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MEMOIR

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ON THE

ANCIENT RESERVOIRS,

LATELY DISCOVERED,

AND

NOW IN COURSE OF RESTORATION AT

Aden.

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BY

LIEUTENANT R. L. PLAYFAIR.

MADRAS ARTILLERY.

ASSISTANT POLITICAL RESIDENT

ADEN.

ADEN.

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MEMOIR

ON THE ADEN RESERVOIRS.

The expedient of constructing reservoirs in which to collect and store rain water, has prevailed in Arabia from the remotest antiquity, these are generally found in localities devoid of perennial springs, and dependant on the winter rains for a supply of water during the summer months; or in those insular positions which are cut off from the copious torrents, that descending from the mountains, fertilize the Teháma of Yemen, and in the beds of which a constant supply of pure water may be procured by digging, a few feet below the surface of the soil.

The first and most remarkable instance on record is the great dam of Máreb, attributed by Aboo'l-Féda to Abd-esh-Shems surnamed Sába, who founded the city from him named Sába, and afterwards Máreb.

Other historians however assign to it an earlier origin, and it is related that Lokman, king of that remnant of the Adites who had renounced idolatry at the preaching of the Prophet Húd, and who are usually called the second Adites, took up his abode about B. C. 1750. in the region of Sába.

This country was frequently ravaged by impetuous mountain torrents, while at other times it was parched for want of a sufficient supply of water, in order therefore to remedy these evils, he conceived the idea of building a dam across the gorge of a valley contained between two mountains, which he thus converted into a vast reservoir of five leagues in length, for the reception of the rain water descending from the hills.

The dam was built of cut stone, secured by iron or copper cramps, and cemented with bitumen, forming a prodigious mass of masonry, 300 cubits broad, 120 feet high, and two miles in length; it was provided with thirty sluices, through which the water was conveyed into canals for the irrigation of the fields and gardens of Máreb, and by means of which, that city became what Pliny styled it, "The mistress of cities, and the diadem on the brow of the universe."

The dyke having somewhat suffered from the lapse of time, was repaired and consolidated by the Himyarite Queen Balkis, about the commencement of the Christian Era, and in her time it was deemed too strong ever to be destroyed.

That catastrophe did however at length take place, the dam which had stood for 1700 years, yielded to the pressure of water from within, and gave way, deluging, the country far and wide, and carrying away the whole city with the neighbouring towns and people; and thus the prosperity of Máreb was destroyed.

This event took place about A. D. 120, and is famous in Arabian History as the "*Sail-el-Arim*" or "*rush of water from the reservoir*" by which name it is mentioned in the Korán.

M. Arnaud, a French traveller, reached Máreb in 1843 after a difficult and arduous journey, and succeeded in obtaining measurements for a plan of this famous dyke, which I believe he has since published; according to his account, it was situated between two hills named Balák, which, when joined, by the wall, formed the reservoir; the enclosed space is of such extent, that a shout from one end, could not be heard from the other, and the massive masonry, though rent here and there, still attests the original solidity of the work. •

This doubtless suggested similar reservoirs in other parts of Arabia and the neighbouring coasts of Africa, which have usually been subject to it, and with the spread of the Kaliphate Westwards, the idea was introduced into Spain and other Mahomedan conquests.

The Reverend Mr. Stern, who succeeded in reaching Sanaa in September of this year, (1855) informed me that, during the whole of the route between that city and Menákhir, near Jebel Harraz, large and beautifully constructed cisterns occur, these during his visit were perfectly watertight and contained a considerable supply of water, though partly filled up and choked with long rank grass.

This traveller did not observe any in the Teháma, probably they are not required there, as the softer nature of the soil admits of considerable absorption, whereby a sufficient supply of water can be obtained from wells.

Lieutenant Burton in his "First footsteps in Eastern Africa" describes several tanks and water courses on the Island of Saad-ed-din near Zailah, one of them is a work of some art, it consists of a long sunken vault with a pointed arch projecting a few feet above the surface

of the ground, the exterior is of rough stone, and the inside is carefully plastered with fine chunam.

Mr. Salt describes a connected set of four reservoirs on the Island of Kútto, in the bay of Amphila, they are excavated in the form of a cross, each being thirty feet long, nine broad, and seven deep, lined with chunam, and together capable of containing about 120,000 gallons of water; a tradition current amongst the natives ascribes their construction to the Persians, who conquered Yemen from the Abyssinians early in the seventh century, and for some time held unrivalled possession of the commerce of the Red Sea.

The same traveller, in his previous voyage with Lord Valentia, discovered a number of similar cisterns in the Island of Dhalák near Massowah, but of larger dimensions, the natives have a similar tradition regarding their construction to that current at Kútto, they asserted that the original number was 316, but admitted that they had never seen more than thirteen or fourteen.

The Island of Massowah also contains a number of oblong tanks, some of which are of great extent, and are chiefly private property, the scanty supply of rain water which they contain, is kept under lock and key.

Captain Haines, in his Memoirs on the South coast of Arabia, mentions the discovery of several tanks amongst the ruins of Hosn Ghoráb, the cement of which was as hard as the solid rock, local tradition assigned the peopling of that district, and the construction of the buildings there, to a race whom he calls Koum Harmás, probably *Koum Hormuz* "people of Hormuz," or Persians, thus confirming, in a remarkable manner, the traditions recorded by Lord Valentia and Mr. Salt, regarding the origin

of the tanks on the Islands of Dhalák and Kútto.

Colonel Chesney mentions the fact of similar reservoirs undoubtedly of Saracenic origin, existing in Granada, Cordova, Seville and Gibraltar, these, from the perfection of their coating, continue to be water tight, though some of them, as those under the Castle of Gibraltar, must have been in use upwards of seven centuries.

Two very remarkable cisterns exist in the ancient fortress on the summit of mount Agatha, in the Termino of Mercadel, in the Island of Minorca, the Moorish origin of which is attested by an Arabic inscription. These differ from those of Gibraltar, by being raised structures instead of excavations, and they are of much greater dimensions, being capable of containing 2173 tuns, or upwards of half a million gallons of water.

Numerous other instances might be cited, but with the single exception of the great dam of Máreb, none equal the magnificent series lately discovered at Aden, which, when restored, will probably contain not less than twenty or thirty million imperial gallons.

There is no certain record of the construction of the Aden reservoirs, and the natives of the place have no tradition regarding them in which they place much confidence. It is probable that some are of great antiquity, and that others were built as the necessity for them arose, or as the piety of individuals prompted them to construct some work, by which a great public benefit might be conferred upon their city. This latter supposition is supported by the fact, that under the domed entrance to one of them lately restored, a tomb, probably that of the founder, was discovered, and I have been given to understand that an inscription was removed from this tank by

the late Surgeon Malcolmson, which probably would have afforded some clue to its history.

My impression is, that the construction of these reservoirs was first commenced after the second Persian invasion of Yemen, about A. D. 600, but of this fact we have no authentic record.

It is related by the Imám Ali ibn Hoosain el-Khuzrají, that Melek-el-Mansoor Taj-ed-Dín Abd-el-Waháb ibn Táhir, sovereign of Yemen, between his accession to the throne in A. D. 1472, and the great famine which decimated Yemen in A. D. 1502, built many religious edifices throughout the country, especially in Aden, amongst others, numerous reservoirs, aqueducts &c. the most important of which was the aqueduct to convey the water of Bir Amhait into Aden.

There is also a tradition in Aden, that about A. H. 906 (A. D. 1500,) the Governor persevered in digging wells for sweet water, and being successful, the reservoirs were permitted to fall to ruins, or to be filled up with the *debris* washed down from the hills.

Probably the water obtained from these wells, and from the Bir Amhait, sufficed for the supply of the place, which had begun to decline in consequence of the Indian traffic having been diverted from its ancient channel, by the discovery of the route to Europe round the Cape of Good Hope, and the preservation and repair of the reservoirs became no longer a matter of pressing necessity.

The aqueduct above mentioned appears not always to have sufficed for the supply of Aden, (which continued, as late as the seventeenth century, to have a population of 30,000 souls,) as, in a Latin tract written by Resendius

bearing date A. D. 1530 and entitled " *Epitome Rerum Gestarum in Indiã a Lusitanis,* " he remarks, "that the water was daily brought in on camels, which on some days amounted to 1,500 or 1,600 and even 2,000, and that if they came in the day time, the water was taken to the city, but if in the evening, it was deposited in a *large cistern near the water house.*"

The above extract is quoted by Mr. Salt, to prove that the aqueduct from Bir Amhait did not exist in the time of Resendius, but I think this conclusion hastily formed, as there is no reason to doubt the fact that it was constructed by Abd-el-Waháb ibn Táhir, and that the "*cistern near the water house*" was the large reservoir built at the Aden termination of the aqueduct, to receive the water of Bir Amhait.

This aqueduct and reservoir were in use when Aden was visited by a deputation of French merchants of St. Malo under M. de Merveille in A. D. 1708, and the remains of both were seen and described by Mr. Salt himself in 1809, who describes the latter as being near a *Beit-el-ma* or *water house*, which formed a shelter for the natives who brought supplies into the town.

The remains of the aqueduct still exist, and those of the reservoir were only destroyed by our Engineers a few years ago, when constructing the Isthmus defences.

If then the aqueduct was not built during the visit of Resendius, the object of the cistern on the Isthmus, in a position where it could never be filled by rain water, is not apparent, the more probable supposition is that water was brought in on camels during some temporary stoppage of the aqueduct, and that the local tradition which assigns the discontinuance of the use of the reservoirs for

the reception of rain water to this period, is correct.

The following is the description given by Mr. Salt of the tanks within the crater of Aden:—"Amongst the ruins some fine remains of ancient splendour are to be met with, but these only serve to cast a darker shade over the desolation of the scene. The most remarkable of these remains consists of a line of cisterns situated on the N. W. side of the town, three of which are fully 80 feet square and proportionably deep, all excavated out of the solid rock, and lined with a thick coat of fine stucco, which externally bears a strong resemblance to marble; a broad aqueduct may still be traced which formerly conducted the water to these cisterns, from a deep ravine in the mountain above; higher up is another still entire, which at the time we visited it (*November*) was partly filled with water, in front of it extends a handsome terrace formerly covered with stucco, and behind it rise some immense masses of granite, which being in some parts perpendicular, and in others overhanging it, formed during the hot weather a most delightful retreat.

Some Arab children who followed us in our excursions were highly pleased when we arrived at the spot, and plunging headlong into the water, much amused us by their sportive tricks."

When Captain Haines visited Aden in 1835 several of the reservoirs appear still to have been in a tolerable state of preservation; besides the hanging tanks, or those built high upon the sides of the hills, several large ones were to be traced round the town, but since the occupation of Aden by the British, no steps having, until lately, been taken to repair or to preserve them from further destruction, they became entirely filled up with stones

and soil washed down by the rains, the people of the town were permitted to carry away the stones for building purposes, and with the exception of the hanging tanks above mentioned, which could not easily be destroyed or concealed, all trace of them was lost, save where here and there a fragment of chunam projecting above the ground, indicated the supposed situation of a reservoir, believed to be ruined beyond the possibility of repair.

About three years ago, Government sanctioned the repair of three of the tanks which appeared in the best state of preservation, and the result was so satisfactory that the Political Resident applied for, and obtained permission to restore the remainder. The task of superintending the work was entrusted to me, and I at first employed the convicts, and such free labor as the limited surplus of the Municipal funds, aided by the sale of the rain water collected, enabled me to command, permission was subsequently obtained for appropriating the quit rent on building grants, amounting to about eight hundred Rupees per annum, for this purpose.

At this time no idea was entertained that the tanks were so numerous and so vast as they subsequently proved to be, and it was believed that they could all be restored in the manner above described, without entailing any expense on the state: as the work progressed, and as day by day new discoveries were made, the impossibility of this became manifest, and Government was pleased to sanction the employment of the public funds to ensure the work being completed expeditiously and well.

At present much has been done and at a comparatively trifling expense, which will be more than repaid

by the first heavy fall of rain, but much more remains to be done, and it will yet be years ere all the reservoirs are put in a serviceable condition.

I despair of being able, without a plan, to give such a description as will enable any one who has not seen, thoroughly to understand them.

A glance at the map of Aden will show, that the range of hills which forms the boundary of the crater, is nearly circular, on the outer or Western side, the hills are very precipitous and the rain water descending therefrom is carried rapidly to the sea by means of a number of long narrow valleys separate from each other.

On the inner, or Eastern side, the hills are quite as abrupt, but the descent is broken by a large table land occuring about midway between the summit and the sea level, which occupies about one fourth of the entire superficies of the Peninsula.

This plateau is intersected by numerous deep ravines, nearly all converging from the Shumshum range into the Tawela valley, which thus receives about a quarter of the drainage of the Peninsula.

The steepness of the ravines, the hardness of the rocks and the scarcity of soil on them, all combine to prevent any great amount of absorption, and thus a very moderate fall of rain suffices to send a stupendous torrent of water down the valley, which, ere it reaches the sea, not unfrequently attains the proportions of an unfordable river.

The damage done by this torrent has frequently been considerable, during my residence in Aden I have seen kutchas houses, furniture, animals, and even human beings carried with irresistible velocity into the sea, and during a fall of rain which occurred at midnight on the

28th. December 1842, so great was the rush of water that upwards of two hundred animals, were carried away, and nine men were missing in the morning, only three of whose bodies were ever found.

Rain to this extent is exceptional in Aden, but few years pass, during which many thousand tuns of water are not lost from want of means to retain it.

Our predecessors were more provident as the gigantic reservoirs, which occur chiefly in and near the main water course, the Tawela valley, attest.

Most travellers have erroneously described them as excavated out of the solid rock, but I am not aware of any such. Those under the foot of the hills are generally built at a re-entering angle of the rock, which promises a copious flow of water, here the soil has been carefully cleared away and a salient angle or curve of masonry built across it, while every feature of the adjacent rocks has been taken advantage of, and connected by small aqueducts, to ensure no water being lost.

The overflow of one tank is conducted into another, and thus I believe that a complete chain existed into the very centre of the town, where small tanks which could not otherwise be filled, are being daily discovered.

Their construction is extremely fantastic, the only principle which seems to have been adhered to, is the avoidance of straight lines, and the wisdom of this has been proved in the recent excavations, as in almost every instance where a straight line has existed, it has been forced in by the rush of water without it.

They are generally of stone and mud masonry, roughly plastered on the outside, and beautifully coated in the interior with chunam, flights of steps, gradients,

platforms, &c. are heaped together and give an exceedingly grotesque appearance to the whole: each large tank has a smaller one in front of it, built for the purpose of retaining all earth and stones carried down by the torrent, and permitting a pure stream of water to flow into the reservoir beyond.

As before mentioned, the majority of the tanks are in and near the Tawela valley, which intersects and receives the drainage of the large table land under the Shumshum range. This valley is 700 feet in length from the point where it leaves the table land, to its actual junction with the level plain of the crater. The hills throughout its entire length are perpendicular, and at the head of the valley they meet, leaving barely sufficient room for one man to pass. The valley then gradually opens out, and at the gorge, it is one hundred and fifty feet in breadth, the hills then circling round to the right and left, form part of the walls of the crater of Aden.

Appendix A. is a tabular statement of the various tanks which, together with the aqueducts leading to them, have been thoroughly repaired and are now ready to receive water.

No. 1 is at the top of the valley just described, and is formed by a wall drawn across it, connecting the hills on either side, precisely similar to, but on a much smaller scale than, the great dam of Máreb.

The rocks within it have been coated with chunam to prevent leakage, above it is another large but natural tank which retains water during the greater part of the year, this was formerly inaccessible, but steps have now been cut, and hand rails and iron stanchions inserted

in the rock, to facilitate communication with it.

No. 2 is situated lower down the valley, on the west or left side, and at some distance from No 1, the intermediate space being occupied by the Tawela well; formerly no communication existed between them, but a broad paved aqueduct has now been constructed to answer the double purpose of preserving the water which may overflow from No. 1, and the drainage of the intermediate rocks.

No. 3 is immediately adjoining No. 2 and connected with it by means of a sluice near the top of the wall.

No. 4 is connected with No. 3 in the same manner, and its overflow is conducted into a large aqueduct thirteen feet in breadth, which runs down the centre of the valley, round the Bír Khalád into No. 8½.

No. 5 is situated on the East or right hand side of the valley, near No. 1, and opposite No. 3, it is extremely fantastic in construction, and has two deep wells in the centre, one of which is thirty five feet in depth.

No. 6 is connected with the preceeding by means of a slit in the rock which conveys the water into

No. 7, a tank of very similar construction, the overflow of which is carried by a branch aqueduct across the valley, into the main aqueduct, in which is situated the small tank No. 8½.

No. 8½ is, as above said, a small tank in the main aqueduct, built for the purpose of preventing the soil and stones washed down by the rain from falling into, and injuring the large one beyond it (No. 8): here the overflow of all the other tanks above it, meet, so that no water descending from the hills can by any possibility escape, it must all flow into the main channel, at some

point of its course.

No. 8 Is a large reservoir through which the main aqueduct flows; it was very much destroyed, one wall having been forced in, either from the pressure of water from without, after the tanks and aqueducts above it became ruins, or by the water finding its way inside the masonry and sapping its foundations. It has however been repaired, and I am sanguine that it will prove watertight.

Thus far only the series is complete, beyond, the main aqueduct has not been finished, though it is in course of construction, and the other tanks, which are finished, have not been united.

One of the most remarkable is No. 11, which is a double tank situated below a deep rift in the hill, down which a great volume of water flows, but as if to make sure of its being filled, the drainage of the hill side behind it, is conveyed into it by an aqueduct leading through a small hole in the rock, not larger than a man's head. The entrance to this tank was originally domed, and contained an inscription which has been removed, the dome has been restored.

The other tanks which have been restored, require no notice.

Appendix B. is a statement of all the remaining reservoirs which have been discovered, some of them are cleared out and nearly completed, others are in course of restoration, the rest have not been commenced: of these immeasurably the finest is that marked I. It is nearly a cylinder of one hundred and forty eight feet in diameter, but the depth has not yet been ascertained, about twenty four feet have been cleared out, but the

bottom has not been reached: into this reservoir, the overflow of all the tanks from No. 1, to 10, in table A. and from A. to H. in Table B. and probably several others, will meet.

It may be imagined that in so arid a spot as Aden, so many tanks are useless and can never be filled, but I have known many falls of rain during my residence here, which would have filled them all, and many more had they existed.

I regret that I am unable to delay the printing of this memoir, until a plentiful fall of rain, which may be expected about this season, shall have tested their value

But whether they *all* prove water tight or no, it is hardly possible to over estimate the value of these reservoirs in a place like Aden, which with a population of 25,000 souls, has a daily supply of sweet water not exceeding 15,000 gallons.

Water containing three parts of saline matter in every 2000 is usually considered unfit for domestic purposes, but in Aden, at least 15,000 of the inhabitants are compelled to drink water containing as much as from five to ten parts in 2000. It cannot therefore be doubted that the large increase to the water supply which these cisterns must afford, will prove an inestimable blessing which would be cheaply purchased at almost any price.

Probably in the most unfavorable season not less than 6,000,000 gallons will be collected, this at once doubles the annual supply, and reckoning the value of this increase at the minimum rate at which water is ever sold in Aden, and at which it has a ready sale viz: one Rupee per hundred gallons, we have an annual revenue of

Rupees 60,000. Thus in a single year, and one far below the average, a greater sum of money will be collected than is likely to be required for the restoration of all the tanks.

I cannot refrain from quoting an extract of a letter addressed to the Right Honorable Lord Elphinstone, under date the 27th. of July 1856, by one who saw the tanks on his route to England, and which was communicated to the Political Resident by Government:—

“I was much interested in the tanks which Brigadier Coghlan showed me; a short time ago they were as completely buried as Herculaneum, and we passed over some, which being filled up to the brim with rubbish, have less the appearance of being what they are than Pompeii must have had before it was excavated. Six of these have been cleared out and are quite ready to catch any drop of water which falls, they are admirable and substantial works, most beautifully chunamed, and most fantastic in their shapes, with all sorts of queer steps: when they are all cleared out, Aden will be quite independent of exterior sources for its water supply.”

Table C is an abstract statement of the receipts and expenditure on account of the restoration of the reservoirs, from the commencement of the work in 1855 to the end of 1856.

The total amount is Rupees 11,543,0,,3 of which only Rupees 6,500 has been paid by the state, the balance having been collected from local sources.

A reference to Table A will show that tanks of the aggregate capacity of 3,538,715 imperial gallons have been completed at an expenditure of 11,543 Rupees, in other words, that a permanent and tolerably reliable

water supply has been secured to Aden, at the rate of five annas and three pies of *original outlay*, for a constant supply of one hundred imperial gallons *per annum*. The best comment I can offer on this is the fact, that at present, Government is paying to the Haswah water contractor, one Rupee and twelve annas for every hundred gallons of water supplied by him to the vessels of war in the harbour and the various public departments located outside the Main Pass, and the merchant vessels are paying nearly double that price for worse water.

It is much to be regretted that no regular register of the Pluviometer has ever been kept in Aden; but an imperfect series of memoranda exists in the records of the Jail, from which Table D has been framed.

The falls numbered 5 and 8 and the two unrecorded, in September 1853 and March 1854, would have sufficed to fill all the reservoirs in the Peninsula, and those numbered 1, 12 and 18 would probably have given not less than 6,000,000 gallons each. Thus in the course of five years the reservoirs would have been entirely filled four times, and about twenty million gallons of water would have been collected in addition at intermediate periods, or calculating the entire contents of the reservoirs, when all shall have been cleaned out and repaired, at twenty million gallons, we may expect to have an annual supply of twenty million gallons, in addition to that afforded by the wells.

This of course may be multiplied indefinitely by constructing new reservoirs at Steamer Point and other localities where they do not at present exist.

The above is of course merely conjectural, the tanks have never been filled, and it is impossible to frame

any calculations regarding them, with even approximate accuracy, but I trust that sufficient has been shown, to remove any doubts as to the advisability of carrying on the work, and restoring all that have been discovered, the more so as the expense cannot be very considerable.

Aden

R. L. Playfair.

1st. January 1857

TABLE A.

Tabular statement of the tanks already completed.

Number.	Extreme dimensions, in feet.			Capacity in Imperial Gallons.	Remarks.
	Length.	Breadth.	Depth.		
1	150	60	40	1,500,000	At the head of Tawela Valley.
2	33	20	28	54,325	(On West side of valley next to, & connected with, No. 1, by an aqueduct.
3	30	34	21	29,875	(On West side of valley next to, & connected with No. 2.
4	45	46	27	188,693	(On West side of valley, next to, and connected with, No. 3.
5	74	30	20	93,000	(On East side of valley, next to, No. 1.
6	41	26	25	58,000	(On East side of valley, next to, & connected with No. 5.
7	75	30	23	95,987	(On East side of valley, next to, and connected with No. 6.
8 $\frac{1}{2}$	26	16	9	22,464	(On West side of valley, small tank to prevent stones &c. falling into No. 8, connected by an aqueduct with No. 4 & by another crossing the valley with 7.
8	80	70	26	508,940	(On West side of valley, connected with No. 8 $\frac{1}{2}$.
9	39	29	14	52,500	On West side of valley.
10	43	29	17	75,181	do. connected with No. 9.
11	99	59	28	328,000	(Outside gorge of valley on West side.
12	33	18	15	45,000	(Outside valley, on the East side, above Parsee cemetery.
13	74	70	33	486,750	(A detached tank, on the Munsorie heights above Church yard.
Total capacity....				3,538,715.	82181

TABLE B.

Tabular Statement of Tanks, under repair, including all which have been discovered, but not yet excavated.

Designation.	Probable capacity in Imperial Gallons.	Remarks.
A	15,255	Near Bír Khalád in Tawela valley,
B	54,315	Do. Do. Do.
C	42,000	Two small tanks joined together, at S. E. corner of Tawela valley cleared out, but not repaired.
D	35,000	Next to C.— cleared out but not repaired.
E	22,000	Next to D. Do.
F	32,000	Next to E. Do.
G	600,000	Behind Parsee cemetery, about half cleared out.
H	202,860	Tank in front of I. to catch the stones &c. cleared out, but not repaired.
I	4,000,000	The largest yet discovered, situated just outside of Tawela valley, into which the overflow of all the above tanks, and No. 1 to 10, in Table A. meet;— about half cleared out.
J	1,500,000	Near I. and leading into it, not cleared out, but outline traced.
K	38,250	Small tank to prevent stones falling into J, cleared out, but not repaired.
L	300,000	Behind Parsee gardens, supposed to be ruined beyond the possibility of repair.
M	Unknown.	Tank in which Parsee garden has been made.
N	Unknown.	Above Jew's burying ground.
O	70,000	Above Sëbundee Lines.

TABLE B. *continued.*

Designation.	Probable capacity in Imperial Gallons.	Remarks.
P	8,000.	Near O.
Q	Unknown.	Large tank, much destroyed, near furnaces.
R	260,000	In good condition, above furnaces.
S	Unknown.	Small tank, quite buried, below R.
T	Unknown.	Large tank, quite buried, below S. will probably contain upwards of one million gallons.
U	340,000	Large tank near R. in good condition, aqueducts destroyed.
V	116,000	In good order, high up on the hill above U. almost inaccessible.
W	190,000	Next U. much destroyed.
X	320,000	Two small tanks below W. much destroyed.
Y	320,300	In corner of hill, near No. 11 of Table A. in good order.
Z	84,000	A large fissure in the rock, walled in, above Q.
a	Unknown.	Above Engineer's store yard.
b	Unknown.	Above lines, 18th. Regiment N. I.
c	Unknown.	In lines of 18th. Regiment N. I. quite buried.
d	Unknown.	Three tanks above Mess 18th. Regiment N. I.
e	Unknown.	Large tank in Hydroos valley.
f	Unknown.	Small tank, below Hydroos bund.
g	Unknown.	In the town, near house of Abdulla Mater.
h	Unknown.	Do. near Sebundee lines.
i	10,800	Do. behind town Police station.
z	25,000	At the Hejaff, in good order.
		<i>N. B. Several on Seerah island, not searched for.</i>

A Memoir on the Aden Reservoirs.

TABLE C.—Abstract statement of the receipts and disbursements on account of repairing the ancient Reservoirs at Aden, from the commencement of the work in 1855, till the end of 1856.

Cr.				Dr.			
	Rs.	A. P.		Rs.	A. P.	Rs.	A. P.
1855.			1855.				
Realized by sale of water collected in reservoirs.	40	9 0	Labor and material expended during the year.	916	7 6	916	7 6
Quit Rent for 1855, collected in this year.	501	14 4	Estimated cost of the labor of 558 convicts at 2 annas each.	69	12 0	69	12 0
Paid from Municipal Fund.	374	0 2	1856.				
Estimated value of the labor of 558 convicts at two annas each.	69	12 0	Labor and material expended during the year.	10,388	12 9		
1856.			Compensation paid to the owners of buildings for their removal.	70	0 0	10,458	12 9
Realized by sale of water collected in reservoirs.	692	15 0	Estimated cost of the labor of 776 convicts at 2 annas each.	79	0 0	97	0 0
Quit Rent for 1855 collected in this year.	299	15 8					
Quit Rent for 1856.	822	1 3					
Government grant in aid of the work.	6,500	0 0					
Paid by Municipal Fund.	2,143	12 10					
Estimated value of labor of 776 convicts at 2 as each.	97	0 0					
Total Rupees.	11,542	0 3	Total Rupees.	11,542	0 3		

TABLE D.

Register kept in the Aden Jail, of the rain which has fallen between the 12th. of December 1851 and the end of December 1856.

Number.	Year.	Day.	Month.	Quantity in Inches.	Total during the year.	Remarks.
1	1851	12	December.	1.50		No record previous to this date.
2	1852	3	January.	.50		
3	"	22	"	.25		
4	"	28	"	5.50	6.25	A very heavy fall occurred in September 1853, which is not recorded.
5	1853	6	December.	.25		
6	"	11	"	.50	.75	
7	1854	11	January.	.24		A fall of about five inches took place in the beginning of March 1854, which is not recorded.
8	"	12	"	3.72		
9	"	13	"	.04		
10	"	6	May.	.25		
11	"	25	October.	.17		
12	"	26	"	1.88		
13	"	5	December.	.10		A fall of about five inches took place in the beginning of March 1854, which is not recorded.
14	"	7	"	.20		
15	"	28	"	.05	6.65	
16	1855	2	January.	.20		A fall of about five inches took place in the beginning of March 1854, which is not recorded.
17	"	9	"	.30		
18	"	10	"	1.80		
19	"	11	"	.24		
20	"	12	"	.10		
21	"	13	February.	.08		
22	"	21	August.	.48	2.70	
23	1856	11	January.	.40		
24	"	22	"	.70		
25	"	23	"	.15		
26	"	11	September.	.13		
27	"	12	"	.08	1.46	



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