearings it was 17·44 per 1,000.

These earlier death rates are of course the expression of all the deteriorating influences to which the colonists were exposed during their first settlement, including the effects of local and general malaria, and the later death rates are the result of improved habits and modes of life, as well as of improved local conditions.

The effect of improved sanitary condition in the Mitidja on the relative proportions of births and deaths has also been decided.

Children, as is well known, are always the most susceptible subjects, and they are the first to suffer from causes of ill health.

In the earlier times the deaths in the Mitidja uniformly exceeded the births, but since the spread of agriculture and drainage the balance has turned the other way. During 1861 there were 259 births in the Mitidja and 231 deaths. In 1862 the births were 286 and the deaths 250.

In the Sahel the births in 1861 were 429 and the deaths 312; and in 1862 there were 438 births, against 304 deaths.

The whole evidence goes to show how much the general health of all countries is dependent on the condition of their agriculture; that in warm climates this is really a fundamental consideration; and that in all countries the health of the people and their progress in material improvement are indissolubly connected with each other.

It is in this way that agriculture becomes in reality as essential a part of sanitary administration for improving the health of country populations as drainage, water supply, cleansing, and general town improvements are part of the public hygiene of towns.

The army, as part of the general population of Algeria, living in the districts and exposed to the same conditions as the civil population, has suffered or improved in health together with the civil population.

Clearing, culture, and drainage have cleansed the air of much of the malaria which formerly infected it; but much yet remains to be done before the public health has risen to the standard properly belonging to the country. Main drainage works also require to be carried out.

The experience of the new town of Philippeville may be taken as showing approximately what the death rate may yet become in Algerian towns as building and population extend themselves. Philippeville occupies the site of the ancient Roman city of Rusicade, the ruins of which are still intermingled with the streets and houses of the town. The fort was erected in 1838-9, since which date the present city has been built. It occupies the sides and bottom of a valley running up from the sea shore towards what was formerly an unhealthy marshy plain among the hills on the road towards Constantine. The streets are open and cross each other at right angles, and the houses do not differ in appearance from those of France. It is, in fact, a new French town. There was much sickness at first, proceeding from the marshy ground referred to, and the influence of this ground on health is still experienced, although to a much less extent since the ground was cultivated and partly drained. The town itself is not all that could be desired in regard to sanitary works. The drainage is imperfect, especially that part of it connected with houses.

The water supply is about to be extended, but in the meantime a large reservoir has been built, and the ancient Roman works of water supply, including an immense covered cistern, have been restored, and now yield water as they did in the time of the Roman empire. Under the present zealous mayor the town has been much improved and when prospective works of house drainage are completed the house sewage will be applied to agricultural use.

In the meantime, it will be seen from the table, Appendix No. 9, that the death rates for the last 15 years have not been such as to lead to the belief that Algeria is specially unhealthy, while for the recent years in the table they have oscillated from under 21 to under 30 per 1,000 for all ages, and are hence as low, or even lower, than those of many towns in colder climates.

Appendix No. 10 shows the nature of the fatal diseases at Philippeville during the last two years. Fevers, bowel diseases, and chest diseases are the most prominent fatal

forms; generally, the table indicates that with better sanitary arrangements, such as are in contemplation, further improved health and a lower death rate may be confidently anticipated.

The general sanitary state of some other towns we visited is not so satisfactory.

As a contrast to Philippeville, we may instance the small town of St. Charles, some miles along the road leading from Philippeville to Constantine. This town lies in a valley, under what was once an entrenched camp. The site is near a river bank, low, damp, marshy, and exposed to winds blowing up and down the adjoining malarious valleys. Here there is bad site, want of drainage and of other appliances of health, and bad water. The result is that the people all look unhealthy, and that they are annually decimated by fevers.

The general sanitary state of the villages and of some towns is far from satisfactory. We would especially point out the Arab district of Constantine as an illustration of how much requires to be done towards the sanitary improvement of that important city.

The city is cut off from the usual sources of malarial fever, but it has had its epidemics of typhoid and even typhus fever, neither of which diseases would exist there at all were it not for the fostering causes of them which are everywhere evident in the native portion.

In rural districts the country people appear still to sleep on ground floors of houses, a practice which is a well known cause of fever in countries where malaria prevails.

The general advance in settlement and in agriculture being by universal testimony the basis of general improvement in health of all classes in Algeria, and agreeing, as we do, with the opinion everywhere expressed on this subject, we shall be in a better position to appreciate the results of improved army administration which have to a certain extent followed from it.

Causes of improved health of troops.

In former times, as already stated, the country and its healthy and unhealthy positions were little known, and the nature of military operations led to the occupation of bad sites for camps. Such sites were situated in marshy plains or valleys at no great distance from the sea. It is now no longer necessary to hold positions in these dangerous or doubtful localities, because the country is now occupied and settled far beyond them.

Mistakes, however, are still occasionally made by inexperienced officers, of which an excellent illustration in point was given us by a high military authority. On one occasion the officer commanding a column placed his camp on marshy ground close to a river, for facility of obtaining water. Another column, commanded by an officer of more experience, encamped on high ground at some distance from the river, the officer sending his men to the river to fetch water, at which they grumbled very much, but the result was that the latter column remained perfectly healthy, while the column which had encamped near the river was encumbered with a large proportion of sick, to the serious diminution, of course, of its fighting men.

More healthy stations.

None of the existing military stations which we had the opportunity of examining can be said to occupy naturally bad sites. Some are, no doubt, less healthy than others, and all, or nearly all, admit of improvement by drainage works, but taken as a whole, the present stations, so far as locality is concerned, afford a very decided contrast as regards health with those earlier occupied positions, in which the high death rates prevailed.

Tente-abri.

Another improvement has been the provision of shelter for troops. In the early wars and expeditions the troops either slept in the open air, or if they had tents it frequently happened that from the nature of the service they had not time, or did not think it worth while, to pitch them. The result was that in climates where the difference between the day and night temperature is sometimes 40° to 50° F., the men were exposed to considerable cold during the hours of sleep and suffered accordingly. In either case the men lay on the ground, a practice which by itself is certain to result in a high sick and death rate in countries where dysentery and pernicious fevers prevail.

To provide a remedy for this during expeditions the tente-abri (Appendix No. 11.) was contrived, and all officers with whom we communicated agreed in opinion as to its beneficial effect on the health of the troops. For the construction of this tent, a tent cloth from 40 to 50 inches square, together with a portion of the tent poles, a cord, and three tent pegs, is issued to each soldier. The soldiers camp by sixes, because by so doing the tente-abri is closed on all sides. The Zouaves, by using their turbans for closing the extremities of the tent, have the same space for four which other soldiers have for six. The tent cloths are buttoned or looped together, to form the sloping roof and ends. The tent, when erected, resembles the roof of a barn, the ridge of which is supported by a tent pole at each end. The tent is easily carried by the men themselves wherever they are required to go in the way of military duty. It can be put up, taken down, and packed for carriage by the men in a few minutes. It affords sufficient

shelter in such a climate. It wards off the effects of radiation at night, and keeps off dew.

Besides this shelter during expeditions, every military station is now provided with permanent barrack accommodation. *Barrack accommodation.*

At several of the larger stations existing buildings were adapted for barracks, with more or less success, but in the majority of instances new barracks have been built.

The general plan of these barracks shows detached ranges of buildings, two, three, or four floors in height.

Each block has one or more large double staircases, from which the rooms are entered right and left. Non-commissioned officers' rooms are generally provided on or close to the landings. The mens' rooms run across the range, and not in its length. The successive rooms in the block are reached by doors through the partition walls. The rooms have windows at opposite ends, with the beds ranged along the dead walls. This form of construction is not the one preferred in this country, and it would not answer for India.

Our experience has led us to the conviction that barrack rooms should have windows along opposite sides (with no more than two rows of beds between opposite windows), and not at opposite ends (with the beds along the dead walls), because the former construction is more easily ventilated, and is consequently more healthy than the latter. For India also there should be but one floor of barrack sleeping rooms, raised above the ground by having a floor below them, to be used as dining and day rooms, &c.

None of the rooms we saw in the Algerian barracks could be said to be much overcrowded, at least, for the season (winter) when we were in the country.

We have already shown that tubercular and chest diseases and typhoid fevers prevail to a considerable extent among troops in Algeria, and it would be an interesting subject of inquiry to ascertain how far the form of barrack construction, together with deficient ventilation, may not be the cause of these diseases. It was several times stated to us that, low as the mortality is, it would become lower if the barracks were thoroughly ventilated.

The structure of latrines and the extent of provision made for the personal cleanliness of the soldier are not such as we should consider sufficient in this country. But taken as a whole, the army in Algeria, instead of being exposed to the climate, as it formerly was, is now provided with as good barrack accommodation as we have seen in France itself.

We are decidedly of opinion that this improvement has exercised a favourable influence on the health of the Algerian army, and ought to occupy a prominent place in our estimation of the causes of diminished mortality.

The rationing of the soldier has also undergone a great change for the better.

On the first conquest, and during the earlier period of the occupation, the army, while constantly engaged in subduing and holding in subjection hostile tribes of Arabs, and exposed to excessive fatigue from long marches, was obliged to look to foreign countries for supplies of all kinds. *Improved rations.*

Even when not actually fighting, the soldier, shut up in military stations, suffered from diseases attributed to nostalgia, and to the privation of the comforts and minor luxuries, which failed him in the absence of a civil population side by side with the army.

This peculiar influence of colonization on the morale of the army is not imaginary. Miliana and Medea are striking illustrations of the truth of the above statement. The health of these garrisons seems to have depended upon and followed the advance of colonization and its results, and the garrisons are now flourishing towns. The same thing has been remarked in India. Whenever regiments in that country are isolated from towns and from a civil population, they suffer both in health and in discipline.

Formerly a portion of every garrison in Algeria had to be employed in guarding cattle on pasture grounds exposed to the raids of the hostile tribes of wandering Arabs.

This duty was found so harassing that the soldiers were stinted in their supplies of fresh meat and were fed on inferior salt provisions, often of bad quality, procured from the American market. The progress of colonization has altered this state of things.

Since the country in the neighbourhood of military stations has been brought under cultivation and occupied by colonist farmers, the army is no longer dependent, as it formerly was, for its supply of fresh meat on the markets of Spain, Sardinia, and Tunis. Algeria is able now not only to supply abundantly the wants of her civil and military population, but is beginning to make considerable exports of cattle.

On the first occupation of the country, the movements of the expeditionary columns were hampered by the difficulty of supplying the cavalry with forage, the whole of which had to be imported from Europe. This difficulty has also ceased, and this most essential arm of warfare in Africa is abundantly provided for in each province.

Instead of the soldiers being expected, as was formerly the case, to make extraordinary forced marches, carrying a week's rations with them and incurring great loss from fatigue, the commissariat department of expeditionary columns is now managed with facility, and the marches are brought within reasonable compass. It frequently happened in former times that the soldiers on the march threw away a great portion of their rations, with the certainty of future suffering from privations. In those early days suicides were not unfrequent on the march.

These evils have ceased under improved army administration. Not only are the men supplied with sufficient rations in garrisons, but on the lines of expeditionary columns there are caravanserais in which stores are kept in readiness for issue, and a column now finds at each halt from its point of departure, until it is actually in the Sahara, fresh supplies of every description, so that the soldier is not unnecessarily burdened with rations, and arrives at his destination fresh for his work.

Appendix No. 11, kindly prepared for us by the sous-intendant at Algiers, contains an interesting account of the French soldier's equipment when on field service, and, amongst other matters, it gives a detail of the ration. It will be seen from this document that the soldier in Algeria usually carries four days rations with him, and that the ration consists of two designations, 1st, what he carries himself; 2nd, what is carried in squad.

The following is the ration:—

Bread	26½	ozs. avoird. ; or
Biscuit	22½	„ „
Coffee	247	grains.
Sugar	324	„
Rice	926	„
Salt	257	„

To these ingredients are added on march the following, called “vivres d'ordinaires:”

Bacon	3½	ozs. avoird.
Rice	2	ozs. „
Sugar	324	grains.
Coffee	247	„

The total weight of a four days ration is thus about 134 ozs. avoird.

Each soldier carries his ration of biscuit, but the other articles are carried in squad alternately in linen bags, which the men make themselves. The various cooking utensils are divided among the men of the squad.

The soldier's ration on a march sometimes contains fresh bread baked at the halts, but generally biscuit, with the other ingredients we have mentioned.

We had an opportunity of examining an admirable baking establishment at Bona, where bread and biscuit are prepared for the garrison, and also for field service. Both articles were very good, and one test to which the loaves were subjected to try their quality struck us as singular. The loaf was placed on the ground and was submitted to the whole weight of the body by being stood on. It was of course crushed flat, but it immediately regained its original form and dimensions when the weight was removed. Appendix No. 12 contains the details of manufacture of both bread and biscuit for the army.

Café soup.

All officers, medical and others, gave a prominent place to the use of coffee (café soup) among the causes of improved health of the troops. Each man, on march, carries a small bag of roasted coffee, and there is a grinder or mill for every eight men carried by one of the squad in his knapsack. Before starting in the morning the soldiers grind and boil their coffee, putting into it sugar and bread, and eating it like soup (hence its name).

It acts not only by affording an early nourishing meal, excellent for marching with, but the stimulating effect of the coffee enables the men to resist fatigue, and to undergo much more exertion than they would otherwise be capable of doing.

In Algeria the soldier has coffee at 6 A.M., and again in the evening. He has a meal containing meat in the forenoon, and another similar meal at half-past four in the afternoon, so that he has four meals a day. Brandy is carried as part of the stores, and is issued, not as a part of the regular ration, but whenever the General orders it. These occasions are long marches, bad weather, fighting, or whenever the soldier is unusually fatigued or exposed to unusual hardships. Arrangements are made regimentally for the supply of meat by butchers who follow the column, and are under its protection. The regimental canteen furnishes the soldier on the march with wine and minor comforts. In

some of the recent expeditions wine has also been given to the soldier as part of his ration, (the same as when in garrison, where he has a ration of wine, but no spirits).

The French soldier, like all other soldiers, is careless as to the quality or quantity of water he drinks. If he is thirsty on a march, he drinks whatever he can get until he is satisfied; while the Arab under similar circumstances will merely wash his mouth. The consequence is that the French soldier often suffers severely from bowel diseases, brought on in this way. Various filters have been proposed to amend the quality of the water, but hitherto without success. The injurious matter is held in solution, and appears to consist of salts or organic matter. On lines of communication, where good water could not be obtained, numerous artesian wells have been formed, with excellent results.

*Improved
water
supplies.*

These wells have been sunk mostly in the Sahara, to the south of Biskra. The Arabs have long been in the habit of executing similar works in a rough manner, but the greatly improved methods introduced of late years by the French engineers have enabled deeper sources to be reached than could otherwise have been possible. The sinking is chiefly done by the French soldiers, who take great pleasure in contributing their efforts in this way to the permanent improvement of the country. Wherever a well has been successful, verdure, followed by population and cultivation, have sprung up around it. Appendix No. 13 contains a list of the principal wells, 62 in number, which had been sunk to the end of 1861. Their depths vary from 100 to 1,800 feet, and they yield from a few quarts up to 1200 gallons per minute. So far as we could ascertain by report, the water is generally good, but some wells have hitherto yielded a slightly brackish water, not, however, objected to by the Arabs.

During expeditions where no local sources can be depended on, a supply of water is carried in wooden casks on camels, to meet the emergency of the Spahi guides failing to find water on the march. In one instance 400 camels accompanied an expeditionary column from Biskra, carrying a two months supply of drinking water for 1,200 men through a country where good water could not be obtained.

Experience of the country and climate has led to improvement in the soldiers' dress, and it is now excellently adapted to its uses. The articles of which it consists are stated in Appendix No. 11.

*Flannel
belts.*

The chief improvement, so far as health is concerned, all are agreed, has been the introduction of a broad flannel belt covering the chest and abdomen. It is in one piece, fastened down the front and suspended by braces. The use of it is obligatory in Algeria, and the men are inspected to ascertain that the regulation is obeyed. Before the introduction of flannel the men used to suffer much from alterations of temperature and from chills consequent on this, often ending in dysentery and other abdominal diseases. Every soldier is provided with two flannel belts. They are considered to be easier washed than flannel shirts would be, and their introduction has, it is stated, led to marked diminution in dysentery and bowel affections.

Columns once started on expeditions into the Sahara, supplies of various kinds are periodically sent under escort to points equi-distant from the column and the base of operations. These escorts meet similar escorts from the column conveying the sick. They exchange their charges, and the sick and wounded find ample comforts and good ambulances at the frontier posts.

The present excellent hospital organization occupies a marked place among the causes of diminished mortality in the French army in Algeria. Formerly the distances to head quarter hospitals, the only places in those days to which sick and wounded men could be taken, were very great, and the columns were weakened by the necessity of sending detachments through a hostile country, to convey the sick and wounded to the coast.

*Improved
ambulances
and hos-
pitals.*

Now all the stations throughout the country are supplied with military hospitals, generally placed in the best available positions; excellent in ward construction and administration, though requiring improvement in latrines, lavatories, baths, &c.

The arrangements for conveying sick and wounded men from the line of military operations to ambulances and hospitals are admirable, and have contributed largely to diminish suffering and to save life.

A detail of the ambulance establishment for Algeria in 1863 will be found in Appendix No. 14.

No. 15 contains a list of the personnel, materiel, and transport for field ambulances accompanying columns of different strengths.

Nos. 16; 17, 18, give the more important medicines and appliances.

The means of communication in each province are excellent, and carriage is abundant, so that with the aid of the civil population, now numbering 215,000, the sick and wounded are easily conveyed to the numerous military hospitals and ambulances in each province.

The military authorities at Algiers having kindly offered to exhibit for our information a field ambulance complete, we proceeded to the neighbourhood of the Hôpital du Dey, and in a country road betwixt the hospital and the sea we found a number of infirmiers, mules, boxes, cacolets, &c., with the officers occupying the road irregularly. The mules had the usual pack-saddle girthed on. The party was under the command of an officer of the rank of ensign belonging to the "Intendance." There were 13 mules, each held by an infirmier. The ambulance was intended for a column of 1,000 men, and was conducted by a mounted non-commissioned officer (brigadier). On the word of command being given, the mules were arranged in a single line up the middle of the road. Another word of command was followed by the infirmiers attaching to the pack-saddles the panniers, &c., which until that moment were lying by the side of the road.

The loading took place with the most perfect precision and without hurry. The men were evidently thoroughly trained to their work. The order in which the mules were arranged is most particularly adhered to. The surgical appliances follow immediately after the wounded, so that in the dark the officer would know perfectly where everything was to be found. The whole arrangement was completed in a few minutes, and ready to start.

The brigadier, who carries a long lance similar to those used by our Lancers, with red flag about two feet by three feet, then placed himself on horseback in front of the line to act as guide. All the infirmiers, except those who were leading mules, at the same time shouldered their muskets to act as guards, and at the word of command the ambulance started at a walking pace along the road, in the following order :

1. The brigadier with his lance and flag.
2. Then followed a mule with a cacolet on each side, arranged for a sick or wounded man in a sitting position.
3. The next mule carried two cacolets extended out for two sick or wounded men to be carried in the recumbent position. In order to show the practice, the cacolets were dismounted, and one of the infirmiers was placed in each of them, and they were then lifted and hung on the pack-saddles. The horizontal cacolets had each an awning covering the man. The number of mules carrying cacolets depends on the number of sick to be conveyed.
4. A mule carrying two panniers containing surgical instruments, bandages, lint, splints, &c.
5. A mule carrying two panniers containing medicines, lint, &c.
6. The next mule carried two panniers containing bed pans and sundries.
7. To the next mule were attached two panniers containing provisions, cooking utensils, dishes, cups, measures, weights, scales, &c.
8. The next mule carried two panniers containing bed pans, hatchet, lantern, saws, &c.
9. To the mule next in order were attached two panniers containing bed cases to be filled with hay or dry grass, pillow cases, towels, nightcaps, aprons for dressers, &c.
10. Then followed a mule carrying two casks containing wine and tisane, also a portable table and some camp stools.
11. The next mule carried eight stretchers in cases.
12. A mule carrying 20 hospital rugs in cases, 10 on each side, together with a spade, pickaxe, &c. came next in order.
13. A mule carrying two hospital tents, one on each side.
14. The last mule carried two tarpaulings with bags containing tent pegs, mallets, floorcloths for tents, &c.

The ambulance, after having proceeded a short distance along the road, turned through a gate within the hospital enclosure, where there is a large field suitable for arranging a field hospital, and continued to march in line until it arrived at a fitting place for a halt, which was ordered.

The infirmiers piled arms, and the panniers, casks, hospital tents, &c., were dismounted on each side of the line of mules, and placed on the ground. The mules were then led away between the lines of panniers, and picketed at a short distance. The mules carrying cacolets were led a little aside, and the cacolets were carefully dismounted and laid on the ground. The mules which had carried them were also led away and picketed.

The whole equipage, when dismounted, covered a considerable length of ground, but in the meantime this was being remedied as follows :—

In order to mark the site of the hospital, the brigadier struck his lance in the ground near the centre of the line, and the panniers borne by each mule were lifted close up, side by side, and end to end, and arranged in the order shown in the following plan, so as to form a double continuous line, having the lance in the centre.

As soon as this was done the two hospital tents were carried a short distance off, and laid on the grass by the infirmiers, who proceeded immediately to unroll them, and to erect the tent poles, of which each hospital tent was supplied with two. The tent pegs were

carried round the outer circumference by other infirmiers, and thrown on the ground where they would be required.

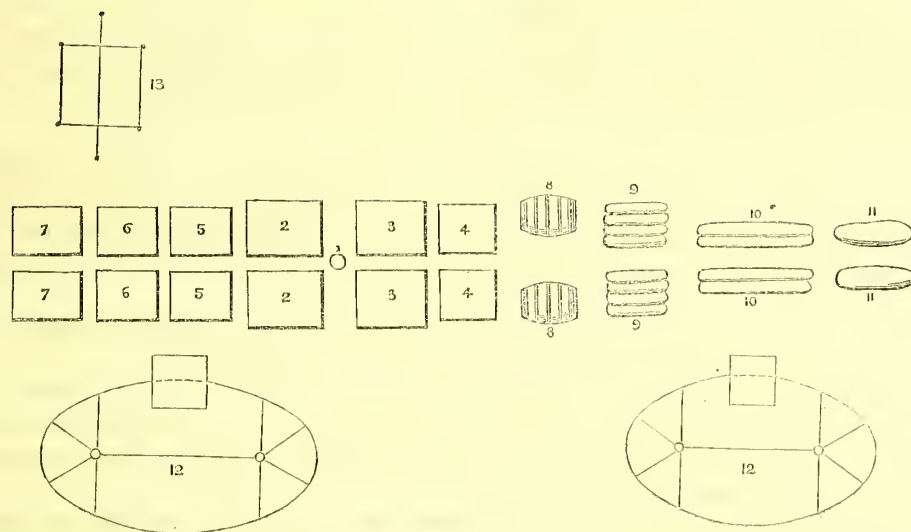
In a few minutes the two tents were erected and the floors covered with tarpauling.

The cacolets containing the supposed sick and wounded men were then carried within cover of the tents and carefully set down while the beds were being prepared.

There was no hurry evinced in this proceeding. Everything was done leisurely and accurately, and not more than from 10 to 15 minutes were required from the time the mules arrived on the ground before the supposed sick and wounded men were under shelter. A tente-abri had by this time been pitched for the attendants.

We next saw the operation of removing an ambulance off the field. This was simply a reversal of the operation of pitching. The tents were struck and rolled up; the panniers, casks, stretchers, &c., were carried away from the close order in which they had been arranged, and extended out in length and breadth so as to allow sufficient space for leading the mules between the lines, each to its respective load. The mules were then led up between the lines, and the loads lifted and attached to them. This was done without confusion or mistake as to distance. As soon as all the mules were loaded and the infirmiers had resumed their arms which had been piled in the meantime, the brigadier with his red flag placed himself at the head of the ambulance and led it off the ground in the same order in which it arrived.

The following woodcut shows the arrangement of this field ambulance when the hospital tents are about to be occupied:—



1. Flag staff.
2. Panniers containing surgical instruments, bandages, lint, splints, &c.
3. Panniers containing medicines, lint, bandages, &c.
4. Panniers containing sundries,—bed pans, lantern, hatchet, saws, &c.
5. Panniers containing bed pans and sundries.
6. Panniers containing cooking utensils, dishes, cups, measures, weights, scales, &c.
7. Panniers containing bed cases to be filled with hay, dry grass, &c., towels, pillow cases, night caps, &c.
8. Casks, each containing 50 litres, for wine, &c.
9. Eight stretchers in cases.
10. Tarpaulin cases for hospital rugs, &c.
11. Tarpauling cases for tent pegs, floor tarpaulings, &c., for the hospital tents.
12. Hospital tents pitched.
13. Tente-abri for attendants, pitched.

There appeared to be a general concurrence of opinion among medical officers that the diseases incident to the country, and their treatment, had become better understood. It was stated also to us that quinine was now extensively used everywhere; even among the colonists and other civilians, as a prophylactic against marsh fevers, and for cutting them short at once in the earlier stages, and that to this practice was to be attributed the fact that many cases recovered in the earlier stages, which in former days might have passed into severe and fatal types of disease.

Improved knowledge of diseases.

Among the causes of diminished mortality resulting from improved army administration must be classed greater care in the selection of recruits than was the case 30 years ago. There was a general concurrence of opinion as to the influence of this element in improving the general health of the army in Algeria.

Improved recruiting and furloughs.

There are now also greater facilities than there were formerly for obtaining furloughs on account of ill health, and many men are now sent out of the country to France, where their health is recruited, instead of being retained in Algeria until their diseases have become confirmed or incurable. The extent of beneficial influence which this practice is likely to exercise on the health of the army in Algeria may be judged of from the facts stated in the "Statistique Médicale de l'Armée" for 1863. In that year, the mean effective of the army in Algeria was 53,772; and of these, 3,169, or 59 per 1,000, were sent away on "Congé de Convalescence," and 210 were sent to mineral waters. The proportion of men withdrawn from the ranks in this way was therefore 63 per 1,000. Appendix, No. 19. gives the number sent to France from the division Oran during 1865 at 1,356.

Improved transport.

Now that the resources of the civil population are available for the army, the military train, which formerly carried everything, limits itself to furnishing the means of conveyance of the ambulance, military and hospital stores, and office establishments.

For the rest, a contract is made with the "Agent de Transport" (a civil contractor), who undertakes the carriage of the stores required from each station until the frontier station which is the base of operations is reached. Such an agency was, of course, impossible formerly, but is effective now that colonization occupies numerous central positions, with excellent highways and with abundantly supplied markets, to meet the demand of food and fodder for the army.

Carriage beyond the settled frontier is provided through the "Bureaux Arabes," to whom is entrusted the administration of all the country not under civil rule. At these bureaux are kept complete registers of the cattle available in each friendly Arab tribe, who are bound by their tenure to furnish when required, and on payment, a fixed proportion of carriage.

The carriage thus provided is brigaded under an aga of camels and mules, and placed under the direction of officers and men of the military train.

So great is the facility of transport that the troops can now carry flour with them on a march in the desert, and portable ovens, so as to bake bread for two or three days at places where they halt for more than a few hours, besides supplies of drinking water, as already stated.

Beneficial operation of the "Intendance Militaire."

Every improvement in the general administration of the Algerian army to which the diminished death rate can be in any way attributed is under the "Intendance Militaire." This great department takes charge of supplies, clothing, rations, tents, barracks, hospitals, ambulances, even to the appointment of medical officers for special service.

Hospital physicians and surgeons have, indeed, no more to do with their hospitals than have civil practitioners in civil hospitals. The "Intendance" takes charge of everything except medical or surgical treatment. We had usually to apply to the local officer of the "Intendance" for permission to visit the hospital, and we did so sometimes accompanied by the medical officer, sometimes without him.

The "Intendance" secures the earliest information of all movements of troops, and is held responsible for everything required for their health and well-being.

It is ably administered, so far as can be judged by its results. All its officers with whom we came in contact are excellent men of business and appeared to be thoroughly masters of detail. From other quarters we heard complaints, but we are inclined to believe that the cases must have been exceptional.

Seen from our point of view, it may be considered doubtful whether a strictly centralized system, such as the "Intendance," would in all its details suit the circumstances of the British army, scattered as it is in corps and bodies of all dimensions over the surface of the globe, with a medical department under its own special government. The results in Algeria have no doubt been satisfactory.

We are of opinion that it would be very advisable to examine the system more fully than our time enabled us to do. We have placed in Appendix No. 20 a statement of the chief peculiarities of this administrative machinery, with the view of special attention being called to it, should the Secretary of State for War concur in our opinion. If the special circumstances of the British army should render it undesirable to apply the system in its completeness, much might yet be learned from it as to the advantages of greater consolidation being adopted in administrative arrangements. At all events, the subject merits careful inquiry and consideration.

Sanitary administration.

Another cause of improved health is no doubt the introduction of a sanitary administration into Algeria, and the greater general interest taken in the subject from this circumstance. We are enabled to give the following brief outline of the present arrangements, partly from official documents, and partly from information kindly obtained for us by M. Perier, principal medical officer at Algiers.

1. At all the ports there are "Conseils de Santé" charged with the various questions connected with quarantine, lazarettos, &c. These councils are presided over by the *prefet*. Their functions are purely consultative.

2. At the chief towns of each department—Algiers, Oran, Constantine—there is a "*Conseil d'hygiène et de Salubrité Publique*," presided over by the *prefet* or by his delegate.

Similar councils or commissions may also be established when necessary by the Governor General in the chief towns of sub-prefectures, or in chief towns of military

subdivisions by the general officer commanding the subdivision. In the former case the council would be presided over by the sub-prefet, in the latter by the general officer commanding the military subdivision.

Commissions of health may be established in any other towns in civil territories by the prefets, or in military territories by the general officer commanding the divisions. In civil territories these commissions would be presided over by the Civil Commissary or by the mayor, and in military territories by the officer fulfilling their functions. All these commissions or correspondents hold of the central "conseil d'hygiène" of the district.

3. Each conseil consists of not more than fifteen and not fewer than seven members, the President included.

Each commission consists of a President and four members appointed (in civil territories) by the prefet, and (in military territories) by the general officer commanding the division. Correspondents are appointed either by the prefet or by the general officer commanding, according to the nature of the government in the territory.

The general commanding the division and the commandant of the subdivision are members *ex officio* of the conseils at their head quarters.

4. Besides the regularly appointed members of conseils, there may be added to them, for the purpose of consultation, the chief of the municipal police, the "médecin des epidemies," the public vaccinator, one or more of the principal *officiers de santé* of the military hospital, the principal physician, surgeon, or apothecary of the civil hospital; the mining engineer, the engineer "des ponts et chaussées," the chief military engineer, the inspector of colonization, the chief officer of civil buildings, and the chief of the *Bureau Arabe*.

5. The medical element must not exceed one half of the conseil, the remaining members consist of notabilities of the town, or the principal functionaries residing in it.

A veterinary surgeon must always be a member.

6. The members serve for two years; one half retire by lot every year, but may be re-appointed. They elect a vice-president and secretary for a year, subject to re-appointment.

7. The conseils and commissions meet at least once in three months, and at such other times as they may be called together.

8. The function of these conseils and commissions of public health is to give their advice on all questions relating to public health which are brought before them by prefets, sub-prefets, civil commissaries, or by generals commanding divisions or subdivisions of the circumscriptions for which they are acting. The departmental conseils are also required to digest and compare all reports on mortality and its causes, the medical statistics, and all documents furnished by commissions and correspondents, for the information of the superior authority.

They also make an annual report on the health of the civil department, and a similar report respecting the military territory. The former is sent to the prefet, the latter to the general officer commanding the division. A duplicate is sent to the Minister through the Governor General.

9. The expenses of these conseils and commissions are paid out of local or municipal funds.

10. Besides these conseils d'hygiène there is an organized service of vaccination, with committees, director, conservator of vaccine virus, and vaccinators. These last officers perform vaccinations either at their own houses, or at the mairie, in the months of April and October, on all who present themselves; and they are also required to go through their districts twice a year to vaccinate applicants.

Compulsory vaccination is not carried out directly; the principle is applied only to children of parents who regularly receive public charity, or in the case of children received into public schools or asylums.

11. The provision for cases of general sickness consists of civil hospitals for one or both sexes (natives); and where such hospitals do not exist, patients are received into military hospitals and ambulances. In the latter case the costs have to be repaid to the military administration unless the patients can produce a certificate of poverty.

12. The general medical service for the colonists is carried out by dividing the settled parts of the provinces into districts, of which there are 69. Forty-five of these districts are under civil medical officers, and 24 are served by military *officiers de santé*.

13. These officers are obliged to attend gratuitously all persons presenting a certificate of indigence from the maire of the commune; they attend at the civil infirmaries and enter their visits on special weekly registers; they make weekly circuits through their

districts; they give gratuitous advice at their residences at fixed hours; they act as vaccinators; they perform inspections of public women; they verify deaths, and supply to the administration all the information required by the medical and public health administration of their circumscription; they also dispense medicines where there are no apothecaries. The fees paid by colonists are fixed by law.

Periodical reports on the movement of disease and mortality on official forms must be sent to the superior authority by all medical officers engaged in this service, and one special object of these reports is stated officially to be "to determine periodically the degree of insalubrity of localities."

14. In addition to the medical service for the colonists, there is a medical service for the Arab population attached to the Bureaux Arabes.

It would be impossible for us to state what the effect of this health organization really is, without a much more minute inquiry than our time permitted, but we are of opinion that a mechanism of such extent, spread over the whole country, must exercise a beneficial influence in the prevention of disease, especially as every officer, besides attending on the sick, is required to perform certain sanitary duties and to supply reports on hygiene.

It will be observed that the responsibility as well as the executive in all matters connected with public health, rests entirely with the civil or military government and that all officers, commissions, or conseils have purely consultative functions. Of course if the superior authority is so disposed, it may neglect or ignore the advice tendered.

The procedure in the army is different from that described. Army medical officers have no power properly so called of giving advice to commanding or other officers in matters regarding the health of troops. The usual course is that when any medical officer attached to a corps is desirous of making any suggestion having reference to the health of the men, he would make it to the commanding officer or to his representative. If the suggestion came from a medical officer attached to an ambulance it would be made to the sous-intendant, to be by him transmitted, if he considered it necessary to do so, to the commandant of the troops or column or to the chief of the staff of the column.

If the suggestion came from a principal medical officer of the army, it would be made to the intendant-en-chef, or to the general, if the latter had requested to be directly informed on the subject.

The responsibility in this manner of proceeding is considered to rest with the officer to whom the representation was last made in order of rank.

Again, the medical officer highest in rank is the officer who would be consulted by the officer commanding or by the intendance. But in any case the medical officer has no power except that of persuasion.

In the course of the inquiries we had an opportunity of making, we occasionally heard complaints as to requirements not having been attended to. But so far as we could judge, there appeared to be less antagonism between what may be called the health element and the administrative element than has been the case elsewhere. All classes of authorities in Algeria appeared to be intelligent and well informed of the bearing and importance of health questions in reference to general points of cost and of administration.

Prevention of syphilis.

We had frequent opportunities of discussing the measures in operation for the prevention of syphilitic diseases in the army in Algeria. These consist of monthly inspections of the troops and the usual police measures of inspecting public women and treating those found to be affected. These police measures have no special reference to the army, more than they have to the population generally.

There are dispensaries for the purpose in the principal towns, and the colonial medical officers are also charged with similar duties. Syphilis and its consequences are very prevalent among the Arab population, and are the result of their degraded morals. This disease is often hereditary among them, and leads to frightful results from neglect.

The opinion was universally expressed by medical officers that the frequency and severity of the disease among the troops in Algeria had been diminished by police measures.*

* The greater frequency of this disease among French troops in the Roman States where there is no such police regulation was cited in proof of this. The subject is one of great importance, and while stating the opinions given to us, it is necessary at the same time to give the comparative admissions from syphilitic diseases in the army serving in Algeria, as compared with those of the French army serving in Italy as these are contained in the "statistique médicale de l'armée," given us officially for 1862-63, the two years for which these statistics had been hitherto published. During these years the admissions from primary syphilis in the army in Algeria amounted to 50.0 per 1,000 "mean present," while in Italy the admissions were 36.1 per 1,000 "mean present." The admissions from primary and constitutional syphilis together were in Algeria 59.8 per 1,000, while in Italy they were 41.1 per 1,000. During 1864 the admissions from primary syphilis were 20 per 1,000 "mean present" more in Algeria than in Italy.

The following is a general summary of the causes to which in our opinion the greatly diminished death rate in the French army serving in Algeria is to be attributed. We have no intention to isolate any one from its connexion with the others, for the state of health of soldiers and civilians is simply the result of all the conditions to which they are exposed, and if we place one class of improved conditions first on the list, it is simply because they are the fundamental ones on which all the others more or less depend.

The causes are as follow :

Conquest of the country.

Extension of colonization consequent thereon.

Introduction of improved methods of agriculture and rapid extension of cultivation of the soil.

Drainage of unhealthy localities.

Generally improved health from diminished malaria and lessened tendency to malarial disease as the result of agriculture and drainage. As another result, every required facility for obtaining supplies for the army.

Comparative rarity of long and harassing military expeditions.

Generally improved administration of the army, including, great facility of transport, excellent arrangements for carrying sick and wounded men, and improved field ambulances.

Good rations and cooking.—The use of café soup.

Improvements in dress.—The use of flannel belts.

Introduction of the "tente-abri."

Construction of barracks at all stations.

Construction of hospitals at all stations.

An able medical service, together with improved knowledge of the diseases of the country.—The use of quinine.

More extended knowledge both among troops and colonists of the method of preserving health in Algeria, and of the precautions required in turning up new ground.

Better water supply.

Generally improved administration for the preservation of the public health, for removing local causes of disease, and for providing medical attendance throughout the country.

Greater care of what may be called the general strength and stamina of the Army by improved recruitment, and by more systematic measures for sending sick men on furlough to France or to special watering places.*

IV.—APPLICABILITY OF METHODS OF PRESERVING THE HEALTH OF TROOPS IN ALGERIA TO TROOPS IN INDIA AND IN OTHER WARM CLIMATES.

We have shown that Algeria possesses a semi-tropical climate, verging southwards into a tropical climate: that much of the country during summer is subject to great variations of temperature between day and night. That the inhabitants of almost the entire area have been subject to dysenteries and fevers, the result of marsh malaria, climatic influence, imperfect food and clothing, and, in some cases, of bad water. That troops and civil inhabitants have suffered alike from these diseases.

It was at one time supposed that natives comparatively escaped, merely because they were natives, but more careful inquiry has proved that natives and Europeans suffer alike from the same causes of disease. In many parts of the country spleen disease prevails to a large extent, especially among the Arab population.

We have seen that it was at first almost impossible to rear children in the country; that the average death-rate for troops was 80 per 1,000 per annum, and for the civil European population 10 per cent per annum; that the rate of invaliding was very high; and that it was at one time a pretty general opinion that European settlers would in the end have to leave the country altogether to the Arabs.

Although this opinion has to a considerable extent been abandoned in Algeria it is a still a fixed belief in India, where it has been held to be impossible to rear a third generation on account of the deadly character of the climate. But the fact itself, when fairly looked at, is no more a proof of ineradicable unhealthiness in India, than the former difficulty of rearing children in Algeria was proof of inherent unhealthiness in that country, or than the immense death rate among children in unhealthy towns in England is a proof that these towns are *necessarily* fatal to infant life.

* Men who die on sick furlough would however be counted as deaths against their corps, so that deaths occurring out of Algeria would not diminish the death rate of the Army there.

It is, indeed, impossible not to recognise the striking resemblance between the facts regarding the former unhealthy state of Algeria and those brought forward in the Report of the Royal Commission on the Sanitary State of the Indian Army. The cases are, indeed, as nearly as possible identical.

Algeria, it is true, has fewer of the characteristics of a tropical climate than India, but its death rates have been higher, and from precisely the same class of diseases as have produced the high death-rates of India.

Here the parallel must stop; for, although, as the result of certain sanitary improvements, the death rates in India have decreased of late years, they have yet to become very much lower before they approach those attained in Algeria.

We must now reply to the practical question in our instructions, viz., as to the extent to which measures, similar to those which have been successfully adopted in Algeria, would be applicable to the army serving in India, and in warm climates generally.

In replying to this question it is necessary in the first place to state that there is nothing positively new in the measures which have been adopted in Algeria.

All of them have been recommended in various reports in this country, and more especially for India in the Report of the Royal Commission referred to; besides having been more or less in use elsewhere.

In that report the great leading fatal diseases of India are traced to the malarial state of the country as their underlying condition, and the Commissioners anticipate the day when the malaria will become of little importance, or will disappear altogether under the influence of drainage and proper agriculture.

What the Commissioners only hoped for, the French authorities and settlers in Algeria have to a considerable extent already realized. It is true, as shown by the statistics given above, that malaria and malarial diseases are still too prevalent there; but it is also true that under the influence of deep ploughing, cropping, and drainage they are gradually lessening in importance year by year.

This is the great practical result which both authorities and colonists in Algeria have had the honour of realizing; and in doing so they have proved practically the truth of another proposition laid down by the Royal Commissioners, viz., that the health of troops is indissolubly bound up with the health of the civil population of the country in which they are serving.

The care taken by the French authorities to supply pure drinking water to the population of their towns has been brought prominently to our notice. This improvement is of primary importance in India, and has still to be carried out.

It is scarcely necessary for us to say that what has been accomplished in the way of water supply, drainage, and agricultural improvements in Algeria can be done in India. What is really wanted in India is efficient administrative arrangements in all matters in which questions of health are engaged. It is a common mistake to suppose that measures required for the protection of public health are necessarily antagonistic to somebody's interests or objects. The French authorities in Algeria have shown that health and prosperity go together, and that they are only different aspects of the same question.

In Algeria, improved health and increase of produce have resulted from simple inexpensive works, and measures which would be equally applicable and equally successful in India or in any warm-climate Colony. The French Government has moreover shown a just appreciation of the value of health improvements by devoting part of the Customs duties to these objects, and the results have clearly proved the great advantages to be derived from this well directed expenditure.

It is our decided opinion that French experience in Algeria has shown, that it is absolutely necessary to adopt drainage and improved agriculture in India and other tropical countries as the basis of their health arrangements, and that the required organization for draining and for improving the agriculture of that great country must be introduced.

These measures indicated by the Royal Commission for diminishing malaria in India and other warm climates cannot be said to rest any longer on theoretical considerations. Their practical results may be seen in Algeria.

In all warm climates malarial disease is proof of the presence of malaria, but it is also proof of unused riches in the soil. Make use of the riches, and the malaria will cease to be of importance. This ought surely to be one of the main objects of Government in countries where the population suffers from malaria.

Probably the best way of accomplishing these great improvements would be for the authorities in India and in other warm climate colonies to execute the main drainage works in agricultural districts, and to give every encouragement to the introduction of improved implements and methods of cultivation.

We are decidedly of opinion that these improvements are perfectly practicable

wherever they are required. In carrying them out the best plan would be to begin by draining the military stations, by draining the country around them, and by selecting the kind and improving the character of the agriculture to be carried out there, and then to extend the work over the country. Experience in Algeria has proved that the general malaria of a country is much less prejudicial than is the local malaria of stations and villages, and of the districts immediately surrounding them. It is there indeed that the problem has to be dealt with in the first instance; but the work should not stop there; it should be commenced with the intention of finally benefiting the whole population of the country.

It is important, however, to remark that those special works for improving the public health to which we have referred have been designed in Algeria by a special engineering corps, the engineers of the "Ponts et Chaussées," who are trained for executing such works, and are hence perfectly competent to lay out systematically new towns and stations, to drain them, supply them with water, and generally to attend to all engineering details required for the protection of public health. It was with the engineers of the "Ponts et Chaussées" we held communication on all such matters, and from them we derived much valuable information within their department of public service.

There is no separate corps in India to undertake the same class of works; and we would venture to suggest whether similar advantages might not be to a considerable extent obtained by affording Royal Engineer officers about to be employed in India facilities in qualifying themselves for directing such works by examining the nature and progress of the large works of drainage and water supply continually being carried out in Great Britain. If this were done, we apprehend there would be no difficulty in these officers acquiring the necessary knowledge and experience to fit them for this highly important department of service.

In a preceding part of this Report we have referred to the proposed use of town sewage for agriculture at Philippeville. This is a subject second in importance only to that of town drainage, and it can be best studied in Great Britain. Young engineer officers should be encouraged to make themselves acquainted with this department of engineering, which is, we believe, as yet, new in India, where the first example must be set by the Government.

The occurrence of typhoid and typhus fevers in certain places in Algeria, where there are few or no sources of marsh malaria, and the obvious connexion of fevers of these types with removable causes of another character, afford sufficient proof of the necessity of directing attention in warm climates to other causes of disease besides those which occasion intermittent and remittent fevers. We have already indicated what these causes are in Algeria, and recent experience has proved the existence of similar fevers in India.

The experience of Algeria has fully proved the necessity of great care being exercised in the selection of sites for stations and camps. This duty is indeed one of paramount importance in all warm climates.

As regards rations, the scale laid down for British troops in India is more liberal than that given to troops in Algeria, but we cannot help feeling that the French soldier makes better use of his ration in Algeria than the British soldier does of his ration in India.

We are of opinion that it would not only be practicable, but that it would be a great improvement over the present practice in the British Army, to give every soldier a meal of coffee and bread early in the morning and always before starting on the march. Indeed this is now matter of regulation before starting on a march, but we fear that the regulation is by no means universally complied with. We would strongly recommend that attention be called to the regulation; that it be enforced, and that due care be taken that the coffee is strong and well made.

We consider further that it would be a great advantage, if instead of eating a large meal of meat during the heat of the day, the ration were divided so as to give two lighter meals as is done in the French Army, with coffee morning and evening.

The Algerian practice in these particulars could be applied in India and other warm climates with great advantage to health.

In regard to spirit drinking, there is much less of this vice in the French than in the British service, but still it exists. Medical officers consider that chronic hepatitis (not a very common disease in Algeria) is mainly due to spirit drinking, and that generally, to use an expression of a distinguished medical officer, "the man who drinks dies."

The evidence we obtained on this point agrees entirely with that given before the Royal Commission, and confirms to the letter their recommendation as to the necessity for restricting the use of spirits in warm climates to the utmost possible extent.

The chief result of our inspection and inquiry about soldiers' clothing has convinced us of the necessity for the use of loose, easy uniforms in hot climates. Such a thing as a tight article of dress is not to be seen in the Algerian Army. Their experience in regard to flannel under-clothing has amply confirmed the recommendation of the Royal Commission as to the necessity for the use of flannel in all warm climates. And they see by inspection that the men have it on. This great safeguard to the soldiers' health has now we believe been granted in the British army, but it might be worth the trouble to ascertain by experience whether the flannel shirt or the chest and abdomen flannel belt of the French army possesses the most advantages as regards wear and facility for washing. But in India it is not sufficient merely to issue flannel as an article of clothing. Constant inspection in the barrack room is necessary in India, as in Algeria, to see that the flannel is worn.

In regard to shelter for troops, we are of opinion that for certain military operations in India, especially in districts where carriage is difficult, where ordinary tents would not be available, and where the men might be exposed to night air and cold, it would be very advisable to make a trial of the "tente-abri." Its great simplicity, lightness, and facility for use under almost every variety of circumstances would to all appearance render it a valuable addition to field equipments.

It is the custom in Algeria to employ soldiers in public works; and most of the great military roads in the dependency have been more or less made by individual corps, whose names are cut either in columns or in the solid rock, after the Roman manner.

Where there is much movement of the soil there is malarial disease, but the general adoption of the practice in Algeria would appear to indicate that it is not specially injurious to efficiency. With suitable precautions, some such out-door work might be advantageously introduced in India, and in other warm climates.

When India is supplied with new barracks and hospitals on the plans recommended by the Royal Commission, and embodied in the "Suggestions" of the Army Sanitary Commission, the army serving there will have accommodation, both for troops and sick, much more suited to the climate than any similar accommodation in Algeria. On this subject we have no special recommendation to make.

We consider that a well organised field ambulance such as we saw in operation at Algiers possesses so many advantages, especially in hilly districts or where there are bad roads, that we are strongly of opinion that an ambulance corps should be trained for field service either on the same or on a similar model to that in use in the French service. There cannot be a doubt, we believe, that the ambulance corps in Algeria has been the means of preventing much suffering and of saving many lives.

In parts of India, and in other countries occupied by the British army, where constant and ready means of transport may not be available, we consider that it is well worthy of consideration, whether establishments similar to the caravanserais adopted by the French during the earlier years of the occupation of Algeria might not be provided along the lines of movement of troops, for the purpose of containing supplies, of affording water, and also means of cooking and shelter for sick or wounded men.

Experience in Algeria has confirmed the recommendation of the Royal Commissioners that healthy, full formed soldiers should alone be sent on service to warm climates. It appears to be the conviction in Algeria that the best age for a soldier to arrive in the country is 25, and that for two or three years thereafter he retains his full vigour. But, as is the case in India, he never becomes accustomed to malaria where it exists. We are of opinion that the question of age and length of service is so intimately connected with the sanitary condition of the country that in proportion as this is improved the soldier's age and length of service will improve with it. In Algeria, as in India, "there is acclimatization to heat; there is none to malaria." The only preservative, anywhere, against malaria is to cut off its sources.

The success which has attended the practice of granting sick furloughs for the purpose of preventing ailing men from becoming permanently unfit for service induces us strongly to recommend a similar practice being pursued in India and other warm climates in such manner as circumstances will admit.

Lastly. We are of opinion that any administrative organization for improving the public hygiene of India should include within its functions those fundamental points regarding an abundant supply of pure drinking water, drainage of stations and towns, country drainage, irrigation, and agriculture to which we have adverted. This principle is practically admitted in France, where the minister of agriculture, commerce, and public works is also charged with all questions affecting the public health, in dealing with which he is assisted by an able permanent comité d'hygiène, containing some of the most distinguished scientific and practical men in the country.

Having thus given the main results of our inquiry in a practical form for use, we are desirous of concluding this report by expressing the great obligations we are under to His Imperial Majesty the Emperor of the French and to the Governors of Provinces and other officers to whom we were referred, for the uniform courtesy and kindness with which we were treated, and for the facilities placed at our disposal for fulfilling the mission entrusted to us by the Secretary of State for War.

JOHN SUTHERLAND.
R. S. ELLIS.

JOSHUA PAYNTER,
Deputy Inspector General of
Hospitals.

C. B. EWART,
Lt. Col. Royal Engineers.

War Office,
July 1866.

APPENDIX.

No. 1.

ALGÉRIE.

DOCUMENTS STATISTIQUES SUR L'ARMÉE, &c.

(Extrait de l'Annuaire de l'Economie Politique pour 1851.)

TABLEAU 1.—EFFECTIF ET ÉTAT SANITAIRE DE L'ARMÉE FRANÇAISE.

Années.	Effectif de l'armée.	Entrés aux Hôpitaux d'Afrique.	Morts dans les Hôpitaux d'Afrique.	Morts dans les Combats.	Total de morts en Afrique.
1831	17,190	13,524	1,005	55	1,060
1832	21,511	32,085	1,998	48	2,046
1833	26,681	27,934	2,512	61	2,573
1834	29,858	31,410	1,991	24	2,015
1835	29,185	34,094	2,335	310	2,645
1836	29,397	33,836	2,139	606	2,745
1837	40,147	51,136	4,502	121	4,623
1838	48,167	39,097	2,113	150	2,263
1839	59,367	53,194	3,600	163	3,763
1840	61,233	86,404	9,567	227	9,794
1841	72,000	88,383	7,802	349	8,151
1842	70,853	90,524	5,588	225	5,813
1843	75,034	77,305	4,809	84	4,893
1844	82,037	84,872	4,664	167	4,831
1845	95,000	89,849	4,664	605	5,269
1846	99,700	121,138	6,862	116	6,978
1847	92,413	92,290	4,437	77	4,514
1848	77,789	95,556	4,406	13	4,419
	1,019,392	1,142,632	75,294	3,404	78,698

NOTA.—Les chiffres de l'effectif, des entrées aux hôpitaux et des décès dans les hôpitaux d'Afrique, sont puisés dans les *tableaux officiels des établissements d'Afrique*, pour les années jusqu'à 1845 inclusivement ; les chiffres pour 1846 ont été communiqués à la Commission des Crédits de 1847 ; ceux des deux dernières années ont été communiqués à M. Desjobert par la direction de l'Algérie. Les chiffres indiquant les pertes dans les combats ont été fournis par le Ministère de la Guerre à diverses Commissions de la Chambre des Députés ; ceux de 1845, 1847 et 1848 ont été fournis à M. Desjobert par le Ministre de la guerre.

Observation.—Ne sont pas compris dans la mortalité constatée par ce tableau les hommes qui, renvoyés malades en France, viennent périr dans les hôpitaux ou dans leurs familles. En comptant ces pertes, on voit que l'Afrique a déjà fait périr plus que 100,000 soldats.

Résultat de ce tableau.—1°. Sur un effectif de 1,019,392 hommes, 1,142,632 sont entrés aux hôpitaux, c'est-à-dire que chaque homme a été *malade à l'hôpital* plus d'une fois dans l'année. Nous passons sous silence les malades traités à la chambre et à l'infirmerie du corps.

2°. En ne tenant compte que des décès survenus dans les hôpitaux d'Afrique, la mortalité a été de 74 pour 1,000, tandis qu'elle n'est que de 68 pour les militaires et marins retraits à l'Hôtel des Invalides, de 19 pour notre armée à l'intérieur, et de 10 pour les hommes de 20 à 30 ans restés dans la vie civile.

3°. La mortalité dans les combats un peu considérables : la moyenne a été de 190 décès par an : la moyenne de la mortalité par maladie a été de 4,180.

TABLEAU 2.—RECENSEMENT, NAISSANCES, DÉCÈS DE LA POPULATION CIVILE EUROPÉENNE.

Année au 31 Décembre.	Français.	Étrangers.	Total.	Naissances.	Décès.
1833	3,483	4,329	7,812	214	221
1834	4,349	5,401	9,750	344	339
1835	4,888	6,333	11,221	369	606
1836	5,485	9,076	14,561	457	738
1837	6,592	10,178	16,770	590	909
1838	8,034	12,044	20,078	721	757
1839	9,526	13,497	23,023	880	1,342
1840	12,032	14,955	26,987	1,101	1,437
1841	15,947	19,780	35,727	1,236	1,637
1842	19,056	25,475	44,531	1,467	2,358
1843	28,163	31,023	59,186	2,012	2,604
1844	37,701	37,719	75,420	2,709	3,357
1845	46,339	48,982	95,321	2,903	4,113
1846	48,274	61,126	109,400	2,943	4,350
1847	50,184	65,619	115,803	3,403	3,834
	300,053	365,537	665,590	21,329	28,072

Résultat de ce tableau.—La population européenne de l'Algérie ne s'élevait, à la fin de 1847, après 18 ans d'efforts et des sacrifices, qu'à 115,000 individus, sur lesquels 50,000 seulement étaient Français.

2°. La mortalité excède d'une manière constante les naissances. La population européenne ne s'y maintient que par les émigrations. On peut facilement prévoir le jour où cette population s'éteindrait si l'émigration européenne lui manquait.

3°. La mortalité qui, en France n'atteint pas 24 décès sur 1,000 habitants, s'élève en Algérie à 45 et 50 sur 1,000 Européens.

La mortalité des Français en Afrique est de 60 sur 1,000.

La mortalité annuelle des Créoles d'un jour à 15 ans a été à Alger de - - 87 pour 1,000

or, cette mortalité n'est en } 27 " "

France que de - - - } 26 " "

et en Angleterre - - - 26 " "

Cette mortalité de 87 pour 1,000, est la plus faible que les enfants de cet âge aient subie en Algérie, attendu qu'Algér est un des lieux les plus salubres de l'Algérie, et celui où il y a plus d'aisance.

Dans les pays chauds, l'influence du climat ne pèse complètement que sur les individus livrés aux fatigues de la vie agricole. En Algérie la population civile française habitant principalement les villes, reste en grande majorité étrangère à la vie des champs et ne subit pas l'influence complète du climat ; néanmoins la mortalité est trois fois plus forte que celle de la population française en France.

Le Français commence-t-il à travailler en Afrique comme a essayé de le faire le colon de l'état, alors sa mortalité s'élève au quadruple.

Le seul travailleur européen sérieux que l'Afrique ait employé jusqu'ici a été le soldat, occupé à la culture lorsqu'il n'avait pas à subir la fatigue de la guerre ; sa mortalité a été sept à huit fois plus forte que la mortalité des hommes du même âge en France.

No. 2.

1°. EFFECTIF de l'ARMÉE d'ALGÉRIE.

Désignation des Provinces.	1847.					1848.					
	1 ^{er} T.	2 ^e T.	3 ^e T.	4 ^e T.	Moyenne de l'année.	1 ^{er} T.	2 ^e T.	3 ^e T.	4 ^e T.	Moyenne de l'année.	Moyenne des deux années.
Alger - -	41,142	40,148	39,908	37,666	39,716	37,507	35,144	33,592	34,256	35,268	37,495
Oran - -	36,714	36,583	36,594	35,726	36,404	33,116	28,460	24,674	25,612	27,965	32,185
Constantine - -	24,636	24,470	25,690	25,626	25,080	24,043	22,768	20,801	21,091	22,178	23,628
Totaux -	102,492	101,201	102,192	98,918	101,200	94,666	86,372	79,067	81,559	85,404	93,308

NOMBRE de tous les MALADES.

Désignation des Provinces.	1847.			1848.			Total des deux années.	
	Militaires.	Civils.	Total.	Militaires.	Civils.	Total.	Militaires.	Civils.
Alger - - - -	30,783	10,973	41,756	32,170	8,879	41,049	62,953	19,852
Oran - - - -	27,020	4,603	31,623	21,776	6,040	27,816	48,796	10,643
Constantine - - -	18,121	7,371	25,502	21,052	7,083	28,135	39,173	14,454
Totaux -	75,924	22,247	98,881	74,998	22,002	97,000	150,922	44,949

PROPORTION des MALADES à l'EFFECTIF.

Désignation des Provinces.	Proportion sur 1,000 Militaires en Garnison.		
	1847.	1848.	1847 et 1848.
Alger - - - -	775·07	912·00	843·53
Oran - - - -	744·94	778·73	761·83
Constantine - - -	768·40	949·35	855·87
Totaux -	760·80	880·02	820·41

NOMBRE des DÉCÈS.

Désignation des Provinces.	1847.			1848.			Total des deux années.	
	Militaires.	Civils, Européens, et Indigènes.	Total.	Militaires.	Civils, Européens, et Indigènes.	Total.	Militaires.	Civils.
Alger - - - -	1,001	555	1,556	1,377	456	1,833	2,378	1,011
Oran - - - -	1,404	381	1,785	996	447	1,443	2,400	828
Constantine - - -	711	462	1,173	683	454	1,137	1,394	916
Totaux -	3,116	1,398	4,514	3,056	1,357	4,413	6,172	2,755

PROPORTION des DÉCÈS à l'EFFECTIF et au NOMBRE des MALADES.

Désignation des Provinces.	Sur 1,000 Militaires en Garnison.		Moyenne des deux années.	Sur 1,000 Militaires à l'Hôpital.		Moyenne des deux années.
	1847.	1848.		1847.	1848.	
Alger - - -	24.62	39.00	31.81	32.09	42.77	37.43
Oran - - -	38.84	35.62	37.28	51.96	45.78	49.19
Constantine - -	27.95	30.79	28.89	39.39	32.44	35.38
Totaux -	30.79	35.77	33.04	41.04	40.74	40.89

Les maladies qui font le plus de victimes en Algérie sont dans l'ordre de leur fréquence : 1^o la Dysenterie ; 2^o la Diarrhée ; 3^o les Fievrès pernicieuses ; 4^o la Fievre typhoïde ; 5^o la Pneumonite ; 6^o les Fievrès sans désignation de type ; 7^o la Phthisie pulmonaire ; 8^o la Méningite cérébro-spinale ; 9^o la Variole ; 10^o l'Hépatite ; 11^o la Bronchite.

MORTALITÉ.

Algérie, 1831 à 1846 - - - 80.0 Desjobert, Annales d'Hygiène, t. 39, page 315.

		Effectif moyen.		
1837	-	40,147	-	101.0
1838	-	48,167	-	45.1
1839	-	50,367	-	64.3
1840	-	51,237	-	140.6
1841	-	72,000	-	108.9
1842	-	70,853	-	79.0
1843	-	76,034	-	74.0
1844	-	82,037	-	54.0
1845	-	95,000	-	50.0
1846	-	99,729	-	62.5
1847	-	101,200	-	30.79
1848	-	85,404	-	35.77

Moyenne de 10 années 77.8
d'après le Moniteur de
l'Armée du 11 Janv. 1848.

Statistique de la mortalité de
l'armée en Algérie.

Années.	Nombre des Décès.	Moyenne des Décès par jour.	Nombre de Malades.		Nombre de Décès pour.	
			Traités.	Sortis en Santé.	1,000 Malades Traités.	1,000 Malades sortis en Santé.
1840	5,852	16	74,169	41,768	79	140
1841	3,870	11	68,635	38,591	56	100
1842	2,561	7	61,883	39,693	41	65
1843	2,033	5.6	53,579	36,953	37	55
1844	1,802	4.9	49,935	36,973	36	48
1845	1,916	5.2	53,361	38,495	36	49
1846	2,557	7	53,116	42,547	48	61
1847	1,557	4.3	46,169	38,759	24	40
1848	1,833	5	44,910	38,658	41	47

(Extraits du travail de Mr le Dr Lacger, sur la Statistique de la Mortalité de l'Armée en Algérie).
Paris, 12 Janvier 1866.

Le Président du Conseil de Santé des Armées.

MAILLOT.

No. 3.

MORTALITÉ dans les VILLES.

Nombre annuel des Décès sur 1,000 Européens Civils.

	1845.	1847.	1848.	1849.	1850.	1851.
Alger - - - -	36.4	48.7	44.3	54.2	66.1	30.0
Blidah - - - -	66.2	76.4	56.7	105.9	73.6	39.0
Tenès - - - -	49.6	42.1	46.6	103.3	10.8	36.6
Cherchell - - -	60.9	50.0	43.6	323.6	72.3	67.7
Médéah - - - -	16.0	30.0	21.7	36.1	41.0	37.4
Milianah - - -	25.6	57.5	69.0	100.0	68.8	30.0
Boufarick - - -	40.4	134.0	49.3	27.5	28.6	19.2
Oran - - - -	41.5	52.1	44.9	107.1	47.1	52.1
Mostaganem - -	37.0	25.5	27.5	116.8	45.6	67.4
T'lemcen - - -	17.6	47.2	32.9	35.2	46.8	11.9
Constantine - -	-	56.0	44.2	61.0	72.3	71.9
Bone - - - -	28.2	47.0	46.8	103.8	54.1	37.7
Philippeville -	55.3	82.0	70.0	100.0	33.4	38.3
Bougie - - - -	30.7	38.3	12.2	30.0	18.1	18.2
El Arouch - - -	141.4	-	-	-	-	-

No. 4.

TABLEAU indiquant l'état de la MORTALITÉ dans les COLONIES de la MITIDJA pendant et après les Défrichements.

1 ^{re} PERIODE. Pendant les défrichements (10 années).				2 ^{de} PERIODE. Après les défrichements (10 années).			
Localités.	Population.	Décès.	Rapport de Décès à 1,000 Habitants.	Localités.	Population.	Décès.	Rapport de Décès à 1,000 Habitants.
Mouzaïaville - - -	2,151	106	49·27	Mouzaïaville - - -	6,138	277	45·12
La Chiffa - - -	1,081	41	37·95	La Chiffa - - -	2,379	90	37·91
Joinville - - -	1,302	77	59·13	Joinville - - -	2,620	105	40·07
Montpensier - - -	917	38	41·43	Montpensier - - -	2,009	73	36·33
Dalmatie - - -	2,150	68	31·62	Dalmatie - - -	2,269	68	29·96
Beni-Mered - - -	2,291	99	43·21	Beni-Mered - - -	5,206	166	31·88
Boufaric - - -	16,354	790	48·30	Boufaric - - -	26,396	945	35·80
Soumah - - -	1,532	54	35·24	Soumah - - -	3,098	72	23·24
Fondouk - - -	2,753	222	80·63	Fondouk - - -	6,695	200	29·87
Larbah - - -	3,300	144	43·63	Larbah - - -	8,691	233	26·80
Totaux -	33,831	1,639	48·44	Totaux -	66,501	2,229	33·51

MORTALITÉ dans LE SAHEL pendant et après les Défrichements.

1 ^{re} PERIODE. Pendant les défrichements (10 années).				2 ^{de} PERIODE. Après les défrichements (10 années).			
Localités.	Population.	Décès.	Rapport de Décès à 1,000 Habitants.	Localités.	Population.	Décès.	Rapport de Décès à 1,000 Habitants.
Boudjareah - - -	6,431	64	9·95	Boudjareah - - -	17,563	287	17·34
El Biar - - -	12,936	211	16·31	El Biar - - -	12,163	234	19·23
Birkadem et Saoula -	7,097	286	40·29	Birkadem et Saoula -	7,716	211	27·34
Dely Ibrahim et Achour -	4,473	504	113·34	Dely Ibrahim et Achour -	4,830	75	15·52
Birmendreis - - -	4,450	77	17·30	Birmendreis - - -	6,168	79	12·80
Kouba - - -	6,388	197	30·83	Kouba - - -	7,494	199	26·55
Douera et annexes -	11,530	1,231	106·76	Douera et annexes -	14,999	1,009	67·27
Sainte Amélie - - -	1,291	43	33·30	Sainte Amélie - - -	2,403	58	24·13
St Ferdinand - - -	1,432	36	25·13	St Ferdinand - - -	2,507	82	31·90
Drariah - - -	3,562	121	33·97	Drariah - - -	5,156	62	12·02
Maelma - - -	991	44	44·39	Maelma - - -	2,401	63	26·23
Baba-Hassen - - -	1,514	36	33·77	Baba-Hassen - - -	2,334	71	21·87
Ouled-Fayet - - -	2,135	72	33·72	Ouled-Fayet - - -	2,617	49	18·72
Cheragas et Aïn Benian -	4,841	91	18·79	Cheragas et Aïn Benian -	6,486	171	26·36
Crescia - - -	1,604	66	41·14	Crescia - - -	2,662	76	28·54
Staoueli - - -	829	36	43·42	Staoueli - - -	3,119	85	27·25
Zeralda - - -	715	36	50·34	Zeralda - - -	1,414	78	55·16
Fouka - - -	2,022	65	32·14	Fouka - - -	3,241	107	33·01
Castiglione et Tefechoun -	3,604	120	33·29	Castiglione et Tefechoun -	4,639	147	31·68
Douaouda - - -	1,743	60	34·42	Douaouda - - -	2,460	76	30·89
Totaux -	89,588	3,197	36·35	Totaux -	112,442	3,219	28·62

MORTALITÉ dans L'ALTAS pendant et après les Défrichements.

Pendant les défrichements (7 années).				Après les défrichements (7 années).			
Localités.	Population.	Décès.	Rapport de Décès à 1,000 Habitants.	Localités.	Population.	Décès.	Rapport de Décès à 1,000 Habitants.
Damiette - - -	3,490	46	18·75	Damiette - - -	2,505	44	17·56
Lodi - - -	2,482	50	20·54	Lodi - - -	2,372	39	16·44
Bou-Medfa - - -	1,045	134	128·22	Bou-Medfa - - -	1,142	22	19·16
Totaux -	6,017	230	38·22	Totaux -	6,019	105	17·44

QUESNOY.—*Topographie Médicale de la Plaine de la Mitidja.*
(Recueil de Mémoires de Médecine, de Chirurgie, et de Pharmacie Militaires, Septembre 1865.)

No. 5.

TABLE OF APPROXIMATE HEIGHTS OF THE PRINCIPAL PLACES IN ALGERIA ABOVE THE LEVEL OF THE SEA.

(Macarthy, Geographie de l'Algérie.)

	Feet.		Feet.
A'in a Beïda - - - - -	2,625	Medea (la Place) - - - - -	3,018
A'in Temouchent - - - - -	853	Miliana - - - - -	3,028
Alger (Port du Sah'el) - - - - -	470	Mostaganem (la Place) - - - - -	364
A'mini Mous'a - - - - -	552	Nedroma (pied du Minaret) - - - - -	1,336
A'Moura - - - - -	1,312	Oran - - - - -	3 ft. to 320
Aumale - - - - -	2,788	Orleansville - - - - -	400
Batna - - - - -	3,350	Ouargla - - - - -	423
Blida (Place d'armes) - - - - -	663	R'ardeïa - - - - -	1,516
Biskra - - - - -	295	Sa'ida - - - - -	2,920
Bor'ar - - - - -	3,608	St. Denis du Sig - - - - -	224
Boufàric - - - - -	190	Sebdou - - - - -	3,141
Bon Sa'da (Fort Neuf) - - - - -	1,896	Setif - - - - -	3,560
Constantine (La K'as'ba) - - - - -	2,100	Sidi Bel A'bèss - - - - -	1,608
Daïa - - - - -	4,182	Sidi Bel A'sel - - - - -	144
Dar ben A'bdallah - - - - -	1,363	Souk Harras - - - - -	2,130
Djelfa - - - - -	3,576	Tebessa - - - - -	3,215
Dra el Mizàn - - - - -	1,466	Tenès - - - - -	180
Géryville - - - - -	4,461	Teniet el H'ad - - - - -	3,707
Guelma - - - - -	916	Tiharet - - - - -	3,552
Le Mar'nia - - - - -	1,170	Tlemsén (Place du Mechouar) - - - - -	2,624
Lar'ouât - - - - -	2,460	Tougourt - - - - -	33
Maskara - - - - -	1,919	Zamora - - - - -	780
Mazouna - - - - -	1,164		

No. 6.

TABLE OF APPROXIMATE MAXIMA and MINIMA of TEMPERATURE and of HUMIDITY at SELECTED STATIONS in ALGERIA, for the Months of June to October 1865.

(Abstracted from the *Recueil de Mémoires de Médecine, de Chirurgie, et de Pharmacie Militaires.*)

	June.				July.				August.				September.				October.			
	Temp. ° F.		Rainfall.	Humidity.	Temp. ° F.		Rainfall.	Humidity.	Temp. ° F.		Rainfall.	Humidity.	Temp. ° F.		Rainfall.	Humidity.	Temp. ° F.		Rainfall.	Humidity.
	Max.	Min.			Max.	Min.			Max.	Min.			Max.	Min.			Max.	Min.		
			in.				in.				in.				in.				in.	
Algiers - - - - -	88	63	·9	77·	90	67	·15	81·	111	67	·14	74·	89	64	—	80·	97	62	·66	68·
Constantine - - - - -	—	—	—	—	104	56	1·	39·	112	60	·70	39·	95	51	—	59·	90	46	·98	64·
Laghouat - - - - -	96	60	·86	40·	109	65	—	27·	109	72	·15	26·	98	58	·77	50·	86	47	·16	50·
Tlemcin - - - - -	93	54	5·2	72·	106	60	·55	60·	101	59	—	51·	—	—	—	—	69	53	·74	71·
Tizi Ouzou - - - - -	100	59	1·4	67·4	112	63	—	52·	114	67	·06	51·	98	59	·16	60·	84	51	2·4	76·
Boghar - - - - -	97	55	2·6	64·3	114	59	·23	52·	115	66	·39	45·	106	55	·04	63·	86	48	·02	73·
Bona - - - - -	91	62	·4	68·	92	67	·01	66·	112	67	·43	62·	94	60	·12	65·	89	57	2·16	66·
Medeah - - - - -	86	55	1·6	56·6	98	59	—	43·	101	62	·03	38·	90	57	·62	52·	83	48	·94	71·
Oran - - - - -	91	64	·7	73·	86	74	—	70·	97	68	·03	65·	83	66	—	77·	83	56	·98	67·
Fort Napoléon - - - - -	85	54	1·8	55·	96	59	·15	47·	98	62	·11	41·	86	56	·7	51·	79	47	3·18	68·
Setif - - - - -	—	—	—	—	—	—	—	—	93	64	·28	33·	74	62	1·2	51·	66	53	1·49	72·
Biskra - - - - -	83	69	—	—	106	—	—	70·	—	—	·19	—	93	63	1·8	56·	90	56	·82	63·

No. 7.

The following Table given by M. Quesnoy shows the relation between mere proximity to marshy ground in the Mitidja and the Death-rate among the Colonists.

Colonies on the Plain in the vicinity of Marshes.				Colonies on the Plain at a distance from Marshes.			
Localities.	Mean Annual Population.	Mean Annual Deaths.	Death rate per 100.	Localities.	Mean Annual Population.	Mean Annual Deaths.	Death rate per 100.
Zurich - - -	192'33	14'42	7'49	Mouzaïaville - - -	545'93	25'53	4'67
Marengo - - -	956'46	43'45	6'61	La Chiffa - - -	230'66	8'66	3'75
Ameur el Ain - - -	196'00	18'58	9'47	Joinville - - -	206'42	9'57	4'63
El-Afroun - - -	365'86	27'40	7'48	Montpensier - - -	154'00	5'84	3'79
& Bou-Roumi - - -				Dalmatie - - -	247'00	8'00	3'23
Total - - -	1410'65	103'85	7'36	Beni-Merid - - -	347'15	13'20	3'52
				Total - - -	1760'16	71'00	4'03

No. 8.

RÉPONSE AUX DIFFÉRENTES QUESTIONS POSÉES PAR LA COMMISSION ANGLAISE CONCERNANT LA STATISTIQUE DE LA COMMUNE DU FONDOK.

1^{re} question. Date de l'occupation par les colons ?
Le village du Fondouk, fut créé dans les derniers mois de l'année 1844. (Les troupes ont occupé le pays en Octobro 1837.)
2^e. Quelle était la condition de santé des colons à cette époque ?
Les premières années de l'occupation du Fondouk furent rudes à traverser, les colons moururent presque tous des fièvres paludéennes, il reste à peine trace de ces premiers occupants.
3^e. Quelle fut la mortalité annuelle à cette époque ?
La moyenne de la mortalité pendant les quatre premières années fut de 47 par année, sur une population d'environ 500 âmes, ce qui fait 9 et 2/5^e pour cent ; Elle fût de 13 par année pendant les dix années qui suivirent, ce qui donne 2 et 3/5^e pour cent ; elle n'a été que de 10 par année pendant les huit dernières années, jusqu'à ce jour, ce qui réduit la mortalité annuelle à 2 pour cent.
4^e. A quelle époque ont été commencés des travaux d'assainissement, drainage ou autres ?
Il n'a été fait aucune espèce de travaux pour assainir la localité, sinon des défrichements de terres, des plantations d'arbres, et la recherche d'eaux saines et salubres.
5^e. Quel est le nombre d'hectares et combien ont subi le drainage ?
Il y a environ six cents hectares cultivés par les Européens et environ deux mille quatre cent cultivés par les Indigènes.
Aucun n'a été drainée.

7^e. Quelles sont les productions agricoles du Fondouk ?
On y cultiva des céréales de toute sorte, du tabac, un peu de coton, et en ce moment on essaie la culture du lin. Le ver à soie y réussit très bien, ainsi que la vigne.
8^e. Quelles sont les maladies ?
Les fièvres paludéennes, encoore tendent-elles à disparaître, du moins elles n'ont plus le caractère dangereux des premières années de l'occupation ; quelques maux d'yeux, c'est principalement les enfants qui en sont affectés :
On peut citer encore quelques affections du foie, mais celles-ci plus rares.
10^e. Quelle est aujourd'hui la population du Fondouk, européenne et indigène ?
La population actuelle, urbaine et rurale, est de 627 Européens et de 3,351 indigènes ; les israélites ne comptent que 12 personnes dans ce dernier chiffre.
La mortalité énoncée plus haut porte toute sur la population européenne, la mortalité chez les indigènes n'étant pas connue.
Quant à la profondeur de l'eau, elle varie suivant l'altitude du sol, elle est en moyenne à 10 mètres pour les puits creusés dans l'intérieur du village.
Fondouk, le 3 Fevrier 1866,
Le Maire,
S. DAUVIN.

No. 9.

POPULATION EUROPÉENNE de Philippeville, Années 1850 à 1865.

TABLEAU comparatif des DÉCÈS pendant la même période.

Années.	Population.	Décès.	Par 1,000.	Années.	Population.	Décès.	Par 1,000.
1850	7127	243	34	1858	10,916	252	23
1851	7875	223	28'3	1859	11,636	321	27'7
1852	7301	275	37'6	1860	12,249	254	20'7
1853	6431	271	42'1	1861	11,471	306	26'6
(Choléra.) 1854	6797	506	74'4	1862	11,518	268	23'2
1855	7743	383	49'4	1863	11,707	314	26'8
1856	7831	310	39'5	(Nombreuse 1864	13,173	297	22'5
1857	9563	263	27'5	population ouvrière.) 1865	13,996	412	24'4

No. 10.

NATURE of FATAL DISEASES in the Commune of PHILIPPEVILLE, Department of CONSTANTINE, for the Two Years 1864-5.

Total Mortality from all causes during the two Years, 709, of which the following Diseases are the more important. Average Population, 13,584.

Diseases.	Deaths.	Diseases.	Deaths.	Diseases.	Deaths.	Diseases.	Deaths.
Intermittent Fever -	13	Dysentery - -	31	Pneumonia - -	68	Genito-Urinal -	13
Remittent " -	27	Hepatitis - -	16	Consumption -	29	Measles - -	7
Endemie continued " -	4	Scorbutis - -	20	Other Chest Diseases	87	Small Pox - -	12
Pernicious " -	31	Dentition - -	46	Circulating System -	28	Anthrax - -	3
Typhoid " -	34	Convulsions - -	30	Digestive System, }	27	Erysipelas - -	2
Diarrhoea - -	64	Other Cerebral diseases	23	(Gastro-enteritis).		Other Causes - -	94

No. 11.

EQUIPMENTS OF FRENCH TROOPS SERVING IN ALGERIA. (Received from the Intendance.)

1°. Poids total.

Le poids total porté par un chasseur a pied ou un zouave est de 34 kilogrammes (about 75 lbs. avoird.) en chiffres ronds, y compris la carabine:—par un soldat d'infanterie de ligne, 33 kilogrammes (about 72½ lbs. avoird.), y compris le fusil.

2°. Munitions.

Le complet réglementaire des cartouches est de 20, en temps de paix, en France, et de 62, en campagne, savoir :

60 en 10 paquets de 6 chaeun.
2 cartouches libres.

Ces 62 cartouches sont portées : les deux cartouches libres dans un petit étui *ad hoc* ; deux paequets dans la giberne : les huit autres paquets dans le sac, entre les deux planchettes de la partie supérieure.

Lorsqu'on est devant l'ennemi, il n'est pas admissible que le soldat ait ses cartouches dans le sac, qu'il serait obligé d'enlever pour les prendre. Il les met alors dans l'*étui-musette*, espèce de gibecière pendue sur le côté et qui sert en temps ordinaire à rouler l'habit n° 1. Cet étui est défectueux parce que, étant en toile, il est facilement pénétré par l'eau, qui mouille les cartouches et les vivres dont l'homme remplit aussi en partie l'*étui-musette* ; de plus, la courroie trop mince et en toile se roule en ficelle et scie l'épaule.

Pour parer à ces inconvénients on fait autant que possible couvrir le dessus de l'étui avec de la toile cirée ou de la peau, et renforcer la partie de la courroie qui porte sur l'épaule avec une lanière de cuir.

Le poids de la cartouche est de 54 grammes (about 526 grains).

Le poids total des munitions du soldat est de 3 kil. 348 gr. (about 6¾ lbs. avoird.)

3°. Vivres.

Le nombre de jours de vivres que porte l'homme varie suivant les ordres de l'autorité supérieure.

J'ai vu porter jusqu'à 8 et même jusqu'à 10 jours de vivres ; mais c'est l'exception ; la moyenne habituelle est de 4 jours.

La ration de vivres de campagne est de :

Pain 750 grammes (about 22½ oz. avoird.)
Café 16 " (247 grains)
Sucre 21 " (324 ")
Riz 60 " (926 ")
Sel 16.66 " (257 ")

863.66

ou, biscuit 643 grammes (about 22½ oz. avoird.)

Café 16 "
Sucre 21 "
Riz 60 "
Sel 16.66 "

756.66

La distribution de biseuit étant la plus habituelle en campagne nous avons pour les poids de vivres d'un jour 756.66 grammes (about 26¼ oz. avoird.)

Quatre jours de vivres pèsent donc 3.026 (about 105 oz. avoird.), mais la ration réglementaire de vivres de campagne, n'étant pas suffisante au soldat, il faut y ajouter de vivres qu'on nomme *vivres d'ordinaires*. Ils sont pris, soit à l'administration quand elle distribue de vivres remboursables, soit dans des postes voisins du lieu où l'on se trouve et dans lesquels on peut se ravitailler.

On calcule d'habitude les vivres d'ordinaires sur les données suivantes :

	Grammes.	about
Par homme et par jour.	Lard 100	(3½ oz. avoird.)
	Riz 60	(2 oz. ")
	Sucre 21	(7 ")
	Café 16	(247 gms.)

197 grammes.

Total pour quatre jours 788 grammes.

Le total des vivres pour quatre jours est donc, de 3.026 + 0.788 = 3 kilos. 814 grammes (=about 134½ oz. avoird.)

Chaque soldat porte ses rations de biscuit ; les autres vivres sont mis en commun par escouade, et portés alternativement par l'un ou par l'autre dans de petits sachets de toile que les hommes se fabriquent.

4°. Campement.

On distribue par 8 soldats :—

1 marmite.
1 grande gamelle.
1 grand bidon.
1 moulin à café.
1 hachette.

Chaque soldat à de plus pour son usage personnel :—

1 petite gamelle.
1 petit bidon ; et,
1 quart de litre de fer blanc.

Ces divers ustensiles, moins la hachette, sont en fer étamé. Le petit bidon est ordinairement recouvert de drap pour empêcher l'eau qu'il contient de s'échauffer au soleil.

Les soldats se partagent les effets de campement et les vivres de l'escouade, et ils alternent pour les porter.

La grande marmite se porte appliquée sur le plat extérieur du sac et maintenue par la grande courroie du milieu qui passe dans deux anneaux ménagés *ad hoc*.

La grande gamelle, le grand bidon se portent de même, et naturellement le même soldat ne se charge pas de deux de ces derniers ustensiles à la fois.

Le moulin à café se porte dans le sac.

La hachette panée dans la grande courroie au-dessus du sac.

Le petit bidon, en sautoir, à gauche, ainsi que le quart : la petite gamelle panée dans la grand courroie et par dessus le rouleau formé par la tente-abri et le manteau.

5°. Manière de Camper.

Chaque soldat reçoit une toile de tente, un support avec sa corde de tension et trois petits piquets.

La toile de tente est un moreau de toile carré, de 1m à 1m 30 de côté environ (about from 39 $\frac{1}{4}$ inches to 51 inches square). Le support est composé de deux bâtons de 0.03 m (about 1 $\frac{3}{16}$ inches) diamètre, et qui s'ajustent au moyen d'un cylindre en fer étamé. Les petits piquets ont 0.20 m de longueur (about 8 inches).

La manière de camper varie suivant l'espace que l'on a, ou suivant le front que l'on doit ouvrir.

La forme de camp est ordinairement le carré.

Les soldats campent par six, parce qu'alors la toile est fermée de tous côtés. Les morceaux de toile s'ajustent au moyen de boutonnières et de boutons, ou bien, au moyen d'œillets et de lacets. En campant par six, les hommes se réunissent par trois fils à la fois ; trois hommes du premier rang, et trois hommes du second.

Les zouaves peuvent avoir sous la tente et pour quatre hommes, le même espace que les autres troupes pour six, parce qu'ils ferment les deux extrémités avec leurs turbans, et économisent ainsi 2 tentes.

6°. Détail des objets portés et poids.

Le soldat porte donc :—

Sur lui directement :

1 chemise	-	100	grammes.
1 cravate	-	50	"
1 flanelle	-	150	"
1 caleçon	-	310	"
1 pr. de souliers	-	980	"
1 pr. de guêtres	-	120	"
1 pr. de jambières	-	310	"
1 pantalon	-	1150	"
bretelles	-	50	"
1 habit	-	1100	"
epaulettes	-	250	"
shako	-	670	"

5,240 grammes.

Dans son sac :

Poids du sac	-	2,250	grammes.
Bonnet de police	-	250	"
2 chemises	-	200	"
1 pr. souliers	-	980	"
1 caleçon	-	310	"
2 mouchoirs	-	60	"
Guêtres de toile	-	120	"
Flanelle	-	150	"
Cravate	-	50	"
48 cartouches	-	2,592	"
1 sac à malice, garni,			
fil, aiguille, &c.	-	830	"
1 pantalon de toile	-	700	"

8,492 grammes.

Autour de la taille :

1 ceinturon avec giberne			
vive	-	900	grammes.
Dans la { 14 cartouches	-	756	"
giberne. { les accessoires	-	170	"
1 sabre-bayonette avec			
fourreau	-	1,320	"
			3,146 grammes.

Sur le sac :

1 manteau	-	1,860	grammes.
1 tente-abri	-	1,200	"
1 support de tente	-	460	"
3 piquets, 1 cordeau	-	240	"
1 demi couverture de			
lit en laine	-	1,620	"
1 petite gamelle	-	350	"
1 effet de campement			
de l'escouade du poids			
moyens de	-	1,000	"
			6,730 grammes.

En sautoir.

1 petit bidon plein	-	1,440	grammes.
1 étui-musette	-	300	"
			1,740 grammes.

RECAPITULATION.

	Kilo. Grs.	Oz. Avoird. (about).
Sur le soldat directement	- 5.240	= 183 $\frac{1}{2}$
Sur le sac	- 6.730	= 237 $\frac{1}{4}$
Dans le sac	- 8.492	= 299 $\frac{3}{4}$
Autour de la taille	- 3.146	= 111
En sautoir	- 1.740	= 61 $\frac{1}{2}$
Carabine ou fusil	- 4.475	= 157 $\frac{3}{4}$
4 jours de vivres de nature	- 3.814	= 134
Total	- 33.637	= 1186

Avec quelques chiffons et quelques bibelots que le soldat emporte toujours cela fait 34 à 35 kilogrammes ; mettons en chiffres ronds 34 kilogrammes (nearly 75 lbs. avoirdupois).

Pour le soldat d'infanterie de ligne la bayonette pèse moins que le sabre-bayonette, et la capote plus que le manteau. On peut compter pour lui 33 kilogrammes en chiffres ronds.

No. 12.

Notes sur le service des Subsistances Militaires de l'Armée Française. Place de Bône (Afrique).

En Algérie le service des subsistances est assuré au moyen des ressources de la colonie, en ce que consiste le pain et le biscuit, qui sont fabriqués des blés indigènes d'essence dure.

La farine est blutée à l'extraction de 12 p. % de son pour le pain comme pour le biscuit. La ration de pain comporte 750 grammes (about 26 $\frac{1}{2}$ oz. avoird.) Le pain que l'on distribue pour deux jours est du poids de 1,500 grammes (53 oz. avoird.) La pâte avant cuisson pèse 1,750 grammes (about 61 $\frac{3}{4}$ ozs. avoird.)

Le pain est distribué au plutôt 24 heures après sa cuisson. Le rendement par quintal métrique de farine est de 204 rations en moyenne. On fait généralement usage de fours du système Lespinasse, lesquels sont destinés à être chauffés au bois et propice à réaliser une très grande économie à l'Etat en matière de combustibles.

Le biscuit est fabriqué avec les mêmes farines, et avec beaucoup moins d'eau que pour le pain, et surtout sans sel. La pâte doit être très dure, parfaitement travaillée et soumise à la fin du travail à l'action de la

table-lévier pour être coupée ensuite par bandes, et amincié au moyen du rouleau-régulateur, coupée et percée par l'instrument dit coupe-pâte piquoir ; après ce travail les galettes sont enfournées, restant environ 55 minutes dans le four, que l'on a soin de tenir moins chaud que pour le pain.

Au sortir du four les galettes de biscuit sont placées sur des étagères placées au dessus des fours, où elles séjournent huit jours environ, afin d'obtenir un bon ressuage avant leur mise en caisse, dans lesquelles on peut les conserver environ 18 mois sans altération aucune.

La galette de biscuit pèse 225 grammes (about 8 oz. avoird.), ce qui porte la ration d'un jour à 2 galettes $\frac{1}{2}$ environ.

Les caisses destinées à conserver l'approvisionnement de biscuit sont en planches clouées, pesant 11 kilog. environ, (23 lbs. avoird.), elles contiennent en denrées nette 45 kilog. (about 99 lbs. avoird.) ou 82 rations.

À l'une des extrémités elles indiquent la place de la

fabrication et la date, à l'autre le poids brut, la tare et le net, ce qui permet, en cas d'expédition, d'obtenir un chiffre prompt.

Le personnel d'ouvriers employé dans les services est l'élément militaire, ils se composent de professions diverses. Une prime de travail leur est allouée en raison de leur profession.

Les ouvriers boulangers pour la fabrication du pain ou du biscuit sont embrigadés : 4 ouvriers, dont 1 brigadier, pour le pain, et 5, dont 1 brigadier, et 1 servant de four pour le biscuit.

Bone, le 1^{er} Février 1866,
L'Officier Comptable Chef de Service,
NOURISSEAU.

No. 13.

PUITS ARTÉSIENS de la Division de Constantine, forés depuis le Mois de Juin 1856, jusqu'à la fin de 1861.

(Tableau de la Situation des Établissements Français dans l'Algérie 1858-61.)

Nom des Sondages.	Profondeur de Sondage.	Nombre de Litres d'Eau par Minute.	Température de l'Eau.	Noms des Fontaines.
<i>Oued Rir'.</i>	met. cent.	Litres.	Degrés.	
Tamerna - - - - -	600 00	4,300	21° 0	Fontaine de la Paix.
Tamel'hat (1er puits) - - - - -	58 50	120	22° 0	" des Amis.
" (2d puits) - - - - -	84 70	60	21° 0	" de la Bénédiction.
Sidi-Rached - - - - -	57 00	4,300	24° 0	" de la Reconnaissance.
Oum-el-Tiour (1er puits) - - - - -	107 00	150	24° 0	" du Commandant.
" (2d puits) - - - - -	79 80	150	24° 5	" du Cheikh Aïssa.
" (3me puits) - - - - -	96 00	180	24° 0	" des Hommes Raisonables.
El-Ksour - - - - -	49 64	3,336	25° 0	" de la Prospérité.
Sidi-Sliman - - - - -	74 97	4 000	25° 0	" de la Vie.
Brâm - - - - -	48 60	2,000	24° 0	" du Souvenir.
Mer'ara - - - - -	107 80	Ascendant.	—	
Sidi-Khelil - - - - -	61 00	180	24° 0	" de l'Aman.
Nza-Ben-Rezig - - - - -	92 00	30	23° 5	" du Repos.
Sidi-Amran - - - - -	77 60	4,800	25° 0	" de la Preuve.
Djama - - - - -	69 00	4,600	25° 8	" de l'Obéissance.
El-Ihahirira - - - - -	83 00	40	23° 0	" d'El Harihira.
Bar'dad - - - - -	6 00	Ascendant.	—	
Our'lana - - - - -	65 17	3,000	24° 3	" du Sous-Lieutenant Lehaut.
Ramra (1er puits) - - - - -	54 95	3,800	24° 0	" des Débuts Heureux.
" (2d puits) - - - - -	56 80	3,600	23° 7	" de l'Avenir.
Tala - - - - -	44 85	2,800	23° 7	" de la Garantie.
Bagdad - - - - -	92 48	12	20° 6	
Aïn-Touareg - - - - -	46 80	100	24° 4	
Tamerna-Djedida - - - - -	63 40	1,329	24° 4	
Sidi-Khelil (2d puits) - - - - -	29 20	360	24° 3	
Aïn-Bory - - - - -	64 95	500	24° 0	
<i>Sahara Oriental.</i>				
Chegga (1er puits) - - - - -	40 00	60	22° 5	" de la Fertilité.
" (2d puits) - - - - -	32 50	100	22° 0	" des Rouar'a.
" (3me puits) - - - - -	50 00	700	23° 2	" du Bonheur.
" (4me puits) - - - - -	151 80	100	22° 5	" du Bénéfice.
El-Mekam - - - - -	94 00	Ascendant.	—	
El-Faid - - - - -	157 00	Ascendant.	—	
Tair-Ragou - - - - -	102 00	Ascendant.	—	
Melkaouak - - - - -	141 90	500	23° 2	" du Coton.
Aïn-Nakhar - - - - -	130 00	500	22° 0	" de l'Espérance.
Aïn-el-Kelba - - - - -	160 00	250	22° 5	" du Général.
Tobna - - - - -	164 10	Ascendant.	—	
Bitam (Ouled-Khebbah) - - - - -	133 00	60	21° 5	" des Bonnes Leçons.
" (2d puits) - - - - -	142 00	115	21° 2	" du Retour.
<i>Tougourt.</i>				
Maïderehi - - - - -	175 00	3	20° 0	
Oum-el-Achra - - - - -	156 00	—	—	
An-ben-Alem - - - - -	54 80	200	23° 0	
Aïn-er-Raian - - - - -	51 00	200	—	
Aïn-el-Amra - - - - -	58 20	160	22° 5	
Aïn-ba-Mendil - - - - -	56 50	100	—	
Aïn-Meehoar - - - - -	57 00	—	—	
Aïn-el-Bir - - - - -	64 50	120	22° 8	
Aïn-ben-Zânoun - - - - -	63 00	215	23° 0	
Aïn-Chabrou - - - - -	55 75	10	—	
Aïn-Khadra - - - - -	56 50	190	—	
Aïn-bou-Aziz - - - - -	52 80	220	22° 5	
Aïn-Mimoun - - - - -	52 85	250	22° 5	
Aïn-bou-Guettaïa - - - - -	55 50	200	23° 0	
Aïn-Chiffa - - - - -	58 50	240	22° 5	
Aïn-bou-Aziz-Djedida - - - - -	54 00	190	22° 8	
Aïn-Thaleb-ben-Mohamed - - - - -	53 00	205	23° 0	
Aïn-el-Toumi - - - - -	53 95	150	22° 5	
Aïn-bon-Delal - - - - -	55 25	180	23° 0	
Aïn-el-Mezalit - - - - -	56 65	145	22° 5	
Aïn-Tar'damit - - - - -	57 95	155	22° 5	
Aïn-ben-Alem - - - - -	54 80	200	23° 0	
Aïn-er-Raian - - - - -	51 00	200	—	

No. 14.

HÔPITAUX ET AMBULANCES MILITAIRES.

TABLEAU de la Situation des Etablissements Français dans l'Algérie, 1863.

Aumôniers, Corps de Santé, Infirmiers Militaires.

On comptait, en 1863, dans les trois divisions, 38 hôpitaux et 6 ambulances militaires, ainsi répartis par division :

nombre de ces divers officiers de santé s'est élevé à 228, savoir :—

Division d'Alger	16 hôpitaux	1 ambulance	Dans le division d'Alger, médecins et pharmaciens	-	93	} 228
„ d'Oran	11	4	„ „ d'Oran médecins, et pharmaciens	-	63	
„ de Constantine	11	1	„ „ de Constantine, médecins et pharmaciens	-	72	

Il a été attaché à ces établissements, ainsi qu'aux différents corps de troupes, 32 aumôniers, dit *aumôniers militaires*, savoir :

Dans le division d'Alger	14	} 32
„ „ d'Oran	8	
„ „ de Constantine	10	

Le corps de santé comprend des médecins et pharmaciens *principaux* de 1er et de 2d classe, des médecins et pharmaciens *aides-majors* de 1er et de 2d classe, des médecins et pharmaciens *sous-aides*. Le

Le nombre des infirmiers attachés au service des hôpitaux et ambulances militaires s'est élevé (sous-officiers, caporaux, et soldats) à 1,678, ainsi répartis:

Division d'Alger	-	-	721	} 1,678
„ d'Oran	-	-	507	
„ de Constantine	-	-	450	

Voici quel était au 31 Décembre 1863 la situation numérique de ces différents corps :—

TABLEAU de la Situation Numérique du Corps de Santé au 31 Décembre 1863.

Grades.				Effectif au 31 Décembre 1863.	Montant de la dépense d'après l'effectif.	Observations.
DIVISION D'ALGER.						
Aumôniers - - - - -				14	Fr. 9,240	
Médecins et pharmaciens principaux - { de 1er classe -				3	18,750	
- { de 2e classe -				2	10,600	
Médecins et pharmaciens majors - { de 1er classe -				16	72,000	
- { de 2e classe -				15	44,250	
Médecins et pharmaciens aides-majors - { de 1er classe -				18	36,000	
- { de 2e classe -				39	70,200	
Totaux - - -				93	251,800	
Infirmiers - - { Majors (serjents et caporaux) -				151	40,197	
- { Soldats (de 1er et 2e classe) -				570	83,757	
Totaux - - -				721	123,954	
TOTAUX GÉNÉRAUX - - -				828	384,994	
DIVISION D'ORAN.						
Aumôniers - - - - -				8	5,520	
Inspecteurs - - - - -				—	—	
Médecins et pharmaciens principaux { de 1er classe -				1	7,691	
- { de 2e classe -				—	—	
Officiers de Santé { Médecins et pharmaciens { de 1er classe -				18	102,632	
- { majors - { de 2e classe -				8	30,814	
- { Médecins et pharmaciens { de 1er classe -				9	24,671	
- { aides-major - { de 2e classe -				24	60,989	
- { Médecins et pharmaciens sous aides -				3	7,264	
Totaux - - -				63	234,061	
Infirmiers - - { Majors (serjents et caporaux) -				94	24,900	
- { Soldats (1er et 2e classe) -				413	61,079	
Totaux - - -				507	85,979	
TOTAUX GÉNÉRAUX - - -				570	320,040	

Tableau de la Situation Numérique du Corps de Santé au 31 Décembre 1863—*suite et fin.*

Grades.		Effectif au 31 Décembre 1863.	Montant de la dépense d'après l'effectif.	Observations.
DIVISION DE CONSTANTINE.				
Aumôniers - - - - -		10	Fr. c. 5,038.00	
Officiers de Santé	Inspecteurs - - - - -	—	—	
	Médecins et pharmaciens { de 1 ^{re} classe - - -	1	8,365.78	
	principaux - - - - - { de 2 ^e classe - - -	3	18,423.53	
	Médecins et pharmaciens { de 1 ^{re} classe - - -	9	50,167.26	
	majors - - - - - { de 2 ^e classe - - -	13	45,298.80	
	Médecins et pharmaciens { de 1 ^{re} classe - - -	16	52,959.72	
	aides-majors - - - - - { de 2 ^e classe - - -	29	44,574.05	
Médecins et pharmaciens sous-aides - - -		1	366.68	
Médecins civils requis - - - - -		—	—	
Total		72	220,155.82	
Infirmiers	Infirmiers-majors (sergents et caporaux) - - -	95	35,051.00	
	Infirmiers soldats (de 1 ^{er} et de 2 ^e classe) - - -	355	66,218.66	
Total		450	101,269.66	
TOTAL GÉNÉRAL		532	326,463.48	

No. 15.

INDIQUANT la COMPOSITION en PERSONNEL, en MATÉRIEL et en MOYENS de TRANSPORT d'une AMBULANCE active pour une Division de 10,000 HOMMES, et celle des Sections d'Ambulance à mettre à la suite des Colonnes expéditionnaires d'un effectif moindre.

	Ambulance Divisionnaire pour 10,000 Hommes.		Sections d'Ambulance pour des Colonnes de											
			8,000 à 9,000 Hommes.		6,000 à 7,000 Hommes.		4,000 à 5,000 Hommes.		2,000 à 3,000 Hommes.		1,500 à 1,800 Hommes.		1,000 Hommes.	
	Nombre.	Trans- ports. — Mulets.	Nombre.	Trans- ports. — Mulets.	Nombre.	Trans- ports. — Mulets.	Nombre.	Trans- ports. — Mulets.	Nombre.	Trans- ports. — Mulets.	Nombre.	Trans- ports. — Mulets.	Nombre.	Trans- ports. — Mulets.
PERSONNEL.														
Médecin-Major de 1 ^{re} classe	1	—	1	—	1	—	1	—	—	—	—	—	—	—
chef de service - - - - -	2	—	2	—	2	—	1	—	—	—	—	—	—	—
Médecin-Major de 2 ^e classe	4	—	3	—	3	—	2	—	1	—	1	—	1	—
Médecin, Aides-Majors - - -	1	—	1	—	1	—	1	—	1	—	—	—	—	—
Pharmaciens, Aides-Majors	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Officier d'Administration,	1	—	1	—	1	—	1	—	1	—	1	—	1	—
chef de service - - - - -	6	—	4	—	4	—	3	—	2	—	1	—	—	—
Adjutants d'Administration	8	—	4	—	4	—	4	—	3	—	1	—	1	—
Sergents - - - - -	8	—	6	—	4	—	4	—	4	—	2	—	1	—
Infirmiers { Caporaux - - - - -	90	—	75	—	65	—	55	—	40	—	25	—	18	—
Soldats - - - - -	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Totaux	127	—	103	—	93	—	77	—	57	—	33	—	23	—
MATÉRIEL. MULETS ET COMPOSITION DU CHARGEMENT.*														
Cantines.	de chirurgie - - - - -	8	4	8	4	6	3	6	3	4	2	2	1	1
	de pharmacie - - - - -	4	2	4	2	4	2	4	2	2	1	2	1	1
	d'administration pour	—	—	—	—	—	—	—	—	—	—	—	—	—
	les utensiles et le	—	—	—	—	—	—	—	—	—	—	—	—	—
	mobilier - - - - -	12	6	10	5	10	5	10	5	8	4	4	2	1
	d'approvisionnement :	—	—	—	—	—	—	—	—	—	—	—	—	—
	Service de santé - - - - -	18	9	14	7	12	6	8	4	6	3	3	1½	3
	Service d'adminis-	—	—	—	—	—	—	—	—	—	—	—	—	—
	tration - - - - -	22	11	20	10	16	8	14	7	8	4	6	3	4
	pour le personnel de	—	—	—	—	—	—	—	—	—	—	—	—	—
Matériel.	santé et d'adminis-	—	—	—	—	—	—	—	—	—	—	—	—	—
	tratif - - - - -	26	13	23	11½	22	11	18	9	14	7	8	4	5
	Tonneaux d'ambulance - - -	10	5	8	4	8	4	8	4	6	3	4	2	2
	Brancards - - - - -	20	2	16	2	16	2	12	1	10	1	6	½	5
	Couvertures (mises en	—	—	—	—	—	—	—	—	—	—	—	—	—
	bâches par paquets de dix)	200	10	180	9	160	8	140	7	120	6	100	5	6
	Bâches { pour les malades - -	30	2	28	1½	24	11	20	1	16	1	12	1	9
	pour enveloppes -	20	1	18	1	16	1	14	1	12	—	10	—	6
	Objets de Campement.	—	—	—	—	—	—	—	—	—	—	—	—	—
	Tentes et accessoires - - -	30	15	28	14	22	11	16	8	10	5	6	3	4
Moyens de transport de Malades.	Sacs à piquet - - - - -	8	4	6	3	6	3	4	2	4	2	2	1	1
	Litière (paires)	24	24	18	18	14	14	10	10	8	8	4	4	2
	Train des { Cacolets (paires)	250	250	200	200	150	150	110	110	80	80	50	50	30
	Equipages { Mulets (haut le	—	—	—	—	—	—	—	—	—	—	—	—	—
	piéd) - - - - -	6	6	6	6	6	4	4	4	4	2	2	1	1
	Totaux	—	364	—	297	—	235	—	178	—	131	—	81	—

* Les quantités indiquées ci-dessus sont applicables aux ambulances des colonnes qui opéreraient dans la limite de nos avant-postes, c'est-à-dire à portée de points d'évacuation et de ravitaillement.

Pour les expéditions lointaines opérant dans le Sud le nombre des cantines d'approvisionnement devra être augmenté de manière qu'elles puissent recevoir un tiers de plus de linge à panser et des quantités doubles de denrées alimentaires. Le nombre des cacolets devra être augmenté dans la proportion du cinquième. Enfin, celui des mulets de transport recevra des augmentations proportionnelles.

Indiquant la Composition en Personnel, en Matériel et en Moyens de Transport d'une Ambulance active pour une Division de 10,000 Hommes, et celles des Sections d'Ambulance à mettre à la suite des Colonnes expéditionnaires d'un effectif moindre—*suite et fin.*

	Ambulance Divisionnaire pour 10,000 Hommes.		Sections d'Ambulance pour des Colonnes de											
			8,000 à 9,000 Hommes.		6,000 à 7,000 Hommes.		4,000 à 5,000 Hommes.		2,000 à 3,000 Hommes.		1,500 à 1,800 Hommes.		1,000 Hommes.	
	Nombre.	Trans- ports. — Mulets.	Nombre.	Trans- ports. — Mulets.	Nombre.	Trans- ports. — Mulets.	Nombre.	Trans- ports. — Mulets.	Nombre.	Trans- ports. — Mulets.	Nombre.	Trans- ports. — Mulets.	Nombre.	Trans- ports. — Mulets.
QUANTITÉS A SUBSTITUER A CELLES CI-DESSUS, POUR LES AMBULANCES DES COLONNES OPÉRANT DANS LE SUD.														
Cantines d'appro- visionnement Cacolets (paires)	26	1	20	10	16	8	12	6	8	4	5	2½	5	2½
	40	20	36	18	28	14	24	12	14	7	10	5	6	3
	300	300	250	250	200	200	150	150	120	120	90	90	70	70
Totaux	—	334	—	278	—	222	—	168	—	131	—	97½	—	75½
Report du nombre de mulets affectés aux autres parties du matériel	—	94	—	80	—	71	—	57	—	44	—	27½	—	16½
Totaux des mulets pour les Colonnes du Sud	—	427	—	358	—	293	—	225	—	175	—	125	—	92

No. 16.

COMPOSITION de la CANTINE de CHIRURGIE, No. 1.

Indication des Contenances.	Nos. de la Classification.		Dénomination des Objets.	Unité réglementaire.	Quantités.
	Sommaire.	Détaillée.			
Appareil d'ambulance	9	1	Agaric de chêne (Amadouvier)	Kilogrammes	0·025
	107	1	Bandes roulées	"	1
	109	3	Petit linge (Compresses assorties)	"	2·100
	110	1	Charpie de fil	"	0·500
	111	3	Gaze à pansement	Mètre	1
	111	1	Aiguilles	Nombre	10
	111	2	Epingles	"	125
	112	4	Cordonnet de soie à ligatures	Kilogrammes	0·015
	112	5	Eponges fines	"	0·010
	115	6	Fil à coudre	"	0·015
	115	1	Seringue à injection en verre	Nombre	1
	156	2	Ventouses	"	1
Tiroir moyen	221	4	Etuais d'Aiguilles	"	1
	243	14	Flacons carrés petits pour appareils	"	4
		7	Boîte d'appareil (pour le cérat)	"	1
	107	1	Bandes roulées	Kilogrammes	1
	109	3	Petit linge (Compresses assorties)	"	2·100
Tiroir grand	202	1	Charpie de fil	"	1·100
	217	3	Verres à boire	Nombre	1
		43	Seringues à injection en étain	"	1
	107	1	Bandes roulées	Kilogrammes	2·200
	109	2	Grand linge (en drap)	"	0·500
Boîte ou case spéciale	110	3	Petit linge (Compresses assorties)	"	4
	112	1	Charpie de fil	"	1·450
	214	3	Gaze à pansement	Mètre	5
	243	3	Coton cardé	Kilogrammes	0·200
		3	Boîte No. 3 (Amputation petite boîte)	Nombre	1
Tiroir petit		10	Bougeoir en fer blanc	"	1
	112	2	Crin pur (frisé)	Kilogrammes	0·060
	214	1	Boîte No. 1 (Instruments pour la bouche)	Nombre	1
		17	Boîte No. 17 (Résection des os)	"	1
	148	1	Bougies diverses (Stéariques)	Kilogrammes	0·100
	162	3	Papier ordinaire	Main	1
	163	5	Canifs	Nombre	1
		6	Crayons	"	1
		8	Encrriers	"	1
		11	Paquets de plumes	"	1

No. 18.

COMPOSITION du SAC d'AMBULANCE.

Numéros de la nomenclature.		Dénominations des Matières et Objets.	Unité Réglemen- taire.	Quantités.	Observations.
Sommaire.	Détaillée.				
MÉDICAMENTS.					
9	1	Agaric de chêne - - - - -	Kilog.	0·050	
10	29	Cire jaune - - - - -	"	0·060	
15	30	Huile d'Arachides - - - - -	"	0·006	
16	1	Ammoniaque liquide à 22° - - - - -	"	0·030	
24	9	Emétique (20 paquets à 1 décigramme) - - - - -	"	0·002	
24	1	Chloroforme - - - - -	"	0·150	
33	3	Ether sulfurique alcoolisé - - - - -	"	0·062	
47	2	Sulfate de quinine (20 paquets de 2 déci-grammes). - - - - -	"	0·004	
78	7	Alcool camphré - - - - -	"	0·060	
79	2	Diachilon gommé - - - - -	"	0·160	
84	3	Taffetas Anglais - - - - -	Bandes	15	
102	3	Laudanum de Sydenham - - - - -	Kilog.	0·030	
102	2	Bouchons de liège petits - - - - -	Nombre	9	
OBJETS DE PANSEMENT.					
107	1	Bandes roulées - - - - -	Kilog.	0·500	
102	3	Petit linge à pansement - - - - -	"	0·500	
102	1	Charpie de fil - - - - -	"	0·250	
111	1	Aiguilles dans un étui - - - - -	Nombre	10	
111	2	Epingles - - - - -	"	50	
111	3	Coton cardé - - - - -	Kilog.	0·150	
112	5	Eponges fines - - - - -	"	0·010	
112	6	Fil à coudre, gris - - - - -	"	0·010	
115	8	Ruban de fil, une pièce - - - - -	"	0·100	
115	2	Ventouses - - - - -	Nombre	1	
OBJETS DIVERS.					
148	1	Bougie filée - - - - -	Nombre	1	
163	2	Briquet à frottement - - - - -	"	1	
183	6	Crayons - - - - -	"	1	
183	"	Serre-têtes - - - - -	"	3	
199	3	Gobelets en fer blanc - - - - -	"	1	
217	6	Petite cuvette en fer blanc - - - - -	"	1	
217	15	Attelles moyennes - - - - -	"	2	
221	4	Flacons avec bouchons de liège - - - - -	"	3	
221	14	Flacons bouchés à l'émeri - - - - -	"	3	
245	55	Tire-bouchons - - - - -	"	1	
295	1	1. Havre sac garni de compartements en fer blanc. - - - - -	"	1	
295	1	2. Rouleau en fer blanc - - - - -	"	1	
295	1	3. Cadenas en cuivre - - - - -	"	2	
295	1	4. Enveloppe en outil pour le rouleau doublée d'une toile imperméable. - - - - -	"	1	
295	1	5. Seringue en étain No. 2, à deux canules, dont une en gomme. - - - - -	"	1	
295	1	6. Trousse de chirurgie (Boîte No. 31 du No. 214 de la nomenclature). - - - - -	"	1	

No. 19.

HÔPITAL MILITAIRE D'ORAN.

ÉTAT des Militaires embarqués pour France, en vertu d'un congé de convalescence, pendant l'Année 1865.

Mois de Janvier	-	-	-	-	-	-	101
" Février	-	-	-	-	-	-	99
" Mars	-	-	-	-	-	-	82
" Avril	-	-	-	-	-	-	50
" Mai	-	-	-	-	-	-	73
" Juin	-	-	-	-	-	-	112
" Juillet	-	-	-	-	-	-	97
" Août	-	-	-	-	-	-	111
" Septembre	-	-	-	-	-	-	127
" Octobre	-	-	-	-	-	-	156
" Novembre	-	-	-	-	-	-	193
" Décembre	-	-	-	-	-	-	155
Total	-	-	-	-	-	-	1,356

N.B.—Ces renseignements concernent toute la province d'Oran.

No. 20.

NOTE on the "INTENDANCE MILITAIRE."

In the course of our inquiry in Algeria, our attention was so frequently drawn to the influence of the "Intendance Militaire" on the health of the army, that it may be advantageous to introduce a brief note, giving an account of the nature of this department derived from numerous conversations and discussions with various officers regarding it.

The "Intendance" comprises within its functions everything that relates to the administration of the army not connected with actual fighting.

In France, the Minister at War is commander-in-chief of the army. He is represented in his purely military capacity by the marshals and generals commanding corps d'armée, divisions, brigades, &c. &c.

In like manner the Minister at War is head of the army administration in everything that concerns the feeding, clothing, sheltering, medical treatment, and conveyance of the soldier from the day of his enlistment to the moment of his death or his discharge from the army.

In these administrative duties the Minister is represented by the "Intendance Militaire," which is as directly responsible to him for the due performance of these administrative duties, as are the marshals and generals for successfully conducting the military operations confided to them.

In the French service, the marshal or general in command has, apart from his "officiers d'ordonnance," or personal aides de camp, two officers to look to:—

1. The chief of the Staff.
2. The head of the "Intendance."

To an army there is attached an "intendant general" who ranks with general of brigade. The "intendant" attached to a division ranks with a colonel.

Responsibility is clearly defined throughout the various ranks, and any failure during a campaign or in time of peace, in the food, clothing, shelter, or medical treatment of the French soldier would rest with the intendant militaire who would be held answerable for it.

The intendant is assisted by "adjoints" ranking as captains, and by "sous intendants" ranking as field officers. The service is recruited from captains of regiments who have to pass a special examination to qualify for the "intendance."

The duties of officers of the "intendance" comprise:—

- Provisioning and clothing of troops.
- Supplies of stores of all kinds (except warlike stores), whether for the field, for barracks, or for hospitals.
- Arrangements with the navy for transport, passages, &c.

The "intendance" may therefore be said to perform all or most of the duties done in the British service by the commissariat, stores, purveyors, and barrack branches, except that unoccupied buildings are in charge of the engineers, and are only equipped by the intendance when required for occupation.

There is no money responsibility attached to the office of intendant. The responsibility of the "intendant" was described as being "toute morale" as opposed to the financial responsibility of the "comptables" who furnish a money security on taking office, and are responsible for the safe custody of all purchased and other stores, and for the production of vouchers of payment.

All bills or drafts must be countersigned by the responsible officer of the "intendance," but the actual paymaster acts under the orders of the Minister of Finance at Paris.

The "comptables" may be compared in respect of position and origin to the quartermasters of the British army. They are employed in subordinate positions, such as taking charge of a hospital or

store establishment, or of a divisional bakery, or of hospital equipments, &c.

The "comptables" are taken from the "sous officiers" of the army generally, and they may rise to a position equivalent to the rank of "chef d'escadron."

In providing supplies, it is the practice to advertise for the stores required, and to receive sealed tenders. The "intendant" determines the acceptance of the tenders and authorizes the purchase.

The comptable is responsible for the payment and the punctual submission of accounts and vouchers.

There is a distinct corps of *ouvriers de l'administration* attached to the "intendance." This is a body of workmen who have undergone military instruction, coopers, carpenters, smiths, wheelwrights, bakers, butchers, &c. &c.

There is also a corps of "infirmiers" corresponding to the hospital orderlies in the British service, who after going through a certain amount of instruction, are assigned to the military hospitals as attendants on the sick and wounded, and who in the field take charge of the ambulance.

An officer of the "intendance" accompanies every column, brigade, or division when in the field, or he remains with the officer commanding as part of his staff when the army is in garrison. To the intendant and to the chief of his staff, the officer commanding explains the military operations contemplated, and the intendant would, according to the strength of the expeditionary column, assign according to a prescribed scale all the "matériel" required. The intendant would either accompany the column himself, if of sufficient importance, or he would depute a sous intendant or an adjoint as his representative, and as the executive officer of intendance on the commandant's staff. The intendant would provide and select the medical officers required for the force, together with a due proportion of infirmiers, and also the necessary provision of medicines, medical comforts, surgical instruments, sick tents, "cacolets," and ambulance carts for the transport of sick and wounded.

For the carriage required by the medical service and for the office establishment of the intendance and "état-major," he would indent on the military train for mules, and he would make a requisition on the military commandant of the province for the contribution of camels which the Arab tribes are bound to furnish, for the conveyance of all the other "matériel," such as provisions and military stores required for the column on its march.

The soldiers carry provisions for three or four days to meet any unforeseen emergency; but the system of contract, and the military stations where the intendance has its stores prevent the necessity of much carriage until the frontier dépôt is reached. This is the base of the military operations and the place at which the great bulk of the carriage required for the expedition is collected.

The medical officers are subordinate to the "intendants," with whom rests their selection for service, their promotion, and who are the channels of communication between the medical service and the superior military authority.†

The principal medical officer with a column often may be, and is, consulted by the officer commanding, and he may make suggestions on matters connected

* By "matériel" is meant all the requirements of an army in the field, not actually arms, ammunition, and accoutrements.

† The intendants hold that even in the matter of selection and promotion, they were perhaps more impartial than the medical chiefs. They considered themselves perfectly able to judge of the zeal and energy of medical officers, and that they were free from occasional prejudices and favoritisms on the part of the medical chiefs who have the control of the treatment of cases in military hospitals.

with the health of the troops, but he has no official right to such direct communication, the recognized official channel being through the intendant or his deputy.

The intendant is held by the general responsible for the care of the sick and wounded. The medical officer has, of course, the responsibility of the medical and surgical treatment of the sick and wounded, but the officer of intendance directs and issues his orders in all questions of hygiene as distinguished from purely medical treatment.

He receives all the suggestions offered by the medical officers regarding the health of troops in the field and garrison, and submits them with his opinion to the military authorities. Of course it is possible for an ignorant or an obstinate official in the position of an intendant to delay or oppose sanitary improvement, but it was stated that practically this rarely happens. The "intendants" who have passed some years in regiments are themselves thoroughly acquainted with all the details of a soldier's life, and know his wants, and their professional reputation and success in their career depend upon meeting all these requirements and in keeping the army efficient. They are therefore glad to avail themselves of the advice of the medical officers subordinate to them, but they are not bound to act on it.

Delays that occur in providing for improvements in hygiene are, it was stated, caused almost invariably by want of funds, and not from differences of opinion between the medical service and the "intendance."

For the supply of rations the "intendance" enter into contracts. Thus, one contractor undertakes the supply of rations for the whole province of Constantine. This contractor has under his orders a number

of subordinates known as "préposés," who furnish at each halt the rice, sugar, salt, coffee, &c. comprised in the French soldier's ration. The contractor is liable to heavy penalties on the failure of any one of his "préposés" to furnish the necessary supplies at every halt.

During the earlier years of the military occupation of Algeria, caravanserais were established on all the principal military highways as dépôts of provisions for the troops, but these are not now necessary. The extension of colonization throughout the three provinces renders practicable the system of *eommisariat* contracts described above. As saving waste, and the deterioration of provisions long in store, the contract system is more economical than the former system.

At many of the halting places on the military roads there are fountains for the supply of good drinking water; beyond the frontier a supply of water to meet emergencies is carried on camels. Pot and artesian wells are also sunk so as to economize the water carried by the camels. Alum has been used with considerable success to improve such water as may be procurable at halting places. Filters have not been generally used. In former years the troops suffered in health from the difficulty of getting good water on the march, and much of the dysentery and bowel complaints which were formerly frequent was attributed to bad water.

The irregular cavalry *spahis*, who now accompany the expeditionary columns, are well acquainted with the available water supplies throughout the country, and this increased knowledge has removed one of the causes of sickness in Algeria which pressed on the troops in former times.

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CARTE GÉNÉRALE DE L'ALGÉRIE



Echelle en Lieues Marines de 20 au Degré.

Echelle en Lieues de 25 au Degré.

ENVIRONS DE BOUFARIK.



Gravé par J. Schwaerzle

Dessiné au Dépôt général de la Guerre, sous la Direction de M^r le L. Pélét, d'après les notes des officiers du Corps royal d'Etat-major

Imp. de Kerppeles et C^{ie} Paris Colonne 15

Echelle (10,000)

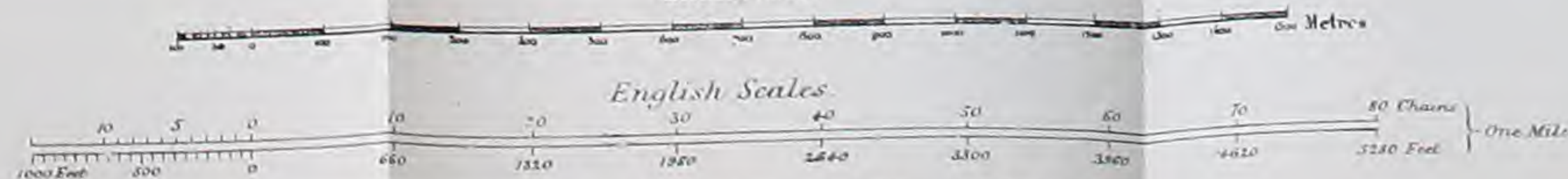


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