

which died during the winter of 1854-55 are buried. Litter has been burned over the burial pits, and powdered charcoal and quicklime have been scattered over them, so that there is now nothing to fear.

The British Camp on the Plateau.—The sanitary regulations in force throughout the British camp are so strict, that after the evacuation the only precautions necessary will be, to burn any organic matter that may remain, and to leave the surface exposed to the air, the sun, and the rain. Nature herself will do all that is wanted.

Kamiesch and Kazatch.—Both these places being in the occupation of the French, their sanitary condition could not be interfered with, but it is believed to be far from good.

Sanitary Precautions against typhus fever.—1. In passing through the country an army ought not to crowd dwelling-houses either in towns or in rural districts. As much as possible the army should be camped in the open field.

2. The same observation holds good with regard to the sick of an army. They should be treated as much as possible outside of towns, under canvas or in field hospitals.

3. The following rules ought to be adopted in towns as precautionary measures:—

a. To cleanse and purify all streets, courts, stables, and cattle-sheds. Dunghills and all collections of organic matter should be removed and destroyed.

b. To cleanse and disinfect all latrines, drains, and open channels. Powdered charcoal will at once destroy the smell from latrines, but quicklime is better for drains and channels.

c. To whitewash all barracks, casernes, hospitals, houses, and living rooms, inside and out with quicklime. This precaution is specially necessary wherever typhus fever prevails.

d. In the latter case all overcrowding amongst the inhabitants should be prevented, and if necessary the infected houses should be cleared of their occupants, till they are cleansed and whitewashed.

e. Ample ventilation should be given to all barracks, casernes, hospitals, dwellings, rooms, shops, stables, and to all confined places, such as cellars and the like.

f. Exposure to air and sun of household goods, furniture, wearing apparel, &c.

g. The use of all alcoholic liquors should be discouraged. Dr. Sutherland remained in the Crimea until the evacuation by the troops was so far advanced that there appeared no further risk of epidemic disease. He left Balaklava on the 20th June, and returned to England after having inspected the hospitals at Scutari.

PART IV.

PRACTICAL CONCLUSIONS.

THE experience obtained in dealing with the sanitary condition of the hospitals on the Bosphorus, and with that of the British occupation in the Crimea, appears to the Commissioners to warrant the deduction of the following practical conclusions:—

RESPECTING THE HOSPITALS ON THE BOSPHORUS.

I.

That the impure state of the air in the hospitals at Scutari, arising from the defective condition of the drainage and ventilation, and the cubic space for the inmates, which the Commissioners found on their first examination of the buildings, were sufficient to account for a large proportion of the excess of mortality then existing among the sick, and also for the violent outbreak of cholera among the troops in November 1855, and that, except in their greater intensity, there was nothing either in the nature of the defects or in their results which differed from what has been usually observed elsewhere.

To avoid similar occurrences, in buildings about to be taken possession of for hospital or barrack purposes, it is requisite:—

II.

That the local position of the building be carefully examined to ascertain the sanitary topography of the site; whether there be any marshes, wet ground, unwholesome mud banks, sea beaches, or other sources of malaria in the

vicinity. All buildings situated in low, confined, or malarial positions, or where the wet ground cannot be easily drained, or where there is a damp relaxing local atmosphere, likely to depress the vital powers, should be avoided if possible.

III.

The sanitary condition of the neighbourhood in which the building is situated should be carefully examined to ascertain whether there be any decaying organic matter, such as dungheaps, unburied carcasses of animals, offal, filth, or foul water lying on the surface; open ditches containing offensive matter, graveyards, &c.

All nuisances should be immediately removed to a distance, or buried or burned, as the case may be. The surface should be levelled, paved, and channelled where necessary, and kept scrupulously clean; offensive open ditches should be cleansed and covered over, and any graveyard emitting offensive effluvia should have fresh earth, with lime or charcoal thrown over it.

No interment should take place at a less distance than 200 yards from a hospital. No more than one body should be buried in a grave, and no grave should be less than five feet deep.

IV.

It is especially necessary to examine most carefully the state of the sewerage and drainage. However spacious and suitable any building may appear for a hospital or barrack, when viewed externally and superficially, it may, nevertheless, have the elements of disease concealed beneath it to such an extent as to render it little better than a pest-house in certain conditions of the weather and directions of the wind.

Sewers or drains built of rough rubble stone, with a square section, or without proper attention to fall, or too large for the volume of water they have to convey, are liable to accumulate foul deposits, and generate poisonous gases. If on examination deposits be actually found within sewers, it is quite certain that such sewers may at any time become dangerous to the health of the building, especially if they

pass under or near any inhabited apartment, so that the air of the room become infected with the exhalations escaping through their sides. Deaths from fever and cholera occurred within the Barrack Hospital at Scutari directly traceable to this cause.

Still more dangerous do sewers become when there is a direct communication between them and the interior of the buildings by means of untrapped privies or sinks. In this way the air becomes tainted to a much greater degree, and may, alone or in combination with other sanitary defects, give rise to disastrous consequences.

To prevent similar occurrences, it is indispensably necessary before putting either troops or sick into such a building to cleanse thoroughly the whole drainage, to provide a suitable apparatus with water for flushing the sewers to prevent accumulations in them, to trap the outfall of the sewer to prevent the wind or sea, as the case may be, from driving foul air inside the building, and to provide ventilating openings for sewers in such positions that the effluvia cannot reach the interior of the building.

It may be necessary to destroy and relay sewers with a better form and inclination. The section should be as nearly oval as the materials at hand will admit.

Wherever earthenware pipes of sufficient sectional area can be obtained, they form the best and safest drainage for buildings.

The experience of the civil hospitals at Renkioi and Smyrna, and of the Naval Hospital at Therapia, and also the partial experience in the Barrack Hospital at Scutari, all go to show that it is not only possible but highly advantageous for the salubrity of any military hospital to substitute pan closets for any arrangement whatever of open privies, and that with ordinary care on the part of the attendants these closets act perfectly.

Wherever practicable, water-closets should be under a separate roof, and in all cases they should have a ventilation distinct and independent of that of the building. Box latrines with flushing apparatus may be used with advantage for barracks. They save water, but they require daily attention and to be used with care.

V.

The actual state of the ventilation, and also the capabilities of ventilation of every building about to be occupied as a hospital or barrack should be carefully examined.

It may be laid down as a principle that any building in which a number of people, whether sick or healthy, are to be congregated together for any length of time, should never depend for its ventilation solely on doors and windows.

Doors and windows may be placed in wrong positions for ventilation. They are liable to be opened and closed irregularly. They may be, and generally are, closed during the night, when ventilation is more necessary for hospitals and barracks than it is during the day.

Whenever there is a want of freshness in the air of a ward or barrack-room, it may be laid down as an axiom that there is danger to health, and no means of ventilation ought to be deemed sufficient that does not remove this.

In carrying out an independent ventilation of a ward or barrack-room, it is of primary importance to afford free exit for the warm foul atmosphere as near as possible to the ceiling of the wards. Ventilating openings of sufficient size, whether through the walls into the external air, or by ventilating tubes through the ceilings and roof, as was practised with great benefit at Scutari and Kulali, are well adapted for the purpose.

The size of the openings must depend on the number of inmates, and they should be considerably larger for a barrack-room than for a sick-ward, on account of the larger number of inmates in the former.

While providing an exit for the impure air, it is necessary to have means of admitting fresh air. This can be most readily done in most instances through the windows, by removing a sufficient number of panes of glass, or by making openings through the wall near the level of the floor. In most cases, it is necessary to modify the current of air, especially in sick wards, by introducing into the openings for admitting fresh air panes of perforated zinc or of wire gauze, if obtainable, or by narrow overlapping louver boards, which can be readily made of any wood found on the spot, or by nailing over the apertures pieces of open

canvas, gauze, or bunting. All such ventilating arrangements to be effectual require attention and modification according to the weather, and the sensible state of the atmosphere within the ward or barrack-room.

Whenever the condition of the weather and climate admit of it, a free perflation of the whole building by opening the windows or doors or both, is most desirable, but it does not obviate the necessity for the other permanent arrangements already mentioned.

VI.

The cubic contents of every room or place where the sick are to be received, or which it is intended to use for a barrack-room, should be ascertained, but the number of inmates should not be apportioned solely on the basis of the cubic contents.

Wards or rooms may be very lofty, but if the cubic space be above the beds, and the beds be placed too close together, on the assumption that there is cubic space enough, the sick may still suffer from all the evils of overcrowding. In like manner a lofty apartment used as a barrack-room may be overcrowded if the men sleep too closely packed together on the floor.

In large stone buildings taken possession of for hospital purposes, beds should never be placed nearer each other than six feet measured from centre to centre, and the cubic space allowed for each patient should never be less than 1,000 cubic feet.

The amount of cubic space required for healthy men in stone buildings depends on the climate and season, and above all, on the presence or absence of an epidemic constitution of the air, indicated by a tendency to zymotic diseases. A smaller amount of cubic space may be allowed in a colder than in a warmer climate, and in winter than in summer. It is unsafe, even with good ventilation, and in a temperate climate, to allow less than 500 cubic feet for an adult man in health, and more than this should be allowed in epidemic seasons. Cholera broke out among the troops in the Barrack Hospital when the allowance was between 250 and 350 cubic feet per man. Of

course if the atmosphere be polluted with emanations from foul sewers or by defective ventilation, a small amount of cubic space is far more likely to predispose to disease than if these additional elements were not present.

The only safe rule in practice is to attend strictly to cleanliness within and without the buildings, to correct defects in the sewerage, drainage, and ventilation, and to spread the troops as much as the accommodation will allow.

It is safer to camp out or to bivouac troops than to overcrowd. Overcrowding of barracks and defective ventilation are only other terms expressive of disease among the men and danger to the efficiency of the force.

During epidemic seasons especially, either one or other, or both of these conditions conjoined, will almost infallibly lead to immediate loss, and during ordinary seasons the loss is merely procrastinated and spread over a longer time.

Should cholera break out under the conditions mentioned, the troops should be immediately removed from the building and put under medical inspection, for the discovery and treatment of premonitory diarrhœa. Camping out in a dry, healthy position, and spreading the troops over a wide area is the best remedy.

It is hazardous to quarter troops in obviously unwholesome localities, or in houses already overcrowded with inhabitants. Regiments, even while on march, when quartered on filthy, overcrowded towns or villages, especially during epidemic seasons, have, from the mere circumstance of additional overcrowding, become affected with fever and cholera, and have left them in nearly every town and village through which they have passed.

VII.

The walls and ceilings of all apartments are liable to become saturated with organic matter, absorbed from emanations proceeding from the bodies and breath of persons inhabiting the room. This is one of the most ordinary consequences of filth, overcrowding, and bad ventilation, and it is a common predisposing cause of epidemic diseases.

Hence before any buildings are occupied, either for hospi-

tals or barracks, the walls and ceilings of the apartments should be scraped, thoroughly cleansed, and then washed with a sufficient number of coats of fresh quicklime wash to make them thoroughly white, and the process should be frequently repeated. This simple proceeding has in numerous instances been found to arrest the progress of zymotic maladies, when nothing else appeared to be of use. The materials and tools required are easily obtained, and almost any labourer can be instructed to do the work effectually.

VIII.

It is hardly necessary to specify that everything likely to give off injurious emanations in sick wards, whether it be the excreta of patients, foul linen, the remains of food, &c., should be immediately removed outside the walls of a hospital.

IX.

Ships, unless specially fitted up, and moored in healthy positions, are not adapted for hospital purposes, and should not be used either for sick or convalescents, if suitable accommodation can be obtained on shore.

PRACTICAL CONCLUSIONS RESPECTING BALAKLAVA.

I.

That the bad sanitary condition of the town and harbour of Balaklava and their vicinity, when the Commissioners arrived in the Crimea, was the cause of much sickness in the town, on board ship, in the neighbouring camps, and among the soldiers employed on fatigue duty in the town and neighbourhood. That the local causes of disease then existing were essentially the same as those which have been observed to predispose to epidemic and pestilential diseases elsewhere, and would have led to similar results at home under an equally high temperature.

II.

The most important of these causes were:—

Nuisances, defective cleansing, defective state of the surface, allowing foul water to remain upon it.

Filthy and overcrowded houses.

The horrible state of the eastern margin of the harbour, from the accumulations of organic matter proceeding from dead carcasses, offal, stable manure, and other filth close to or under the water line.

Emanations from the putrid marsh and graveyards at the head of the harbour.

Dampness of the subsoil from defective drainage.

It is requisite to point out, besides these existing evils, another that might have been of grave import, namely, the polluted state of one of the principal water sources of the town and shipping. Had there not been a sufficient supply obtainable, independently of this stream, unwholesome water might have aggravated the severity of the cholera.

III.

To prevent and remove these evils, it is necessary, on taking military possession of a town, especially if troops are to be barracked in it for any length of time, and above all, if it is to be made the basis of operations, at once to organize a sanitary police to attend to the health of the town.

The duties of such a police should be clearly defined and vigilantly exercised, and should be as follows:—

IV.

1. To make a thorough sanitary examination of the whole town and neighbourhood, and to report thereon.

2. To proceed immediately to organize measures for a thorough cleansing, and removal of nuisances. All offensive matters should be transported to a safe distance from the outskirts of the town, or be burned, if inflammable, or buried, if removal be impossible or dangerous.

3. To provide for the daily cleansing of all streets, alleys, courts, open spaces, backyards, stables, cattle sheds, &c., and for the safe disposal of refuse in the way pointed out.

4. In places where the surface of the streets or roads is in so defective a state as to accumulate foul water, and to interfere with surface cleansing, the defects should be

repaired, and proper channels formed for carrying off surface water.

5. Under certain circumstances, it may be necessary to cleanse foul ditches. Care should be taken, in all such cleansing operations, not to throw the mud extensively over the surface, so as to expose a large surface to the action of the sun, and the work should be suspended during the heat of the day. Quicklime, charcoal, or fresh earth may be advantageously used for covering the mud.

6. All buildings to be occupied by troops, or as hospitals, should be dealt with as already mentioned.

7. All wells and sources of water should be carefully examined and guarded, to prevent accidental or intentional pollution, or waste.

8. Wet, unwholesome ground, may be rendered less injurious by trenching or by covering it with fresh earth.

Besides these measures additional precautions are requisite to prevent the evils resulting from the occupation itself.

9. A sufficiency of latrines should be provided, and regulations laid down for their management.

10. Stable manure from the additional number of horses, should be daily removed and burned.

11. Carcasses of dead animals and the offal of slaughtering-places, should be daily removed and buried.

12. The dead should be interred away from the living.

13. Refuse charcoal dust, where obtainable, may be used with advantage for deodorizing latrines and filth which it would not be safe to remove. Sand or fresh earth answer the same purpose, but in larger quantity. Quicklime prevents decomposition. Burning stable litter over them also deodorizes foul unwholesome surfaces.

14. Deodorizing agents should never be used as *substitutes* for the *removal* of decaying organic matters to a distance, or for their destruction by fire.

V.

As regards transport ships, the experience at Balaklava has proved:—

That crews of transports may become liable to sickness and mortality, especially during epidemic seasons, from an infected state of the atmosphere of seaports, even although the vessels themselves be in a good sanitary condition.

That, in such cases, removal of the affected vessel outside the port into the open sea, and out of the infected atmosphere, is the readiest means of arresting sickness on board.

That especial care should be taken to keep cattle and horse transports in a good sanitary state, by cleansing and ventilation, and further to preserve the animals in good condition, by making proper arrangements for embarking and disembarking them without injury, and for securing forage and water during the voyage and on landing.

That when epidemic diseases appear on board ship in seaports, a medical sanitary inspection should be made of all ships in port, to ensure the adoption of proper measures of cleansing, ventilation, and lime-washing on board, and for the purpose of bringing all attacks of prevailing epidemic diseases, especially of cholera, under treatment in their earlier stages.

That the true method of protecting seaport towns and ships frequenting them, from pestilential diseases, is not by quarantine regulations against vessels arriving from suspected countries, but by sanitary works and measures for removing those causes of disease on shore as well as on shipboard, which determine the localization of pestilence. Quarantine regulations, had they been enforced in the East while the cholera prevailed, would have occasioned serious injury to the service, by interfering with the supplies, without affording the required protection.

That in seaports in military occupation, a water sanitary police should co-operate with the sanitary police of the town, to prevent dead animals, offal, refuse of food, manure, &c., being thrown into the water of the harbour, and to make arrangements for the removal and safe disposal of all such matters from on board ship, either out at sea, or on shore.

PRACTICAL CONCLUSIONS RESPECTING THE CAMP.

I.

That by far the greater part of the disease and mortality existing in the camp, when the Commission arrived in the Crimea, was due to zymotic maladies, such as cholera, fever, diarrhoea, and dysentery.

That besides the effects of topographical and climatic peculiarities connected with the occupation, and making allowance for the predisposing influence of other conditions, to which the troops had been exposed, the prevalence of zymotic maladies was obviously connected with local favouring causes essentially the same in kind as those observed in civil life, especially in rural districts, namely:—

Damp.

Impure Air.

(Although in a minor degree) Impure Water.

II.

Attacks of zymotic disease were observed to be connected with the three following sources of dampness:—

A wet subsoil; a retentive surface soil; confined locality.

1. Of these three conditions, a wet subsoil occasioned the largest proportional amount of sickness.

The experience of the 79th Regiment, and that of the 31st and Royal Artillery, who were successively camped on the same ground, below Marine Heights, proves that one of the worst sites for a camp is that in which a thin bed of porous material rests upon an impervious bed beneath, which retains the water, and keeps the subsoil charged with it, while the surface may afford little or no indication of the fact.

Dangerous sites of this kind were often marked by a greener or more vigorous vegetation than that of the surrounding district, or by water-springs coming to the surface, or by evening fogs settling over them sooner than over the adjacent country.

Before selecting positions for camps in unknown ground, it would be very advisable to dig trial holes a few feet deep, to ascertain what is the condition of the subsoil drainage, and not to risk the health of the men in camping on ground in which these trial holes show the presence of water near the surface.

Should it be necessary, for military reasons, to hold a position on a wet subsoil, the whole should, if practicable, be thoroughly drained by deep trenches, and if there be a hillside or water-shed above the ground, the surface water from it should be turned aside from the site by deep, catchwater drains, as was done with the camp of the Highland Division at Kamara.

If the position be such that deep trenching and draining cannot be carried out, it is in the highest degree probable that if held for any length of time, it will be at a considerable sacrifice of the force.

2. *The retentive character of clay surface soils*, and the difficulty of draining such soils, render it advisable to avoid them as camping-grounds, when it is possible to do so.

Wet clay soils keep the air near the ground damp and cold, and they affect the atmosphere of tents and huts in a similar manner. There was sufficient proof of their injurious effects on the health of troops in the Crimea.

Where such soils must be occupied, for military reasons, the defects in the natural drainage should be remedied, as far as practicable, by trenching the ground, and by trenching the site of every hut and tent separately, connecting the hut and tent drains with the larger trenches. In this way, not only are the sites and the vicinity of the huts and tents kept comparatively dry, but the surface water is more readily removed, the exhalations from the damp soil diminished, and the air purified. The experience of the army in the Crimea showed the very beneficial effects of this surface drainage and trenching on the health of the troops.

3. *Dampness of the air, arising from the nature of the locality*, proceeds from the topographical peculiarities of the ground preventing a free circulation of the air, and the atmosphere becoming stagnant, and charged with moisture

and emanations from the ground. The valley of Karani above Kadikoi afforded an illustration of this, in certain states of the weather.

It was observed in other parts of the seat of the war in the East, that damp white mists, settling in valleys or hollows occupied by troops, had been the precursors of epidemic diseases, especially of cholera. All valleys are at times exposed to similar occurrences, especially such as contain stagnant lakes. An unhealthy and stagnant state of the air is sometimes increased by brushwood or trees.

There is often no escape from epidemic sickness occurring among troops from the occupation of such positions; they should, therefore, be avoided or abandoned.

III.

The evils resulting from these local causes of dampness were not unfrequently aggravated by the manner of pitching tents and erecting huts. Want of due preparation of the ground and defective drainage of the site, often led to a damp state of the air within huts and tents, and induced a tendency to fevers.

Deep trenching round the tent-site, as already mentioned, is the best remedy, and in the case of huts, the site should be isolated from the surrounding ground, and the area to be occupied by the hut, drained by a trench dug round it at least a foot below the level of the floor.

If it be not practicable to drain the subsoil, and if the position must be held, adequate provision should be made with any materials at hand for raising the beds of the men above the ground.

Huts should never be banked up with earth against the wood. The experience in the Crimea has shown that it is a dangerous practice, for it used to be a common cause of fevers. An interior lining, even of old newspaper, affords a much better, and at the same time a perfectly safe protection from drafts.

The flooring of huts should be occasionally raised, the surface of the ground below cleansed, and quicklime and charcoal strewed over it.

For hospital huts, an interior lining of boards, or building

a rough rubble stone wall outside, as was done in many of the regimental hospitals, affords the requisite protection from weather, and from sun heat.

IV.

The camp before Sebastopol was, generally, remarkably clean when first visited; but there were in certain situations sources of atmospheric impurity from putrescent organic effluvia, likely to influence injuriously the health of the troops. The chief of these were:—

Picketing-grounds, and manure heaps.

One or two slaughtering-places, and latterly the large cattle depôt and slaughtering-place at Kadikoi.

The graveyards and putrid marsh near Balaklava.

Latrines kept too long open, and exposing too large a surface.

When an army can shift its ground at will, danger to health from similar evils can always be avoided by doing so.

When, on the other hand, an army is tied to its position for a length of time, the camp becomes a town, and is subject to all the sanitary defects of towns, as these existed before the introduction of the first great step that was taken for improving the public health, namely, the introduction of paving.

Picketing of horses saturates the ground they occupy with organic matter. In like manner accumulations of manure, if allowed to remain, saturate the ground they cover. Filth of any kind is washed into the ground by the rains, or trodden into it by the steps of men and animals, and must necessarily give off impure emanations under the joint action of sun heat and moisture.

To avoid the injurious consequences likely to arise from these circumstances, it is indispensably necessary to observe the most scrupulous cleanliness over the whole surface and vicinity of a camp. All refuse should be at once swept up, and removed to a distance. None should ever be allowed to accumulate within, or in the immediate vicinity of a camp.

Bones and refuse of food can be most easily disposed of by burial.

Stable litter and all inflammable refuse should be carefully burned. The usual method of forming heaps of litter and firing it is imperfect. Before being fired, it should always be opened up, to admit the air to dry it, and to expedite the combustion. Manure heaps burn with difficulty if left on the ground for any length of time before they are fired.

Carcases of animals and offal should be buried to a sufficient depth below the surface. Three feet is enough under ordinary circumstances. Refuse charcoal dust thrown over tainted ground will assist in deodorizing it, or, if that be not obtainable, the burning of stable litter on the spot will furnish sufficient charcoal for the purpose.

Latrines should be made narrow and deep; a quantity of earth should be thrown into them each day, until they are filled within two feet of the surface, after which the latrine should be filled up and another dug.

When an army requires to occupy the same surface of ground for years, it would be unsafe to bury the refuse in the ground, because eventually the soil would become saturated with organic matter and dangerous to health.

In such a case the construction of furnaces to consume every organic product of the camp, is by far the best and safest proceeding. Speedy collection, removal, and destruction by fire of all such refuse matters obviates any risk of danger from them.

V.

Atmospheric impurities arising from overcrowding and defective ventilation of tents and huts, were a frequent predisposing cause of zymotic disease.

Were it practicable in warfare to diminish materially the number of men sleeping in tents, it would be advisable to do so.

But considering the limited transport at the command of an army in the field, the injurious consequences of overcrowding may, to a considerable extent, be obviated by a free ventilation of huts, and by improving the construction of tents and marquees, by introducing effectual means of ventilation round the top of the poles.

In the case of huts, ridge ventilation is the most efficient.

Lime-washing huts inside, especially hospital huts, purifies the air; lime-washing of huts outside protects them, to a certain extent, from the intense sun's rays and keeps them cooler within.

The usual practice of striking tents and shifting ground is an excellent means of avoiding the effects of saturation of the earth by emanations proceeding from the breath and bodies of the men.

VI.

The condition in which the water was drawn for use in the camp was likely, especially during the prevalence of cholera, to aggravate the severity of the disease, although not to a great degree.

It is always desirable that water for drinking and cooking purposes should be as nearly as possible destitute of colour, taste, or smell. Anything that interferes with these three natural tests is more or less injurious to health; but marsh water, however apparently pure, is not wholesome.

All engineering works for supplying camps with water should comprehend:—

The selection of the purest obtainable source.

The delivering the water for use as pure as it is at its source.

If it be necessary to pound the water, the tanks should be covered.

Water should, if practicable at all, never be drawn by dipping, if it be rendered muddy in the act of being so drawn.

If a source of water of sufficient purity be not obtainable, the water should be filtered. A filter may be made with sorted gravel, clean sand, and charcoal.

Every trough for supplying horses should have a separate inlet and overflow.

GENERAL CONCLUSIONS FROM THE WHOLE EXPERIENCE.

I.

That as scurvy, and the forms of disease connected with it almost disappeared from the army under the influence

of improved diet, clothing, &c., so, in like manner, zymotic diseases, the destructive effects of which mainly depend on breathing a humid, tainted atmosphere, declined on the carrying out of suitable sanitary works and measures.

II.

That men just arrived in a new country are especially liable to suffer from prevailing zymotic maladies. That any given number of reinforcements will not compensate to the service for the loss of the same number of the original force from these diseases, and hence the necessity for effective sanitary precautions is doubly imperative, whether as regards the abatement of local favouring conditions, or the discovery and immediate treatment of the premonitory stages.

III.

As the result of their whole experience, the Commissioners beg to express their opinion, that, inasmuch as the neglect of military hygiène, whether as regards the soldier personally, or the sanitary condition of camps, barracks, and hospitals, has hitherto, in all countries, climates, and seasons, been the cause of the largest amount of loss in armies, the whole subject, closely connected as it is with the physical efficiency of Her Majesty's forces, demands in future a practical development commensurate with its importance to the public service.

We have the honour to be,
My Lord,

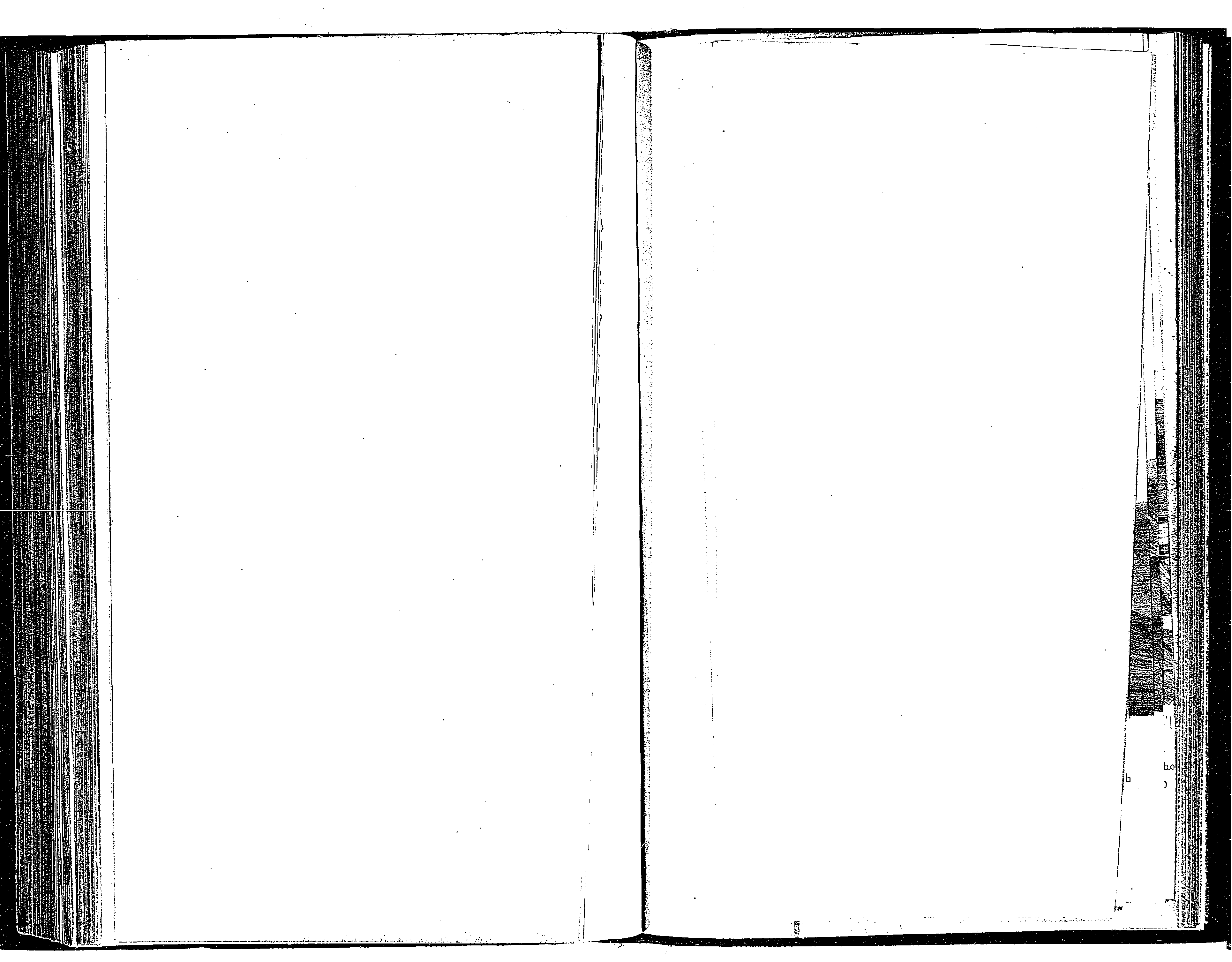
Your Lordship's humble and obedient Servants,

JOHN SUTHERLAND,
ROBERT RAWLINSON,
GAVIN MILROY.

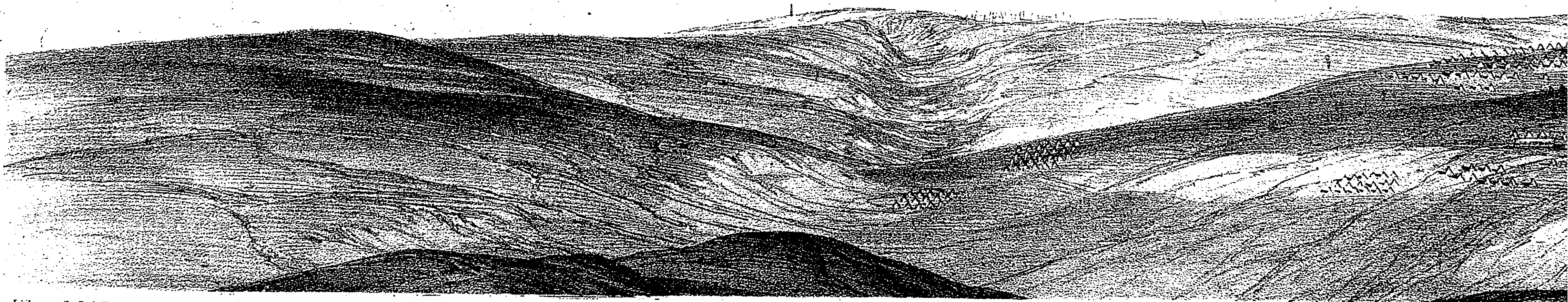
The Right Hon.

LORD PANMURE, G.C.B., &c.,
Minister at War.

December 1st, 1856.



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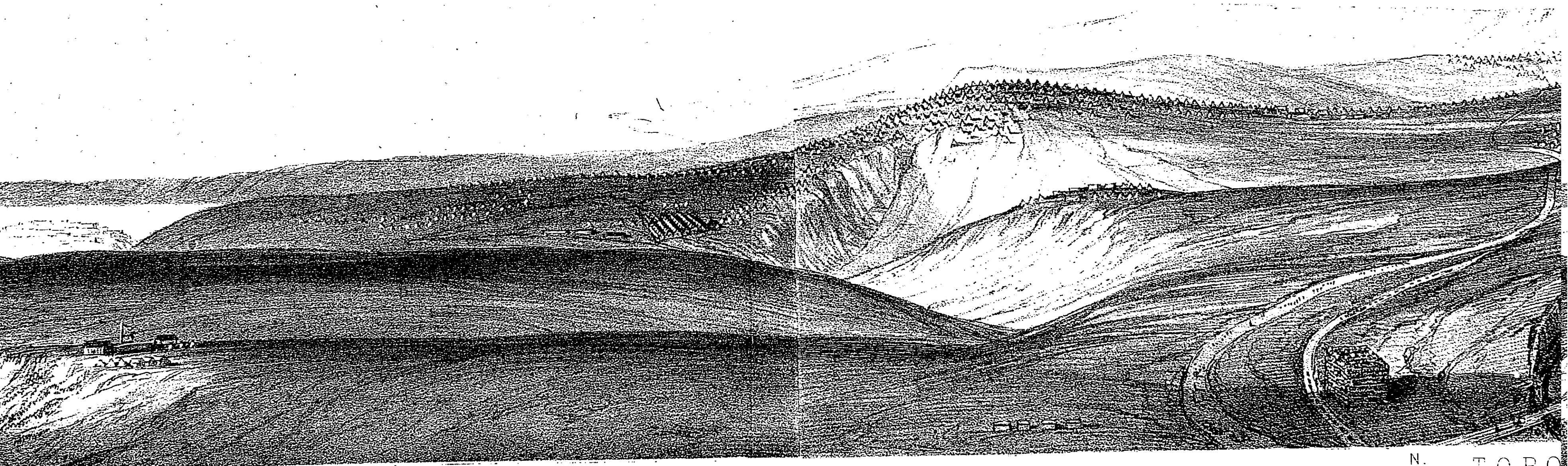


French Camps and Head Quarters

Fort Constantine Sevastopol Harbour

SEVASTOPOL.

British Head Quarters



Sevastopol Harbour
ASTOPOL.

British Head Quarters

Camp of 3rd Division

B R I T I S H

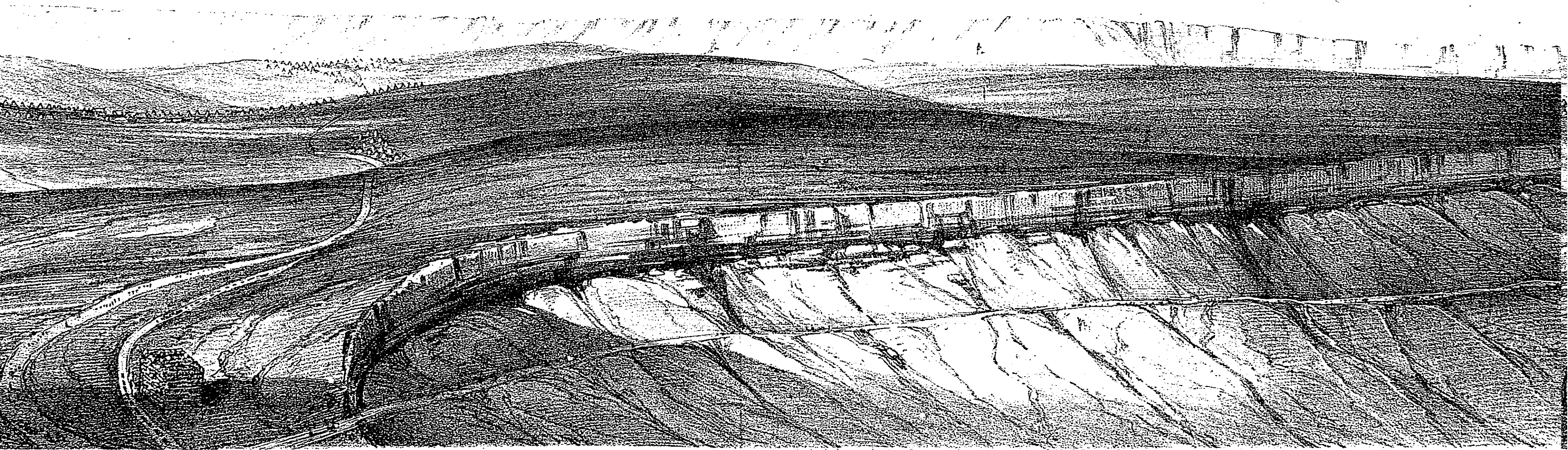
Camp of 4th Division.

Cathcart's Hill.

2nd Division.
French Commissariat.

Light Division.
Col de Balaklava
Road & Railway Commissariat.

N. TOPO
French Ca
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N. TOPOGRAPHICAL SKETCH OF THE ALLIED OCCUPATION

Light Division.

French Camps.

Inkerman Heights

Col de Balaklava

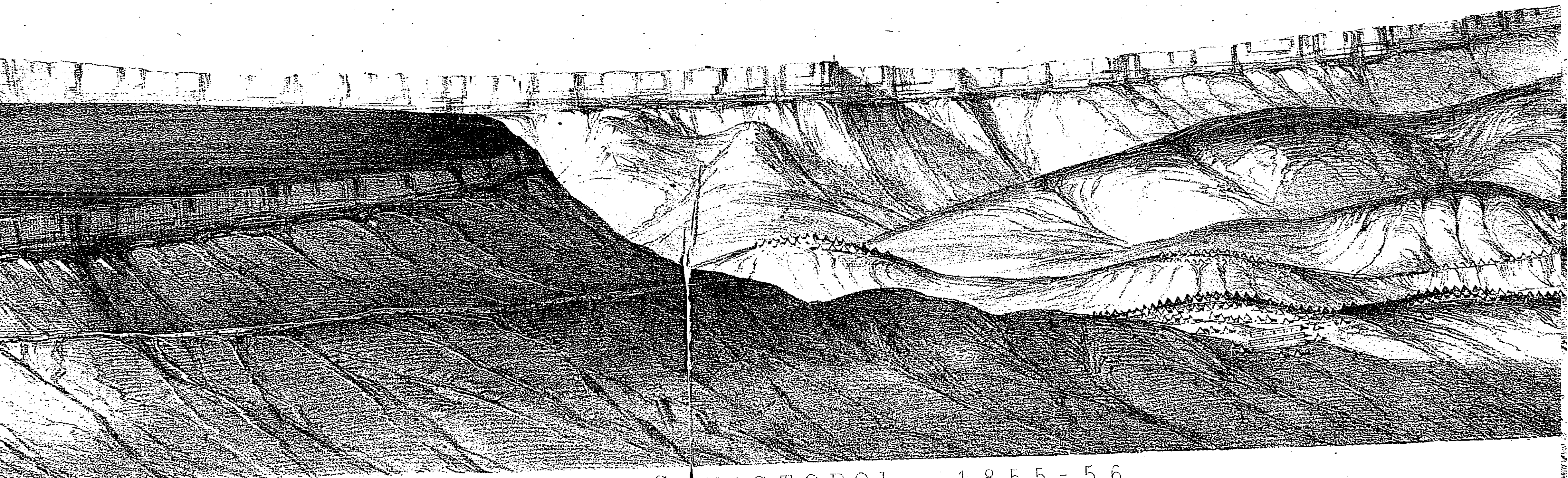
Guards Camp.

Inkerman Lighthouse West.

Inkerman Lighthouse East.

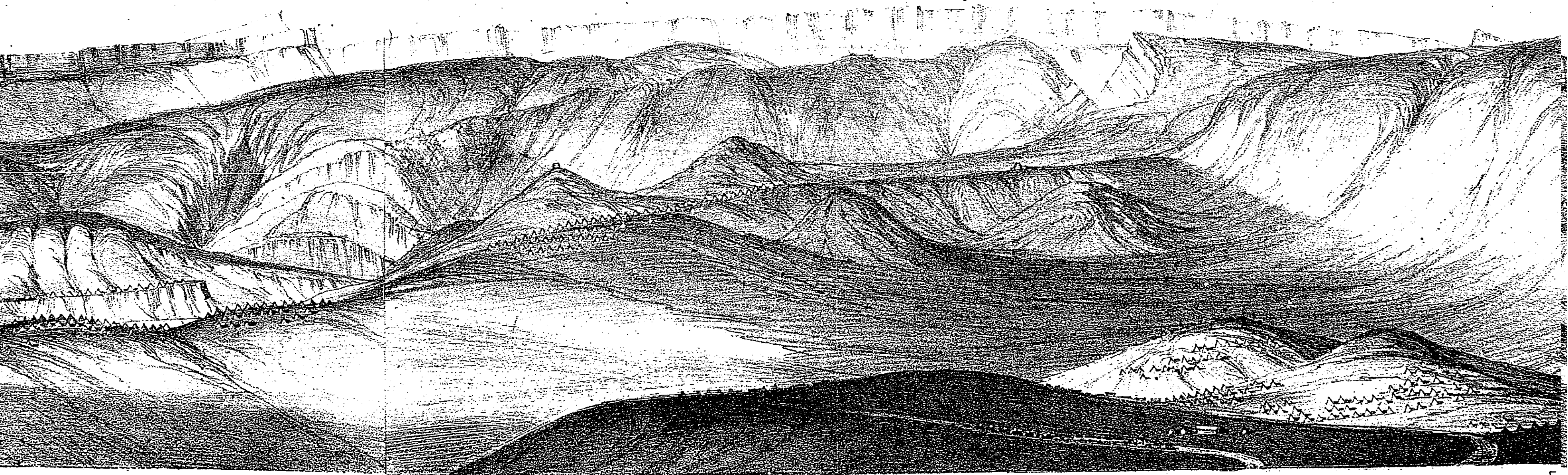
Road & Railway Commissariat.

EASTERN EDGE OF THE PLATEAU



LIED OCCUPATION BEFORE SEVASTOPOL 1855-56

Russian Telegraph McKenzie's Heights.
Valley of the Tchernaya
FEUKHIN HEIGHTS WITH FRENCH CAMPS
Ridge of Red



Summit of Tchatir Dagh.

Ridge of Redoubts with French Camps.

Sardinian Observatory.

Sardinian Camps.

Canrobert's Hill.

Baidar Valley.

Kamara Church.

Frenchman's Hill.

P L A I N O F B A L A K I A V A

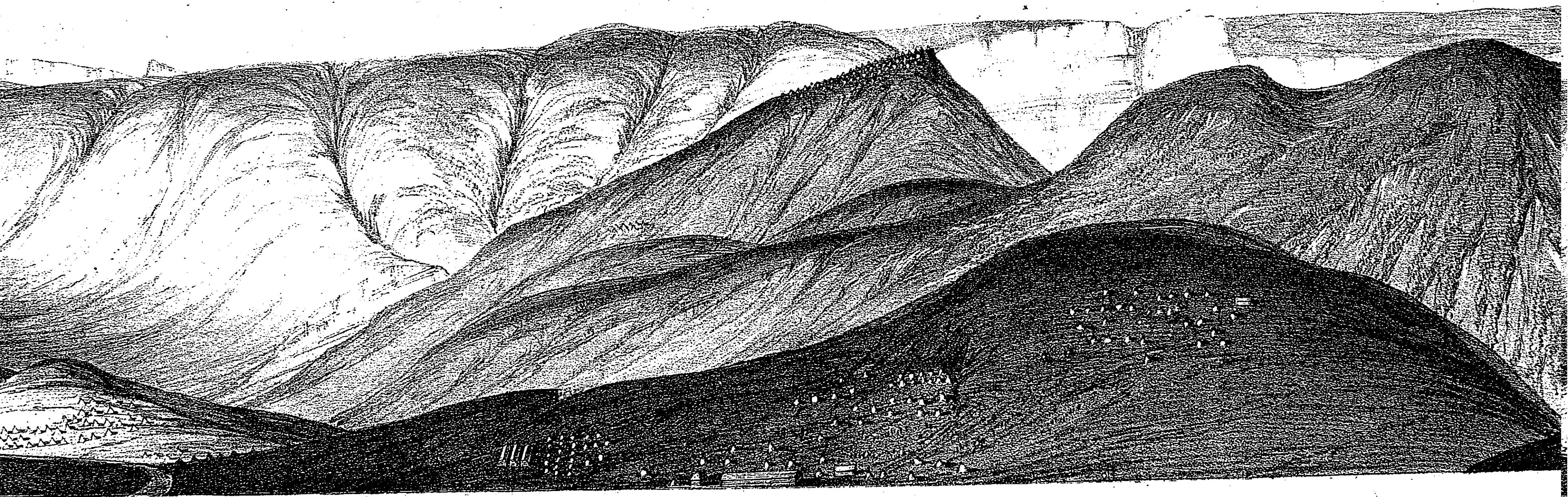
Land Transport and Army Works Corps.

Railway.

Road.

E.

P.



E.

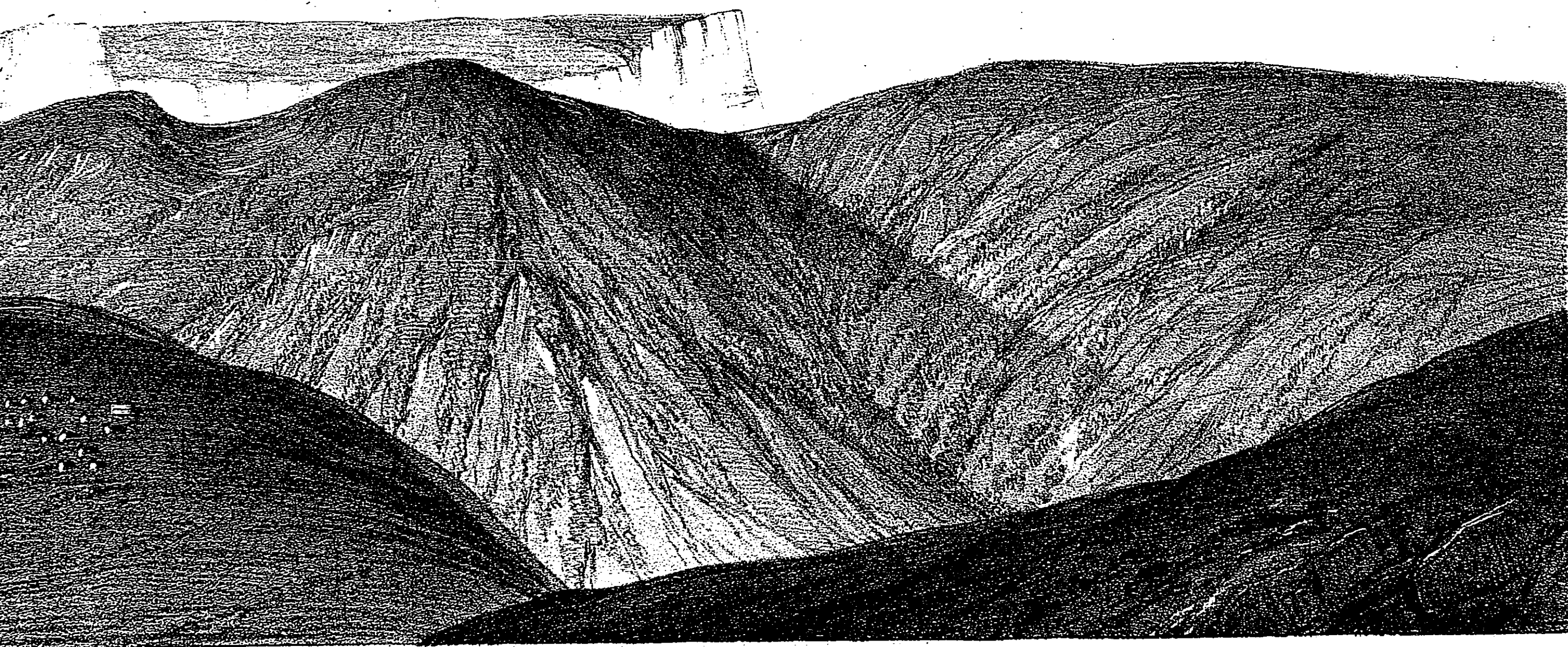
Marine Heights.

Land Transports. & Artillery Camps.

Valley

Army Works Corps.

Road.



From a Sketch by D^r Sutherland.

Cape Aya
Valley of Karani.