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CONFIDENTIAL.

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Report by Dr. Theodore Thomson on the Sanitary Requirements of certain Places in or near the Persian Gulf, &c.

Dr. Theodore Thomson to Sir Edward Grey.—(Received July 16.)

Sir,

Local Government Board, Whitehall, July 14, 1906.

IN accordance with instructions, I visited certain places in and near the Persian Gulf, in relation with the question of the sanitary defence of these regions, and have the honour to submit herewith my Report on this subject.

I have, &c.

(Signed) THEODORE THOMSON.

Inclosure.

Report by Dr. Theodore Thomson on the Sanitary Requirements of certain Places in or near the Persian Gulf, in relation with the protection, not only of Countries adjacent thereto, but also of Europe, against invasion by Cholera and Plague; and, more particularly, as to the desirability or otherwise of the establishment of an Observation Station near the Entrance of the Gulf, and the Degree in which Hormuz, Henjam, or other Place may be regarded as affording a Site suitable for this Purpose.

THE sanitary defence of the Persian Gulf has in the past received, and still continues to receive, considerable attention, not only in the interests of countries adjacent thereto but also because it is maintained by some authorities that cholera and plague are particularly likely to invade these regions, by reason of their nearness to and frequent communication with India, and thence to extend overland to Europe. This view was voiced by M. Barrère, one of the French Delegates at the International Sanitary Conference of 1897, when he classified the Persian Gulf along with the Red Sea as the "routes naturelles des maladies pestilentiellles" (*procès-verbaux*, p. 24). In relation with this aspect of the matter, the question of what measures should be adopted with a view to guarding against the suggested danger to Europe was discussed at the International Sanitary Conferences of 1894, 1897, and 1903; and in each of the Conventions drawn up at these Conferences clauses were incorporated embodying measures intended to secure this end. The 1894 Convention provided for the establishment of a large lazaret with complete sanitary staff and equipment at Fao, a small lazaret near Basra, and sanitary posts at Basra (then already established), Koweit, Manama in Bahrein, Bandar Abbas, Bushire, Mohammerah, Gwadar, and Maskat. The British Government, however, did not accept that part of the Convention which embodied these proposals, and the scheme was not carried out. This scheme, indeed, was thrown overboard at the 1897 Conference, the Convention of that year providing simply for a sanitary station near Basra and another at or in the neighbourhood of the Island of Hormuz or of Kishm, near the entrance to the Gulf. These proposals were accepted by the British Government, and Persia also ratified the Convention, subject to the reservation that the station at the entrance to the Gulf

should be under the Persian flag and should have Persian guards. The 1903 Convention provides for the Basra station as before, and for a sanitary station at Hormuz. The British Delegates were empowered by His Majesty's Government to sign that Convention, subject to reservations regarding the finding of the funds for the construction of the proposed station near the entrance of the Persian Gulf, and the reorganization of the Constantinople Superior Board of Health, which is charged, under the Convention, with the construction, upkeep, and control of this station. The British Government, however, through its delegation, expressed its doubts as to the necessity of such a station, pointing out that the experience of recent years lent no support to that view, and, in addition, called in question the suitability of Hormuz, with its unhealthy climate, as a site for that purpose.

The 1903 Convention has not yet been ratified; and, meanwhile, a proposition has been made that the observation station near the entrance to the Gulf, which has never yet come into being, should be placed on the Island of Henjam, and should be constructed, maintained, and controlled by the Persian Government instead of the Constantinople Superior Board of Health.

THE PRESENT SANITARY DEFENCE OF THE PERSIAN GULF.

In the course of my inquiries into the present sanitary defence of the Persian Gulf I visited Maskat and Jashk, in the Gulf of Oman; Bandar Abbas, the Islands of Hormuz, Kishm, Henjam, and Bahrein, Koweit, Bushire, and Linga, in the Persian Gulf itself; Mohammerah, on the Karun River; and Fao and Basra, on the Shatt-al-Arab. In Appendix 1 of this report each of these places is described in some detail; while an account is given, in Appendix 2, of the administrative procedure, as regards plague and cholera, at the ports of Maskat, Jashk, Bandar Abbas, Linga, Bushire, Mohammerah, Basra, Koweit, and Bahrein. I do no more here, therefore, than briefly recapitulate the points of chief importance.

All these places are characterized by many conditions prejudicial to health. Water supply, with few exceptions, is liable to dangerous pollution, and is frequently inadequate in amount. Systems of sewerage and drainage do not exist. In the better class of house slops and excreta pass to rudimentary cesspools, seldom or never cleansed. Generally, liquid and solid refuse is cast in the vicinity of the dwelling, while the sea-shore, open spaces, and, not infrequently, streets, and even roofs of houses are fouled by excretal deposits. Many of the houses are in bad condition, and much of the population live in mat huts. Streets are frequently very narrow, and are unpaved, uneven, and generally filthy.

The foregoing description is not, however, equally applicable to all the places I visited. In certain respects, noted in Appendix 1, some are less unsanitary than others.

In none of these places is there any provision for isolation of cases of infectious sickness other than in connection with the quarantine station, when such exists. There are quarantine stations only at Maskat, Jashk, Bandar Abbas, Linga, Bushire, Mohammerah, and Basra; but in no instance is the accommodation for infectious cases satisfactory. Of these stations, the best equipped is that at Bushire. Efficient means of disinfection are provided only at the Bushire and Basra stations. The measures adopted with a view to guarding against invasion by cholera and plague, recounted in Appendix 2, are generally satisfactory in Persian ports* except where limited by inadequate observation and isolation accommodation, or by absence of efficient means of disinfection. At Maskat* they are less satisfactory; at Basra they are unreasonably stringent, with the result that they defeat their own object; while at Bahrein and Koweit no measures of this sort are in force.

It is evident, from the foregoing account, that the sanitary defence of the Persian Gulf is weak, both by reason of deficiencies in, or absence of, measures protective against invasion of places there by cholera and plague, and also because of the existence of conditions at these places favourable to the spread of these diseases, should they establish a foothold there. On the other hand, there are two conditions which afford some degree of protection, the one against invasion of these places by cholera and plague, the other against extension of these diseases therefrom to adjacent countries, and therefore, ultimately, to Europe. The first of these conditions is found in the fact that at all, except the river ports of Mohammerah and Basra, large vessels lie off-shore at distances ranging from half-a-mile to as much as five miles; only the smaller

* The Port sanitary administration of these places is at present conducted by officers of the Indian Medical Service (see Appendix 2).

native craft lie close to the shore or bring up to quays, when these exist. This materially diminishes the amount of communication between large ships and the shore; and, in so far as danger of plague is to be apprehended from infected rats on board, reduces this risk, in respect of these vessels, to vanishing point. There is little or no protection of this sort, however, against native craft; and these constitute the vast majority of vessels trading to and about the Gulfs of Oman and Persia. The second condition is the nature of the country abutting on the shores of the Persian Gulf and the Gulf of Oman. This is most conveniently considered in three sections, viz.: (1) the Arabian side of these gulfs below Koweit; (2) their Persian side, and (3) the northern extremity of the Persian Gulf, including Koweit, Mohammerah, and Basra.

As regards the first of these sections, the extension thence of cholera or plague by land is not to be seriously apprehended, because of the tracts of desert that lie along and beyond the shores of the Gulfs of Oman and Persia on the Arabian side, in consequence of which there is little or no communication by land with countries from which these diseases might conceivably spread in the direction of Europe.

As regards the second section, the danger of extension of cholera or plague by land cannot so readily be set aside, in view of the considerable amount of trade from the ports of Bandar Abbas and Bushire to the interior of Persia. Ordinary communication, however, is much restricted, as, indeed, that for trade purposes is undoubtedly hampered, by the difficult and often desolate nature of the tracks over the great mountain range that separates the shores of the Persian Gulf from the interior.

The third section is not characterized by these natural difficulties. Koweit is within 100 miles of Basra by land, and, although human habitations on the route are infrequent, the journey, which ordinarily takes three days, does not present serious difficulty. Communication, by this way, between Koweit and Basra, though not large in amount, is fairly constant. Basra itself has much and frequent communication with the interior of Mesopotamia by the Tigris and Euphrates valleys, while there are trade routes from Mohammerah to the interior of Persia up the valley of the Karun. Further, such protection against invasion by cholera or plague as may be referred to large vessels lying a long distance off-shore, is not afforded at Basra and Mohammerah. Such vessels, it is true, ordinarily lie towards the centre of the river, but even so they are within easy-distance of the shore. This third section, therefore, is naturally less protected against invasion by cholera and plague, while the nature and amount of its communication with the interior is such as to render extension of these diseases thence to Mesopotamia in particular and, though in much less degree, to the interior of Persia, a good deal more probable than like extension from either of the other sections.

THE HISTORY OF PLAGUE AND CHOLERA IN RELATION WITH THE QUESTION OF THE SPREAD OF THESE DISEASES FROM INDIA TO EUROPE BY THE PERSIAN GULF.

It is of interest to consider what evidence there may be to justify the classification of the Persian Gulf with the Red Sea as a natural highway for cholera and plague from India to Europe.

Europe has suffered in all from seven epidemics of Asiatic cholera. The first of these (1830-37), and also the second (1847-49), came from India overland through Central Asia to Russia, and spread thence throughout Europe. The third epidemic (1854-59) did not come from the East; it was a recrudescence from existing *foci* in several parts of Europe, where there had been no interval of entire freedom from the disease since 1849. The fourth epidemic (1865-67) reached Europe by way of the Red Sea and Egypt. The fifth epidemic (1869-74) appears to have been due to importation of the disease into Russia from Persia, which it had invaded either from India by way of Afghanistan or from Mesopotamia, or from both India and Mesopotamia. Mesopotamia had been invaded by cholera, both through the Persian Gulf and through Asia Minor from the Mediterranean. The sixth epidemic (1884-87) came to Europe by way of Egypt, which it reached presumably through the Red Sea. The seventh epidemic (1892-95) came from India overland through Afghanistan and Persia to Russia, and spread thence to other parts of Europe.

Outbreaks of plague in Europe have long been rare and of no serious consequence. This disease made occasional appearances in Europe in the earlier part of last century, after which it did not recur there, save for one exception of small importance, until 1899, when Oporto was the first European community to share in the great pandemic of plague that commenced in 1894. How the disease reached Oporto is not known,

but neither in relation with that appearance of plague nor with its other appearances in Europe during the last century is there any indication that its route from East to West had been by the Persian Gulf.

From these facts it is clear that the Persian Gulf cannot justly be described as a natural highway for cholera and plague from India to Europe; historical evidence indicates that these natural highways are two—the first overland through Central Asia to Russia, the second by the Red Sea and Egypt.

Recent experience of cholera and plague in the Persian Gulf goes to confirm a view, which has more than once found expression, that these diseases do not tend to wide extension there; for which some explanation may be found in the second of the two conditions, to which I have before referred as naturally protective, that characterize large part of the neighbourhood of the Gulf. In this connection it is to be noted that cholera, in addition to minor manifestations in these regions of late, was epidemic in the Sultanate of Oman in 1899, and continued to be prevalent there in the year following. At Basra also there was considerable prevalence of cholera in 1899. In 1902 Bandar Abbas was seriously affected with cholera, as also was Minab in 1903. In 1904 there were 220 deaths from cholera at Mohammerah; over 1,600 cases were reported to have occurred in Bahrein; and the disease is said to have caused great mortality in Trucial Oman. No material extension of the disease beyond the invaded localities occurred, however, save from Basra in 1899, when it spread some way northward into Mesopotamia. In like manner plague was epidemic at Maskat and Matrah in 1900, and at Bahrein in 1903 and 1905; yet there was no noteworthy extension of the disease beyond these localities.

THE MEASURES WHICH SHOULD BE ADOPTED WITH A VIEW TO SECURING THE SANITARY DEFENCE OF THE PERSIAN GULF.

The most effective defence of the Persian Gulf against cholera and plague would be the removal of the unhealthy conditions obtaining in these regions, and the provision of sufficient sanitary staff, with adequate equipment, at the more important ports and places there. But, in view of the character of the population and of the indifference of the ruling authorities to health considerations, such a scheme is to be regarded as purely Utopian, and must be dismissed as impracticable. It is no doubt in recognition of this fact that the alternative schemes embodied—one in the 1894 Convention and the other in the Conventions of 1897 and 1903—have been put forward. The former of these has been superseded by the latter and need not now be considered. The Conventions of 1897 and 1903 provide for the construction of what may be termed a sentinel station near the entrance of the Persian Gulf, to which all vessels must go before proceeding up the Gulf, and a terminal station near Basra. This scheme is based on an entire misconception of the conditions obtaining in the Persian Gulf; it would fail to secure the protection of places there against cholera and plague which it seeks to attain, and it would inflict upon commerce in these regions an amount of loss totally disproportionate to the degree of the danger it is intended to guard against. The disproportionate character of the conception involved in the proposal to establish a sentinel station near the entrance of the Persian Gulf is well illustrated by consideration of the measures applied to shipping proceeding to Europe by the Red Sea. There is close resemblance between the circumstances of the Red Sea and those of the Persian Gulf, and at the northern end of the one lies Suez, as at the northern end of the other lie Basra and Mohammerah. But there is no sentinel station, save for pilgrim ships, near the entrance of the Red Sea; ordinary shipping, whether for Europe or for Egypt, proceeds to Suez and is dealt with there. It is entirely unreasonable to impose upon shipping in the Persian Gulf measures more stringent than those in force in the Red Sea, when, as I have shown, the danger of transmission of cholera or plague to Europe by the former route is small in comparison with the danger of such transmission by the latter route.

The injury to commerce resulting from the obligation on all vessels to call at a sentinel station, there to undergo inspection and detention for such measures as might be applicable to them, before proceeding up the Persian Gulf, would be serious. In addition to the loss of time involved in deviation from their natural course, the amount of which would depend on the position of the station, to which I shall presently refer, there would be the further loss of time incurred by detention at the station, and the direct pecuniary loss in quarantine fees to be paid. It is true that, at a well-administered station, the period of detention need not, in many instances, be of long

duration if the principles of the 1903 Convention were applied ; but if the administration were in the hands of either Turks or Persians it may certainly be anticipated that it would be bad and that it would not be based upon principles of a reasonable kind.

As I have already stated, this scheme would fail to secure the end it is intended to attain. Failure would ensue because of the deviation from their natural course imposed upon vessels. No doubt for a steamer this would be a less serious matter than for sailing-vessels, and the temptation, in the case of steamers, to give the sentinel station the go-by would be correspondingly less. Moreover, a steamer doing this could hardly hope to escape subsequent detection. But with the native craft, which not only trade coastwise in the Gulf but also trade in considerable numbers to and from it, matters stand in an entirely different position. These vessels are dependent for their progress on the direction and force of the wind, and a deviation of even a few miles from their course might, and, it may safely be averred in view of the well-known characteristics of the Gulf weather, frequently would entail for them the loss of days rather than hours. From this would assuredly result, in many instances, evasion of the obligation to proceed to the sentinel station ; and, for craft of this sort, escape from subsequent detection is an easy matter in the Gulf. And yet these are precisely the vessels that, as carriers of cholera or plague, are the most dangerous, since, unlike the steam-ships, they can lie close inshore, or up to quays and banks, or can be beached. The establishment of a sentinel station at the mouth of the Gulf would indeed actually increase the danger from these craft, inasmuch as, after evasion of their obligation to proceed there, concealment of the infraction of this obligation would be necessary, with the result that they would avoid the sanitary authorities at their place of destination and so would escape sanitary control in any form.

Nor has the scheme in question taken due account of what is to happen in the event, which not infrequently occurs, of places in the Gulf itself becoming infected with plague or cholera. In such a case, are native craft that come from, or have called at, the infected place within the Gulf, to proceed to the sentinel station or to Basra before going elsewhere ? If this be the intention, the briefest glance at the map of the Persian Gulf will satisfy any impartial observer that the probabilities of such an obligation being complied with are so small as to be a negligible quantity. And, if this be not the intention, the claims in favour of the creation of a sentinel station at the mouth of the Gulf, are thereby correspondingly diminished.

To these considerations, hostile to the creation of a sentinel station near the entrance of the Persian Gulf, has to be added the impossibility of finding, for this purpose, a site which is not open to the gravest objections. Maskat and Jashk, besides being unsuitable for reasons which will appear from the account of these places given in Appendix I, are too short a distance from India to serve this purpose usefully, as also is Gwadar, which at one time was thought of in this connection. The neighbourhood of Cape Musandam, the promontory on the Arabian side of the entrance of the Persian Gulf, is impossible, because of its intolerable heat during the summer and autumn months. Topographical considerations exclude all other sites, with the exception of the Islands of Larak, Hormuz, Kishm, and Henjam ; and of these Larak may be dismissed as wholly unsuitable by reason of its total lack of anchorage. There remain for consideration Henjam, Hormuz, and Kishm ; there being, at each of the two first-mentioned, only one spot which can be regarded as in any way suitable as a site for an observation station, while at Kishm there are two such spots, one at its eastern extremity, near the village of Kishm, the other at Basidu, its western extremity. The distances of these places from the natural course up the Gulf are as follows :—

Henjam	10 miles.	Kishm	40 miles.
Basidu	30 ..	Hormuz	50 ..

As regards anchorage, all these places are fairly off, although in no instance is the anchorage completely sheltered from all winds ; in this respect Henjam is the most satisfactory. A pier and landing stage would have to be constructed in each instance. At none of these places is there a sufficient supply of wholesome water ; nor could potable water, free from all risk of dangerous pollution, be obtained at any of them, in quantity sufficient for the needs of an observation station, whether by sinking wells or by storage of rain and surface water in reservoirs. In each instance, plant for the distillation of water would have to be provided. Provisions for the staff and occupants of the observation station could not be obtained on any of these islands ; they would have to be brought from Bandar Abbas to Kishm, Hormuz, and Henjam, and from Linga to Basidu. Bandar Abbas is 11 miles from Hormuz, 14 miles from Kishm, and 40 miles from Henjam, while Linga is about 25 miles from Basidu. The climate of

Hormuz, Kishm, and Henjam is locally said to be unhealthy and extremely trying during the hot season of the year. On this point actual statistics are lacking, except for Henjam. The Henjam meteorological records show that the climate there is characterized by great heat, frequently accompanied by much humidity of the atmosphere, during the months of May, June, July, August, and September; and the keeper of these records frequently notes the weather as having been "oppressive," "very oppressive," or "stiflingly oppressive." The records kept of the health of the telegraph staff at Henjam, about twenty in number, show that sickness is of common occurrence among them. The situation and the conditions of Kishm and Hormuz so closely approximate to those of Henjam that the data available regarding the climate and the degree of healthiness (or unhealthiness) of the latter place may fairly be taken as applicable to the former places also. In addition to disadvantages already enumerated, the eastern part, at least, of the Island of Kishm is liable to severe earthquakes; Basidu, however, is said not to suffer in this way. It is claimed as a special advantage for Henjam that there is a telegraph station there; a point, however, of minor importance, since there would not seem to be any difficulty in the way of laying a cable to Hormuz or Kishm.

It will be seen, from the foregoing account, that there is little to choose between these three islands as sites for an observation station, except that the liability of the eastern part of Kishm to severe earthquakes may properly be held sufficient to exclude it for this purpose. All are objectionable by reason of absence of good water supply, lack of provisions, and a trying and unhealthy climate. The construction of a proper observation station on any of them would be a costly affair, as also would be its upkeep. If, however, in the end, there should prove to be no escape from the creation of such a station, the Island of Henjam would, on the whole, provide the most suitable site, partly because of its better anchorage, partly because it would entail less deviation of vessels from their natural course up the Gulf.

I have already indicated the impracticability of securing a general defence of ports and places in the neighbourhood of the Persian Gulf in the interests, not of Europe alone, but of the inhabitants of those regions themselves. In so far, however, as opportunity may from time to time offer, influence should be brought to bear on the ruling authorities of these districts, with a view to securing such improvement as may be attainable.

In the meanwhile, it is desirable that a reasonably practicable scheme should be devised and put in operation, with a view to the ultimate protection of Europe against such danger as there may be of cholera or plague reaching it by way of the Persian Gulf. Such a scheme should be based upon the principle of concentrating sanitary defence against cholera and plague at those points from which these diseases, should they effect a lodgment there, would be most likely to spread overland in the direction of Europe. Looked at from this point of view, Bahrein and the Arabian side of the Gulfs of Persia and Oman below Koweit may be regarded as of little moment. More risk is to be apprehended from the Persian side; although it is to be borne in mind not only that there are natural obstacles which tend to limit communication from the coast to the interior, but also that the danger of cholera or plague reaching the interior of Persia from the coasts of the Gulf is small, as experience has shown, in comparison with that of its invasion by these diseases coming from India overland through Afghanistan. The greatest danger lies at the northern end of the Gulf, in that section which comprises Basra, Mohammerah, and Koweit. Each of these places should be provided with an adequate health staff and with a sanitary station comprising sufficient and suitable accommodation for the purposes of observation and of isolation of the infectious sick, and efficient apparatus for disinfection. The measures applied to shipping should be in accordance with modern principles and not, as is now the case at Basra, so unreasonably stringent as to afford direct incitement to their evasion. In my judgment, provision of the kind I have indicated is necessary for all these three places; the defence of Basra alone would not suffice, since there is easy communication by land between Mohammerah and Basra, and also communication in the same way, although less easy, between Koweit and Basra. To carry out this scheme effectively at Mohammerah the Indian Government, who in effect already control the Persian Port Sanitary Service, would probably have to advance the necessary funds to the Persian Government. At Koweit there may be more difficulty, since the Sheikh of that place does not look kindly on port sanitary precautions; and here, it is much to be feared, the Indian Government, should the Sheikh's consent to the establishment of a sanitary station at Koweit be obtained, would have to find the necessary funds and staff. At

Basra it may be that the Constantinople Superior Board of Health will presently replace their defective sanitary station there by one completely and suitably equipped. I am, however, little hopeful that they will abandon the antiquated principles on which some of the measures they apply to shipping are based.

On the Persian coast Bushire is already provided with a sanitary station, which, with the addition of satisfactory provision for the isolation of the infectious sick, would meet all necessary requirements. But, although in this way Persia complies with the international stipulation for at least one port on each seaboard sufficiently equipped and organized to deal with any ship, whatever its sanitary condition, yet there would, in my judgment, be advantage to commerce in also fully equipping the sanitary station at Bandar Abbas. Bandar Abbas is not only a base for important trade routes into Persia, but has also a very considerable trade by sea; and, in the interests of shipping, it is not desirable that vessels should be sent thence to Bushire if their sanitary condition were such that they could not be dealt with at Bandar Abbas.

The circumstances, to which I have alluded, of Bahrein and the Arabian coast below Koweit, do not, from the point of view of the protection of Europe, call for the establishment of sanitary stations there, however desirable these may be in the interests of these localities themselves.

In substance, therefore, the scheme best adapted, in the circumstances, to secure a reasonable degree of protection to Europe and the minimum of interference with commercial interests in the Gulf of Persia, consists in the perfecting of the present sanitary stations at Mohammerah and Bushire, the establishment of a sanitary station at Koweit, and the creation of a new station in place of that now existing at Basra. Sanitary defence of the Gulf based on these lines will afford a greater degree of protection to Europe against plague and cholera than would be secured by a sentinel station near the entrance of the Gulf, combined with a terminal station at Basra; and will not impose on shipping the unnecessary and prejudicial restrictions that would result from the latter scheme.

If this view should meet with acceptance, I would urge that steps should be taken to put the scheme I have suggested in operation with all possible speed. I view the alternative sentinel station project with apprehension, as calculated to be ineffective, expensive, and gravely detrimental to commercial interests—and these are mainly British—in the Gulf. Abandonment of this sentinel station project is much more likely to follow on knowledge that defensive measures, of the kind and at the places I have indicated, are in actual operation, than on mere announcement that such measures are in contemplation.

(Signed) THEODORE THOMSON.

July 12, 1906.

APPENDIX 1.

AN ACCOUNT OF THE CONDITIONS, BEARING ON THE SUBJECT OF THIS INQUIRY, OF CERTAIN PLACES IN THE GULF OF OMAN AND THE PERSIAN GULF.

MASKAT.

MASKAT, the capital of the Sultanate of Oman, is situated on the southern coast of the Gulf of Oman. The population of the town proper and its suburbs may, perhaps, be put at about 15,000. The town proper consists mainly of flat-roofed houses, usually two-storved; the suburbs, where two-thirds or more of the population reside, are largely composed of mat huts. Streets are mostly very narrow, and are unpaved, uneven, and undrained. There is no sewerage system. Better-class houses drain to cesspools, which are seldom or never cleansed; the inhabitants of other houses and of mat huts cast their slops and house refuse on the streets or in the vicinity of their dwellings, and ease themselves on the sea-beach or any open space. Sometimes the street or the house roof is utilized for this latter purpose. The main streets, however, are scavenged, at the instance of the Sultan, and are kept fairly clean. The water supply is from wells lying a short distance to the west of the town; it is not distributed by pipes, but is carried thence by the inhabitants in skins or other receptacles. There is, however, a small aqueduct that conveys the water to the principal landing place in the harbour. The supply, unless after a long drought, is plentiful; but the position and construction of the wells lay their water open to some risk of dangerous pollution. The climate of Maskat is trying during the hot season (April-September), when the temperature is frequently very high. During the hot weather many of the inhabitants leave Maskat for other places where the heat is less severe. The rainfall is small. (Meteorological data are given in detail in Appendix 3.) No mortality records are kept in Maskat; but, save for considerable prevalence of malaria, it is said to be fairly healthy.

Maskat and Matrah (a town of some 20,000 inhabitants, about 2 miles west of Maskat) have a considerable amount of trade by sea. Matrah, however, although largely resorted to by native craft, is not a port of call for steam-ships; these go to Maskat. They consist mostly of the Persian Gulf service of the British India Steam Navigation Company, whose fast and slow boats both call weekly at Maskat in going to and returning from the Gulf of Persia. Other steam-ships coming from Bombay or direct from Europe, also call at Maskat more occasionally. They anchor in Maskat Cove, about half-a-mile from the town, which lies at the bottom of the cove. Native craft lie near the shore. Maskat Cove is about three-quarters of a mile in length and about half-a-mile in width; it affords good anchorage and shelter save against the Shamāl (north-wester), which, when it blows, renders landing a matter of considerable difficulty. The Shamāl is the prevailing wind in the Gulf.

There is a quarantine station at Harāmūl, which lies in a small bay about $1\frac{1}{2}$ miles south of Maskat. It is accessible by sea save when a south-easter is blowing, and by land by a footpath from Maskat which, in the immediate vicinity of the station, where a precipitous hill has to be crossed, is somewhat difficult. The station, of which a general view is afforded by the accompanying photograph, lies on the shore of the bay in proximity to a small village of about a dozen houses. The structures which constitute the station are not inclosed by any wall or fence. They consist of:—

- (1.) A new hut, with ten compartments.
- (2.) An old hut, with six compartments.
- (3.) Three old huts, with 4, 2, and 2 compartments respectively. These are about to be demolished and replaced by three new huts of 1, 2, and 4 compartments respectively.

The walls of these huts are constructed of date sticks, and they are roofed with matting. Each compartment is about 7 feet square, and 6 feet in height to the eaves. Their appearance is shown by the accompanying photographs.

There is also a stone mosque adjacent to the huts, which has been used for sheltering pilgrims.

In the event of infectious disease occurring among the occupants of the station, a hut, about 100 yards distant from any of the others, is utilized as an isolation hospital.

The foregoing accommodation is intended for third-class passengers only; no provision is made for first-class or second-class passengers.

There are no drainage arrangements in relation with the structures described: refuse and slops are got rid of in the vicinity of the station, and its occupants ease themselves on the sea-shore. The water supply is obtained from a neighbouring well, said to yield a plentiful supply, and apparently little likely to incur risk of dangerous pollution. Provisions are supplied from Maskat.

There is no disinfecting apparatus at the station.

JASHK.

Cape Jashk is a low, flat, sandy spit of land, jutting out for a distance of about four miles from the Persian coast of the Gulf of Oman. Ships calling here anchor either in the east bay or



Maskat Cove & Maskat. The principal landing place (where small boats are seen lying up) is in the centre of the photograph.



General view of Maskat & suburbs from the East.



3
6

General view of the Maskat Quarantine Station at Haramul. The Quarantine buildings are towards the centre of the photograph: the adjacent fishing village, with boats drawn up on the beach, is on the extreme right.

3
7

Shows some of the structures at Maskat Quarantine Station. That in the centre, with the two figures standing in front, is the new ten-compartment hut (N. 1.). On the left is a hut in process of construction: on the right, the canteen. The stone building showing behind & on the right of the canteen is the mosque. In the background, on the extreme right, is seen part of the fishing village.