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My Lord,

The Council will, I trust, permit me to offer a few observations which, from the relations that are now recognized to exist between Famine and Public Works, may not be wholly unacceptable or without interest. And the more so, as the administration of the latter being my particular function, some declaration of our policy may be looked for in the light of the teachings of our recent sad experience.

It is hardly time for us to review the history of the famine that is passing away, though not yet completely gone, in the Deccan and Southern India. Scarcity and high prices of food, there as well as in other parts of the empire, still remain and render it as difficult as it is premature to come to any finite conclusion as to the exact cause of the calamity, or to dogmatize on the remedies that should be applied to meet the recurrence of famine in the land.

Unhappily, as handed down to us, we have many and varied precedents, both administrative and economic, not all consistent however, and not all wise or good for us to accept as standards for our guidance, or as models to imitate; some, in fact, are rather the reverse. You, my Lord, have discussed this section of enquiry in your Minute of last August. But whether, looking backward or forward, our object is to ascertain what is the policy to accept, the practice to adopt, in order to enable us, if we cannot abolish famine—an end I fear hopeless to be attained—to do at any rate what we can to limit its area, to localize its scourge, to mitigate its intensity.

But here I may ask, though no complete or satisfactory answer, I fear, can yet be given, to what are high prices, scarcity or famine due? And why in recent years have these been so recurring, so severe, so virulent?

Are there causes, possibly as potent but silently at work, to bring about these visitations, besides mere atmospheric phenomena?

Is there less thrift than formerly? Is the surplus of full harvests no longer stored, but sold, and the proceeds dissipated? Has population increased and in proportion food produce diminished? Have edible grains given place to more paying crops?

It is possible that these causes are at work here and there, in isolated places, due to special circumstances, but I am inclined to think they are not by any means general. Their consideration, however, calls for thorough scrutiny and investigation, a duty pertaining, in its early stages at least, to the Economist and Statistician rather than to the Engineer.

In connection with this, I would mention one incident of grave practical moment in the late famine. It is known that more than two-thirds of the autumn and spring harvest failed over an area inhabited by 30 millions of people, and that during the period, some ten months, of the greatest intensity of this famine, the food imported could only have helped to feed one-third of this multitude: yet at the instant the fresh harvest was assured, prices dropped and import ceased. This might lead to the assumption that Southern India held within itself, even when its harvests had failed, stores of grain nearly sufficient to feed its people for the whole time, and yet we

were assured on all sides at the end of last, and beginning of this, year that there were no reserves of food, or next to none, in that country. Is it impossible to devise a means by which our knowledge on this all-important point may in the future be, if not absolutely reliable, at least not absolutely *nil*?

Again, the facts of the grain trade of Northern India present some features which it may be worth while to note, and which suggest that vast reserves are still in hand, notwithstanding the enormous export trade of the last two years, and particularly of the present year.

The export of wheat from Calcutta on an unusual scale commenced in May 1876, just after the spring wheat harvest had been garnered. Wheat then sold at Cawnpore for 27 seers per rupee, and the export rose from 150,000 maunds in April to 540,000 maunds in July, but checked (apparently by a rise in price in July to 22½ seers) fell in August to 265,000 maunds. At the end of August the price again fell to 27 seers, and the exports rose to 560,000 maunds (the maximum of the year) in October. It was about this time that the signs of approaching famine were unmistakeable.

From the end of August, the price rose till nearly the middle of December 1876, when it was 21 seers for the rupee, and the exports in January 1877 fell to 120,000 maunds.

Now it is since January 1877 that the extraordinary export has taken place—thus anticipating by at least 3 months the course of trade of the previous year,—but prices remained constant from December till the beginning of April, at 20 to 21 seers.

War was declared in Europe on the 23rd April 1877.

By May the exports had risen to upwards of one million of maunds, and with a slight check in June (the price had risen to 16 seers in May) reached its maximum (1,270,000 maunds) in August, the price having been 19½ seers early in June and 18 seers early in July.

From June till the early part of August there was no great variation in price, but in the latter half of that month the price rose to 15 seers, reaching its maximum in the latter half of September, when it stood at 11 seers. The autumn crops of Northern India had failed, and the export trade fell suddenly to 440,000 maunds in September, was 255,000 maunds in October, and 235,000 maunds in November.

Thus, so far as we can see, the enormous abstraction of grain for export from Bombay as well as from Calcutta, in addition to what was sent to the famine districts of Western India, did not cause a greater variation in the price of wheat at Cawnpore between December 1876 and August 1877 than is represented by a difference of 4½ seers in the quantity obtainable for one rupee.

But the moment one harvest had failed and the sowings for the next were in jeopardy, the law of self-preservation appears to have asserted itself, and we may, I think, deduce from the rapidity of its action that the reserves are great, and if, as I was informed, more than 100,000 tons of shipping were left without freights, we have an index of the trade which had been reckoned on, by those most fitted to estimate the power of the supply, to equal the demand.

No doubt there are tracts of country which, formerly growing food for home consumption, now grow produce for export, and depend for their support on supplies from without; but accepting this, what follows will, I think, show that this is a source of satisfaction rather than a cause for regret, since in the restoration of the balance we find the very weapon with which to fight famine: for the fleecy capsules of the cotton plant, or the jewelled diapers of the poppy, feed their cultivators with no less certainty than the crops of the rice swamp, or of the wheat field, feed those who raise them.

The Agricultural returns of India, from which much might have been gleaned, are not very complete, or rather they are not as yet in a very accessible form, but Mr. Bernard has been kind enough to give me a note which will make a review of them intelligible. He says—

"The best return I have been able to get of the area cultivated and the "area under food crops in different parts of India, incomplete it is true for some "provinces, but still sufficient for our purpose, shows that in our most thickly "peopled provinces there are about 75 to 80 acres of land under cultivation "to every 100 persons, and that out of those 75 to 80 acres 65 to 70 are under "food crops. For instance, Oudh with its dense population of 14 millions has "9 million acres of cultivated lands, of which 8,200,000 acres bear food crops; "Madras has 21 millions of acres under food crops for its ryotwarce population "(excluding Zemindarees) of about 27 millions. Mysore has 4½ millions of "acres under food for its population of 5 millions. British Burmah has 2½ "millions of acres under food with a population of 2¾ millions. The Central "Provinces, where the land is poor and cultivation is slovenly, and where "there are grown much cotton and oil-seeds, have only 13 millions of acres "under food crops out of a total 18½ millions of cultivated acres, but then its "population is only 9¼ millions. There are great differences in provinces, for "instance British Burmah exports annually 800,000 tons of rice, that is to "say, it produces from 2 to 3 times as much food as its people require. Assam "on the other hand has also a very rich soil, a heavy and never-failing rain-"fall, enormous areas of virgin land, yet she does not produce food enough "for her people, and has to import food from thickly-peopled Bengal. But "so far as I know, Assam is the only province in this case, and all the "other provinces of India produce enough food for their own support and for "export as well.

"A great deal has been said of late years about the vast areas put down "with opium, cotton, indigo, seeds and other crops, to the exclusion of food "crops, and to the exploitation of India for the benefit of rich traders and of "distant populations. But much of this kind of talk is due to ignorance, for "out of the cultivated area of British India, estimated at about 160 millions of "acres, only about 580,000 acres are under opium, and little more than "one million acres under indigo, 8,000,000 oil seeds, and 10,500,000 acres "under cotton, most of it for home consumption in India, while at least 130 "millions of acres are under food crops. And an acre of food crop land will "in an ordinarily good season support two people if the produce of one province "be taken with another. In Burmah and Bengal one acre supports 3 or 4 "people; in the Central Provinces and Bombay it supports less than two. No "doubt the area under such crops as oil seeds, jute and oil-bearing roots "has increased greatly during the last 10 or 15 years. But then the total

"area under the plough has also increased vastly. In the Madras Presidency "alone I find that Mr. Dalyell, no mean authority, wrote in 1867 that the cul- "tivated land in certain districts of Madras had from 1856 to 1866 risen from "10 millions to 16 millions of acres, so that it is quite safe to say that the area "of food crop land in India is now as high or higher compared to the popula- "tion than it was in old times, notwithstanding the great extension of "non-food staples like linseed and rape seed."

My object in calling attention to this statement will be patent and, I trust, conclusive. It is this, that even if Drought and Dearth were more extensive and widespread than they have been in the most disastrous of Indian famines, the empire can still from its own soil feed itself, and I say this with the full knowledge, that we have drawn rice from beyond the limits of the empire.

The significance of this fact should go far to reconcile us to accept, not with cheerfulness certainly, but with resignation, the proposals of my Hon'ble Colleague; and this consideration recalls me to my more immediate object that, though the measures for which we now seek assent are the premium which we must pay for insurance (I fear only for a part insurance), and though it is to be hoped that sweet nature will give us a little longer time for recovery and restoration before she again withholds from us her bounteous and fruitful gifts, we must in wisdom and with prevision and energy, use the opportunity of husbanding with knowledge, as well as of distributing with certainty and rapidity, those gifts so that our peoples may not again suffer as they have in the past.

Severe as the dearth and consequent distress have been from which we are now emerging, there has been no dearth of suggestions for the remedy and prevention of a similar state of things. These suggestions are as varied in their scope as they differ in the means required to give effect to them, ranging from a scheme to cost only a hundred millions sterling—but the money did not come with the scheme—to the simpler and certainly less costly introduction of a patent two-wheeled cart for horse or bullock draft—my friend forgot to tell me how the cattle were to be fed—or to a cheap and simple wind-mill for pumping water, but I was not told how the water was to be raised when there is no wind, the normal atmospheric condition of India when water is most wanted.

And now, my Lord, in what I am about to say on the particular specific that has been so boldly proffered to us, on many sides from many irresponsible authorities, as the certain cure and remedy for all our ills, I desire most emphatically to record the fact that, though not an Irrigation Engineer myself (for my experience in this field of my profession has been very limited), I have approached the consideration of the subject as applicable to all India, prejudiced in favour not only of Irrigation, but also of Inland Navigation, and that one of my dreams has been the hope that during the time I was to sit at this Council Board I would unite the waters of the Arabian sea with those of the Bay of Bengal by an inland channel.

The stern realities that confronted me have dispelled this illusion, but at any rate this bare statement should clear me from the charge that because I have had larger experience in Railways, I am therefore biassed in favour of Railway enterprises.

The construction of Irrigation and Navigation works must strike the most heedless as the most obvious way of preventing famines. Water in ample abundance, rushing and racing to the Ocean only to be spread and lost in its broad bosom, has to be but bitted and curbed by dam or bund, and then so distributed as to fertilise the wide level plains of India, and to secure food and life for man and beast.

A step further, and these running rills are deepened, extended and converted into silent highways, to bear to foreign markets the redundant harvests of the tracts they traverse, and to bring back argosies laden with the wealth of other lands.

This seemed simple and captivating, and in India, with its tropical sun, its certain (?) monsoons, and the prodigious rainfall along the Ghats and in some localities, nothing should be more sure.

Others again having studied well our geography, have seen in the perennial supply drawn by our northern rivers from the eternal snows of the Himalayas an inexhaustible source of national wealth.

Have these rivers been neglected? A glance at a map showing the districts of Northern India protected from drought by irrigation works will give a graphic answer.

These protected areas form, it is true, but a small portion of the entire surface of the Continent, and of the balance left little can unfortunately be reached by this perennial supply; for the area within its influence ceases a little south of the Jumna, and from Rajmahal on the East away to the far South and West all the immense region of Central India bounded by the Vindias falls to the Ganges, and is inaccessible to canal irrigation.

This area then, and that again to the South of the range I have named, may be said to be wholly dependent upon rainfall. And we are thus brought to see that, vast as is the country we have to deal with, mere magnitude is but one element of the problem to be solved.

Much, very much, has already been done, especially in Southern India, and much more still can be, and will be, done in storing water; but the lessons which past and recent famines have taught us are that territories dependent on reservoirs, or "tanks" as they are better known in India, offer, and at the best can offer, only an intermittent protection under the phase from which we are now emerging.

Multiply these tanks as we may, they will stand us in but little help in such a famine as we have just passed through, due, as it has been, not to the failures of a single season, or of a single year. Deficiency of water in them originally, and ceaseless evaporation, are the influences which dry up

one and dry up all when once the supply fails. And here, before I pass from this subject, I would desire to say that, although confidence in tanks cannot be assured, dependent as they are on the doubtful factor of local rains, yet in Madras and especially in Mysore, where there is the enormous number of 37,600 tanks ranging from the size of a village reservoir to a respectable-sized lake of 14 square miles, much has been done in recent years to place them in a condition of safety, improving, as far as practicable, their capacity. But in this direction still more has to be done, and every effort will be made to insist on the continuance of systematic action in perfecting these works.

To replenish these reservoirs from other than their natural catchments, as has been suggested, by means of channels led off from the larger rivers, would, in nearly all cases throughout the centre of the peninsula, where the scourge of famine has been heaviest, be either wholly impossible, or relatively so if financially considered.

The tempting idea of storing up the flood wave where the streams first issue from their birth place in the bosom of the Western Ghâts, unless in a very few exceptional positions, appears to be as deceptive as it is luring, judging from the experience of works of this character in the Bombay Presidency. No less than 27 works more or less of this type estimated to cost over 2 millions sterling have there been either completed or commenced as Famine Relief Works, with, it is much to be feared, little prospect of paying for many years to come.

The greatest advocate for schemes of this character has lately stated that 10,000 such reservoirs with an unfailing supply could thus be constructed, and instanced as a case in point one capable of storing 1,600,000,000 cubic yards of water and of commanding "nine-tenths of the whole Peninsula of India," which project, however, had in vain been pressed on the attention of Government.

The Officer whose duty it was to investigate this project, and who himself was at first most sanguine as to its success, informs me that, after several years' gauging the river which was to supply the reservoir, the available quantity of water turned out to be only one-fourth of that calculated above; and further, that judging from the experience of three other works of a precisely similar character which were experimentally carried out in the same chain of hills, the fact was clearly demonstrated that such works could not, at least under existing conditions, be made to pay. The land is there, the water is there, but the inducements hitherto held out to the cultivators to embark in irrigation have met with the same disheartening response as in the case of the most marked manner the expectation held out when it was projected. I have Madras Irrigation Company's Canal, which has hitherto disappointed in the said it would not pay; but to my mind this is a matter of secondary importance, if only it would not fail. But as a security against famine in times like those we have passed through, it would be a broken reed to lean on.

In these situations, with *régur* or other unsuitable soils, rapidly sloping ground, and other drawbacks, the sparsely scattered, ignorant and indigent cultivators, who perhaps have had no previous acquaintance with

irrigation, fail to realize the advantage of incurring the outlay requisite for terracing their fields (often in such localities a serious charge), and it is thus to be feared that generations must be born and die before appreciable progress can be made towards the desired goal.

Until the general conditions with which we have to deal alter materially, or schemes hitherto tried without success solve the difficulty of bringing water to the land without thereby imposing an unbearable burden on the country, we must accept as a fact that close on 550,000 square miles of the 740,000 comprising the Great Provinces of the Empire (exclusive of the Native States, Burmah, &c.) cannot receive protection in any broad sense, and the vision of the 10,000 great reservoirs conjured up by the enthusiastic projector must be allowed to fade into dreamland.

Another distinguished writer who has been quoted as a great authority, and whose opinion I admit is deserving of every respect, has stated that the great tracts of the Punjab might, at the cost of some 10 millions, be irrigated without the risk of pecuniary loss, and that this would be an insurance against drought.

This may be true, but the question is not entirely connected with famine, and considered from an irrigation point of view, the scheme has been already considered and abandoned, because the taxpayers of all India would have to find the money to execute it, and when executed there would be for generations no people to enjoy it, the district containing but a handful of inhabitants.

The same writer when criticising our past expediture in the Tirhoot famine would also have that country irrigated. Press these principles to their logical sequence and apply them to all the area of India, and we are brought face to face with an outlay of some £700,000,000 sterling!

For a moment however admitting the dictum that "there is not a district in India that could not be more or less irrigated," and assuming that only 100 millions of acres (say 156,000 square miles) of its whole surface could have this great blessing conferred on it, at the rate specified, *viz.* £2 per acre (the Bombay works give Rs. 23½ per acre for protection exclusive of indirect charges), a capital outlay of 200 millions would be needed, and an annual burden imposed on the people of 8 millions sterling to cover the interest charge at 4 per cent.

A proposition so startling might be allowed to answer itself, or still better, by adopting an argument already used that the taxation of India "is almost "without limit so high that you cannot turn the screw a bit more," be condemned by those who have brought it forward for grave consideration; but as the best means of bringing home the very precarious nature of the revenue derivable from these protective works, the following sentence may be quoted from the Bengal Revenue Report for the past official year:—

"In Midnapore the rainfall was 75 inches more in the opinion of the "ryots than is good even for rice. Hence Canal water was at a discount. "Those cultivators who had executed leases at the commencement of the season "regretted that they had done so, and the result seemed to justify their view of

"the case, as numerous careful experiments made by both Revenue and "Engineer Departments showed that the outturn of the irrigated crops was in "no degree superior to that of the unirrigated. This following upon a previous "year of good rainfall has brought the Midnapore Canal into the greatest "disfavour. There was a large falling off in the leased area, which has again "been followed by a very much larger decrease in 1877-78."

This has the greater significance when it is recollected who the author is, and his devotion and attachment to this branch of his profession, for no better Irrigation Engineer exists in India than Colonel Haig.

Again he observes—

"The previous year having been a very favourable one for the unirrigated "crops, the area leased for in 1876-77 fell from 55,995 acres to 32,681, but "as the season advanced and its real character developed, the lessees repented "of their engagements, and endeavoured to evade them by every possible "means, first clamouring for a remission of the Government demand on the "ground that the water was of no value to them, (which, as it has turned "out, was true), and when this was refused, endeavouring to prove that water "had not been properly supplied. The result has been disheartening for both "Government and people. The revenue demands were enforced mostly by "process of law, the people resisting them to the last. Very little of the "demand for the year was recovered during the year, but the recoveries of "arrears of former years were so vigorously carried on that the actual collec-"tions exceeded those of any previous year except 1874-75.

"It is impossible to record this result with any satisfaction, as it seems "certain that the arrears and the difficulty of enforcing payment were mainly, "if not solely, due to the extreme poverty of the people. It is melancholy to "read of 12,714 certificates having been issued for the recovery of the arrears "after abandoning all claims for less than one rupee, and making remissions to "a large extent on other grounds; and this in a district where the irrigators "have, as a rule, dealt fairly with the Government, and have always been ready "to pay when they had the means. One can hardly read the description of "the revenue operations of the year, and it may be added, of previous years, "without a wish that, if the state of the cultivators is such as it is described "by the Collector and his subordinates, irrigation, which, according to them "only enhances the difficulties of the people in ordinary years, had never been "introduced at all. The Deputy Revenue Superintendent remarks—'The "'most potent cause about the gradual decline of the area leased is the indebt-"'edness of the Midnapore ryots. They are involved over head and ears; "'and it is a matter of infinite regret that their debts are increasing as their "'connection with the Government irrigation is growing older. Excepting "'during the year under review, the canal irrigation as compared with the "'unirrigated crop has always increased the yield from 3 to 5 maunds in the "'acre, but the Government irrigators are not in a position to benefit by it; "'all that they obtain from the fields go punctually to fill the coffers of the "'Mahajuns, and they have finally to borrow money for the payment of the "'water-rate. The increased yield of the crop, if reserved for the liquidation

"'of the Government debt, is sure to prove more than enough for the purpose; "'but no notice is taken of it, and when the irrigator is forced to pay for the "'irrigation of his land, he blames the canal for the increase of his debt.'"

"Again attachments and sales of the debtors' property were very "frequent, and where they had not the desired effect, the debtors were arrested "for the realization of the Government dues; and it is now a very common "saying within the irrigable area that the major portion of the Government "irrigators has been deprived of their plough-cattle for the payment of the "water-rates. This is not very untrue, as the most valuable saleable property "in the possession of the cultivators are the bullocks; and where we could "catch hold of them no other movable or immovable property belonging to "them was attached or sold. The number of sale notices and warrants for "the arrest of the debtors issued during the year under review was un-"usually large, yet from the well-known poverty of the Midnapore ryots, "the result has not been as satisfactory as was anticipated."

"The part played by the Zemindars and Mahajuns in the matter is shown "in the following extracts from the Deputy Superintendent's reports:—

"'The Zemindars, whose resistance to the spread of irrigation was hitherto "'passive, have now broken out in action, and many of them have openly prohi-"'bited their tenantry from using the canal water on the penalty of incurring "'their severe displeasure. They have done this with the view of securing the "'realization of their own dues, and of preventing their ryots from increasing "'their debts unnecessarily as they call it. The Mahajuns also have been "'telling the ryots not to resort to the canal any longer.'"

"For the Collector's explanation of the causes of this state of things "reference may be made to the Revenue Report of 1875-76, para. 36. It "should be noted, in passing, that the year 1876-77, in which coercive "measures on so large a scale were found necessary for the realization of "the Government revenues, was one of exceptionally high prices, and so "far peculiarly favourable to the ryots."

I have at length, and I fear to weariness, made these quotations; not that I desire to repeat them in the remotest degree to depreciate irrigation, but to show that the subject is surrounded with other difficulties, perhaps more obstructive and more powerful than those which the Engineer can overcome or the Financier deal with.

What has been done already in the way of this artificial irrigation in parts of India, its cost and its results, may be rapidly sketched.

Take first, my Lord, this great Province of Bengal, with its 62,000,000 of population, and its 48,000,000 acres of land under food crops, and its 7,500,000 acres producing industrial staples of one kind or the other, and consider its three great irrigation schemes of Orissa, the Sone and Midnapore.

These three projects protect generally some 1,231,000 acres, or 2·2 per cent. of the whole cultivated area of the Province; they will, when completed, fully preserve that area from drought under the worst conditions yet known. In

the last year water was taken from them for 360,000 acres, or only a little more than ½ per cent. of the total lands under crops. To obtain this result, we have already spent close on 4½ millions sterling, and a little under £4 an acre will have been spent when the works have been completed.

In the Punjab, exclusive of ancient works, nearly 3½ millions sterling have been spent in irrigating a little more than 1 million acres. The Sirhind project, now drawing to completion, promises well, but none of the other numerous schemes for further irrigation in the Punjab hold out fair prospects of immediate success.

The same difficulty applies to the prosperous Provinces of the North-West, where £5,500,000 have been already expended in irrigating, according to the last returns, some 1,390,000 acres, and in prosecution of works which will eventually command a much wider area. This accomplished, the Ganges and the Jumna, the perennial rivers of these regions, will have given up possibly all the treasures they have drawn from the glaciers of their source.

An author, one indeed of our own circle, has in an English periodical, alluding to our not having constructed the great Sardah Canal in Oudh, twitted us now in India, for locking the stable door after the horse had been stolen, and has compared us to a father who has fee'd the doctor, but has forgotten to feed his own child.

In answer to this, I shall only quote an extract from the Secretary of State's Despatch of the 9th April 1873, in which he says :—

"At a time when the finances of India are burdened with the pressure "of so many and such important public works it was obviously impolitic "to persevere in a vast undertaking costing upwards of 3 millions of money "for the purpose of bringing water to the estates of landholders, who protested "against the project as being unnecessary and a source of disease, while the "opinions of the great majority of the local officers in Oudh, endorsed by every "Chief Commissioner of the Province, and shared in by the Lieutenant "Governor, were that the proposed canals were not wanted and would not "be a financial success."

Let me pass on to Madras, where, as far as I can gather from the facts, some six millions sterling have been spent on irrigation schemes, or rather where this amount has been calculated without taking into account the dead stock value of the ancient native works. The results are certainly better there, for whilst in ordinary years some five million acres receive the full benefits of irrigation, in the very worst years one million six hundred thousand acres are effectually protected,—yet Madras, with its 32 millions of people, has even then but seven per cent. of its agricultural industry secured from disaster in years of ordinary rain-fall, and a much smaller area in years of drought.

In Bombay, exclusive of Scinde, with 19 million acres under cultivation, some 17,000 can now be irrigated, and when the works which are now under construction are completed, costing at present estimates more than two millions, it is hoped, at all events, some eight to nine hundred thousand acres may be protected.

I could go on giving dry facts, but in themselves they would, I fear, convey but a small idea to the mind of the vast work already accomplished in this country, far exceeding all that has been hitherto done as regards irrigation by collected Europe with the great canals of Italy and the reservoirs and dams of Spain; and I should assuredly fail were I to undertake the still greater task of practically bringing home the boundless nature of the effort which some would have us undertake, were we to rely on irrigation alone as an universal insurance against Famine.

It must also be distinctly borne in mind that the early Irrigation Engineers, who have left an imperishable name in connection with the works of their creation, naturally, and indeed necessarily, selected those fields in their enterprise, where all the elements of success lay in happiest combination. Where in fact—

"Mill sites fill the country as thick as you can cram 'em,
An desput rivers run about a' beggin folk to dam 'em."

One of these Engineers, not the least distinguished, nor the least loud in his upbraidings at the shortcomings of those whom he has left behind in India, for not following his good example, has quite forgotten that he has himself plucked the choicest plums off the tree and has left us only the kernels. Take for example the Kistna Delta Irrigation alone. What have we there? a garden it is admitted. But then, from the 31st December till the 1st July, it places under contribution, and claims exclusive right over, all the water from a catchment of not less than fifty times its own area.

Having now, however, entered upon those tracts where these advantages no longer exist in such profusion, the least want of prudence may, by bringing about failures, injure the very cause which those, who most earnestly desire the extension of irrigation, have most at heart.

I think that I have, however, sufficiently shown that the administrators of this country, whether civil or professional, have ever valued the precious treasures of its rivers and storm waters.

In short, as far as I can ascertain, we have spent some 24 millions sterling, and for this we have some 14,000 square miles actually irrigated with more or less certitude as regards permanency of supply. In other words, we have had to pay £1,700 for each square mile, or something under £3 an acre.

Even if we had the water at command and it were otherwise practicable to protect all the agricultural land of India, it would demand on this basis, an outlay of at least some three hundred millions sterling. This would build some 40,000 miles of Railway, the fourth of which would give us an insurance not against famines, but certainly against extreme scarcity, distress and death from want.

I said just now *if practicable* because, in order to irrigate, we must have water, either annual from heaven or perennial from the snows of the Himalayas. The first we must regard, I fear, as precarious and uncertain, and as for

the last, great as is the extent of the region over which the snow waters have their influence, and though possibly more may yet be garnered of their generous and perpetually recurring flow, we have already in the Punjab and in the North Western Provinces, especially in the latter, appropriated so great a quantity of it, that we fear we are approaching the limits of the supply. This last year we are told that the Ganges Canal was strained to its utmost, and at the tail of its distributaries the cultivators got but a scant supply; thus rendering more doubtful than before, the wisdom of drawing off any further supply for the proposed Eastern Ganges Canal.

It is in years like the past one that the great advantages of irrigation are so apparent. We have evidence that the undeveloped Sone has already saved harvests, which must otherwise have perished, of more than a million sterling in value, whilst in the recent visitation in Madras the irrigated districts of the Godavery, Tanjore and Trichinopoly have practically paid their land revenue in full. The Kistna District, where the Irrigation project is not complete, has had remitted some 15 per cent.; but in the unirrigated districts, remissions ranging from 30 to 70 per cent. have prevailed, whilst they have drawn from the irrigated districts food to the value of some £150,000 exported by sea alone.

I will not now trouble the Council with any observations as to the Embankments or Inundation projects of parts of Bengal, of Burmah, or of Scinde. I only allude to them at all as significant of the fact that the rulers of this country, Native as well as British, have in more ways than one, in the present as in the past, thought out the difficult problems that this struggle against nature has from time to time presented to them.

So also I will not now say anything of the water-logging of land, of the raising of the spring level, of fever and other alleged evils, which even if I admit as existing at all, I admit only to say that a remedy for them by drainage exists, though its cost, a heavy item with low-lying stiff clay soils, must be added to that of the original works.

Let me, when mentioning drainage and the necessity for applying the severest examination to irrigation schemes, quote what one of the apostles of irrigation himself says when speaking of promoting indiscriminate and wide-spread irrigation—"We should," he says, "make sure that we may not turn the irrigated districts into vast swamps, decimating the inhabitants with fever, and reducing, instead of increasing, the fertility of the soil."

And here I may remark that the nature of the soil has been a factor which has been too often wholly ignored not only in schemes projected but since completed.

I trust it will not for one moment be thought, because I have said what I have, that I am in the most remote degree opposed to, or the enemy of, irrigation; far from it. I believe I am—by the course I have taken in applying to every scheme and estimate that has come before me since I have taken my seat at this Council the closest enquiry and the most minute scrutiny as to the soundness of the one and the accuracy of the other—a truer friend to irrigation

than the romantic but rash enthusiasts who can only see that in water there is a cure for every ill, or the orator who, from the vantage ground of his great eloquence, makes easy the task, and would guide us through a maze, of which it is reserved for statesmen yet unborn to find the clue. So in saying this I wish it to be understood that, we do not purpose to neglect in the future irrigation works which give prospects of being not only beneficial in ordinary years but in years of scarcity. Many projects are now under enquiry of which I hope this may be said, though of some of them the full cost of which would come to some £ 15,000,000 sterling, I find it already recorded that "none of them are so urgently needed, in view to the prevention of famine, as to render it essential to extend financially the scale of operations in irrigation works."

I have already alluded to the projected through water communication from Kurrachee to Calcutta, estimated to cost £ 5,000,000. If this line of navigation, passing as it does across the Peninsula through regions flooded by the great waters from the Himalayas, stretching to both seas, traversed by a net-work of rivers, flowing through a natural physical formation—fulfilling in short all the Engineering conditions favorable to inland navigation—offer little or no prospect that, until years have elapsed, its practical influence as a means of communication will be felt, and that as a reproductive work, there is but little hope for any return, how does the problem stand in other parts of Hindustan?

Here and there, as around this city, local works of this nature, isolated and apart, have been a success, and many other navigation canal projects are likely in this limited form to be carried out from time to time; but any connected system of internal navigation seems a remote possibility.

The irrigation and combined navigation systems of the Godavery and Kistna, projected to open up traffic from the Eastern sea-board to the country of their sources and even to the Western Ghâts, and ultimately to debouch at Carwar on the Western Coast, give little prospect or encouragement for us to anticipate from them the great benefits or facilities predicted by their projectors. It is not difficult to understand this when the main link in the chain, that of the Madras Irrigation Company, is closed for six months of the year, because the source of its water supply is closed to it for that time! Even if this source were a constant one, the extension of the navigation to the Coast is barred by physical difficulties of apparently an insurmountable character. I may be told all this can be remedied by storage tanks. I grant this might be possible, but without counting their cost, or other difficulty of even a more serious nature which, as a financial undertaking, will make the original scheme a still more hopeless affair than now when the returns on the work do not come within a lakh per annum of the maintenance and establishment charges irrespective of interest on capital, recent experience tends to show that these aids will in the hour of our direst need fail us.

Still I do not desire to condemn these schemes altogether, and I hope to see something practical done with them; possibly, a remodelling of the works may ensure better results.

The East Coast Canal, the most promising project of all, will demand, in order to secure its ultimate success, the solution of difficulties which will try the skill, genius and daring of another Cautley, owing to its having to cross the drainage of the whole Peninsula.

I fear then, that as far as our knowledge goes, we cannot look forward to being able at any early period in India's future to see established a connected system of inland navigation. No doubt in districts favoring their construction we shall see navigable canals introduced and extended, but, judging from the past, their use and general adoption must at best be necessarily a matter of slow growth, and in the centre of the Peninsula, where they would be of the utmost service in case of the recurrence of any such famine as we have now passed through, it may be doubted whether any connected line of real utility could be constructed with advantage.

Accepting the difficulties of the position as thus briefly pourtrayed, it is evident that the only practical course at the present moment is to recognise the mutual inter-dependence of the different parts of this vast country, and provide the means of distributing the surplus of one part to meet the deficiency of other parts.

Happily we have not suffered simultaneously throughout India. The surplus produce of one part has been available for transport to other parts, and the enormous export of wheat which has been concurrent with the late calamity has shown that India has been able as a whole to produce more than it could consume.

I do not lose sight of the fact that the people of Southern India are not a wheat-eating people, but from the experience of the late famine and of that of 1874, it is evident that the calamity must be indeed frightful when India herself and the neighbouring rice-producing countries accessible by sea cannot feed any afflicted part.

Even if on the whole empire the scourge of famine fell, and the food of its people had to be ocean-borne, how entirely dependent must the country still be on its internal communication!

The point then at which I have arrived is that land communications have been our main stay in the recent famine and must ever be.

I do not purpose to enter again upon the vexed question of waterways against railways. Even could I bring myself to consider that the former were possible in places where the latter exist, I could not shut my eyes to the facts which are patent to every one.

We have a system of railways and we can say that they are now paying investments in the matter of direct returns. These railways have taught the people the advantages of rapid locomotion, and the merchant and trader know well without such teaching the value of the Telegraph and of the Railway in the matter of quick returns. The railway system must continue to expand and will expand till every inhabitant of India is within 50 to 100 miles of a line.

But there is an argument for Railways which has especial force in a time of famine. A grass famine may be said to be as bad as a grain famine. For if the cattle on which the tilling of the ground is dependent cannot get

fodder or even grass, the people are indeed in a bad way. Their only resource is to take time by the forelock, as thousands have done in Upper and Central India in the course of the last few months when scarcity threatened, and, as in the case of a water famine, emigrate to distant tracts in order to save their cattle.

We have not neglected the extension of Railways in connection with the lessons taught us by the famines of the last few years. The Northern Bengal, the Tirhoot, and the Irrawaddy Valley lines all received an impetus from famine if they do not owe their early existence to it. The recent calamity has precipitated the construction of the Dhond-Manmar line into an almost accomplished fact, and has given a stimulus to at least two other lines in Southern India. Similarly the threatenings of scarcity, now happily almost passed away, which came upon us a few months ago, have given an impetus to the projected lines of Central India and Rajputana.

The Government has not hesitated, notwithstanding the severe strain upon its resources, to devote during the present year upwards of a million sterling to Railway lines over and above what it had arranged to spend this time last year.

And whatever views may be held on the subject of Railways, there is this justification for their extension that since October 1876 they have carried into the heart of the afflicted districts upwards of one and a quarter million tons of food grains, representing the supply of 7½ millions of people for 12 months at 1lb. per head per diem. But continuous as has been the inward current of food, the work of the Railways has at times been far heavier than would be gathered from the even distribution of the quantity named over the entire period. Thus in the three months ended December 1876 the Great Indian Peninsula Railway carried into the districts afflicted nearly 27,000 tons monthly, besides the larger proportion of the grain (44,000 tons in the three months), exported by sea to the Southern Mahratta ports of that Presidency.

In July and August of this year, when the intensity of the famine was at its maximum, that Railway carried almost the same quantity.

And during those two months the Madras Railways distributed almost 200,000 tons of food.

The effect of a prompt supply of such a quantity of food can only be estimated by a consideration of the direful effects of its non-supply, and I shall not be accused of exaggeration when I say that the Railways have saved Southern India.

The work done by a Railway is only partly appreciated, unless the distance over which the goods are transported is considered.

The rice exported from this port, Calcutta, was not carried over any great length of Railway, but the wheat of Upper India, which was carried in large quantities to Poona and even as far as Bellary, and the grain of the Central Provinces, was carried over hundreds of miles descending and ascending the Western Ghâts. The waste of power over the Ghâts and the risk attending it have been eliminated for all time by the construction of the Dhond-Manmar line.

But vital as is the assistance which the Railways have afforded, it must not be left out of sight that this aid was rendered with a concurrent unprecedented export trade, and, consequently, augmented general traffic.

Thus, in the first half of the current year, on all the Railways of India, there were about 4½ millions of tons of goods lifted against 3¼ millions in the corresponding period of 1876.

The pressure during the past year has been very great, and no doubt more or less loss and inconvenience has followed from this strain on the resources and means; but considering the distances traversed and the consequent impossibility of preventing detention of rolling stock, the working has, on the whole, been creditable to Railway management in India.

In considering the effect upon the English railway system of the construction of the Channel Tunnel, the diversion of rolling stock to continental railways has been discussed as a matter which would call for very special arrangement. Our English Railway Managers would not, I apprehend, view without misgivings the concentration of a moiety of their wagon stock at Berlin, Vienna or St. Petersburg; yet the diversion from the lines of Northern India of a couple of thousand wagons was a frequent occurrence during the recent pressure, and on one occasion the number of wagons thus absent was close upon 2,800.

Perhaps a few words from me here in further explanation of what has been already stated by my Hon'ble Colleague in reference to this Railway traffic and the preference given in September to food destined to the famine stricken district may not be amiss.

Very early in February of last year the power of the Great Indian Peninsula and Madras Railways to deal with the increase of traffic thrown upon them arrested our attention, but both Companies then thought that nothing special was needed to facilitate their operation.

But on the 5th March, I find myself writing, when ordering engines from our State lines in Northern India to be placed on the metals of the Madras Line, that "the Great Indian Peninsula is now in need of engines to work its own lines," so rapidly had grown the demands from various causes on the rolling-stock of the lines. This growth of traffic led to many suggestions all pointing to the direct interference and intervention of the State with the management of the lines and the direction of trade. On this I find I again wrote pointing out that more engine power was all that was needed, adding—

"From the north and west the lines in correspondence are working as
"one system, and their capacity is only limited by their united haulage power,
"which no new organization or fresh administration can possibly improve;
"whilst on the contrary the introduction of foreign interference will inevitably
"tend to irritation and friction; and misunderstanding, confusion and chaos
"will take the place of hearty co-operation and management which at pre-
"sent exist between the Managers, who are mutually aware of their individual
"difficulties, and that these arise from physical and material causes requiring
"only time for their removal."

"At this moment throughout the whole of our railway system, a number
"of other circumstances, and not the famine alone, has caused a sudden expan-
"sion of traffic. All railways are taxed to their utmost, and even on the far
"Indus Valley, where by the opening for goods traffic of a portion only of the
"line last January, the Flotilla on the river was released for more concentrated
"traffic, an unexpectedly large trade has sprung up, and the wheat of Sindh
"and of the Northern Punjab is seeking a market not only in the Deccan, but
"even in Europe itself. All this has to be watched and nurtured, and any
"rough or rude remedy, dictated by the momentary necessity for removing a
"block on a line traversing a district of Bombay or Madras, might irreparably
"throw back the growth of this trade and industry."

Again—

"I hope I have shewn in this note that no exceptional *administrative*
"measures are really needed to meet the present pressure, which I am con-
"fident can be satisfactorily overcome without them."

This I wrote in March of last year.

To do more than the Railways were already doing could only be effected by two measures—one the doubling of the lines, the other the procuring of additional engines.

The first was out of the question even if it could have been done in time to be of use in such a crisis; the second, owing to the exceptional gauge adopted in this country, was really almost as impossible as the first, since we have in Europe no reserve from other systems to fall back upon. The only alternatives left then were to contribute stock from the Northern lines, although on them too the pressure had fallen, and to give preference to food consigned to Southern India. Still reluctant to press, till forced by inexorable necessity, either of these courses on the Railway administration, it was not till the calamity in Southern India was assuming yet darker features, that with your approval, My Lord, I wrote confidentially to the several Railway Agents on the 27th July a letter which with the permission of the Council I will now read.

"DEAR SIR,

"The situation in Southern India appears to be graver now than ever. It
"is causing the Viceroy to consider with anxious solicitude the means to be
"adopted in order to mitigate the terrible distress which seems imminent from
"want of food in Mysore and Madras, and it points to our being forced to
"take exceptional measures for facililating the transport of grain into, and
"within, those countries.

"This, I fear, will have to be done at the sacrifice of certain trade
"interests, for in face of such a crisis, preference must be given to food-grain
"traffic.

"The haulage power and the stock on the Madras, and very possibly on
"the Great Indian Peninsula Line, will have to be increased by contributions
"from other lines; and Lord Lytton feels assured that he may reckon on the
"co-operation of other Companies, should such a course be forced upon us.

"I trust that it may not come to this. But I invite your aid and co-opera-
"tion to help us, and in the meantime I write this to ask you to consider what
"you can do to regulate and increase famine traffic, so as to give it a special
"service and preference over all other consignments on your lines, and to
"see what powerful goods engines (the gradients of both the Madras and
"Great Indian Peninsula Railways are bad) and covered or high-sided stock
"you can supply to the Madras Line, in order to distribute what is sent from
"the North or by water. The latest information shows that the Madras Rail-
"way must have 16 powerful goods engines and 400 wagons without loss of
"time.

"I write this therefore to prepare you for what is probable. Please con-
"sider this in the meantime as very secret and confidential, but in case the
"worst comes to the worst, I should like to know beforehand what are your
"views on the course suggested."

I need not dwell upon the correspondence and negotiations that followed the issue of this Circular.

The Agents of the Northern Railways did as much as was in their power to do, but fortunately it was not necessary to insist on preference on these lines, though the Government of Bombay were compelled at the end of July or beginning of August to urge on the representative of the Great Indian Peninsula to give food consigned to the Famine Districts preference over other goods.

Hardly had this been done when the correspondents from the Calcutta press in Madras telegraphed to their principals in this city—"People are asking, should not the Railways now carry food only?"

I give these facts to shew that this subject was fully considered, and that we did not lightly, nor without very great reluctance, urge on the Companies those exceptional steps—a necessity as imperative, if not more so, than the necessity of war.

The same distinguished Statesman who has advocated Irrigation as the treatment for famine has asserted that we have abandoned this remedy in favour of Railways, the agents that support our Military policy.

That in the alignment of these great highways the part they might play in the defence of the empire in time of war was not overlooked by the great Proconsul who first gave them to India, is incontrovertible; but if they have not yet helped to deliver us in time of war, they most certainly have in time of famine, nor have they failed to deliver us from some of the accidents of war. After the tempest of the great mutiny had calmed down, those who were then responsible for the future peace of India, decided that a British force of a certain strength should always be in the land. The extension and part completion of the Railway system has permitted of a reduction in recent years of this force, which at the very least falls not far short of, if it does not exceed, two millions sterling a year. Thus besides having saved India some thirty millions already, it has saved to England a corresponding drain on her people.

Nor am I, I believe, oversanguine, when I express the idea that, judging from what has been the development of traffic on the essentially Military lines of Northern India, their designers will be agreeably disappointed at finding that as Commercial lines they will not be such a drag on the finances as has been anticipated, whilst of this I am sure that they will be found to be the most powerful pacificator of our troubled frontiers.

I have purposely avoided making any observations as to what should guide us in our administration, either civil or professional, when famine with all its suite of evils is really in the land; and I can scarcely be anticipating any final conclusion if I express the opinion that in proposing works for the exigencies of famine they must be chiefly of a character suitable for unskilled labour, requiring little skilled supervision, and able to be executed by concentrated gangs whose wages can be paid with the least opportunities for peculation. Far be it from me to say that we should have no work for the artisan or the skilled labourer. This class suffers just as much as, if not more than, the mere cooly or the simple agriculturist. But as the bulk of the labour is ignorant, the bulk of the work must be simple, and as the skilled supervision is limited (unless you divert it, and then you create mischief, from those works which must go on in any case), there exists still stronger reason that the work should be such as earthwork, collecting and breaking stone, a kind of work easy to supervise and to pay for.

The various classes of works, suitable for relief objects taken in their order are tanks; road, river, and railway embankments; irrigation channels, canals and drainage works; and I agree with those who think the last three are the last to be undertaken, because if these are not thoroughly well designed, they are the cause of very serious and absolute mischief. I would dwell upon this point, as I cannot too strongly reiterate the intention and, I believe, the instructions of the Supreme Government, that in view to the efficacious working of this policy it is primarily essential to have in reserve and ready the full and clear engineering details of such works, elaborated in quieter times by the professional officer in concert with the local civil authorities.

To this precaution I attach the highest value, because I wish most distinctly and emphatically to disclaim, both on my own part and that of the Officers of the Public Works Department generally, that we regard famine as the opportunity for advancing our schemes or airing our pet projects. The initiative in these matters should be taken by the Civil Administrators, who are primarily responsible for the good government and material prosperity of the peoples committed to their charge.

In saying this, however, I do claim for the Public Works Officers of the State that to them should very early in a campaign against famine be entrusted the agencies to fight it, and that operations be not postponed till to scarcity and lack of means are added disease and emaciation among the people, to say nothing of the demoralization inseparable from the pauper's dole, or the existence prolonged only by the relief ration.

This is the more essential in this country, where it is not, from a total absence of food within the country itself, that men perish, but from the absence of means of acquiring it. They are deprived for the time of winning their

bread by their usual callings, because we have not in this country, from its social relations and the functions Government has taken on itself, men of enterprise or philanthropy as we have in our own Western Home, who see, in the failure of a harvest, or of an industry, openings for giving to the labour thus set free, employment in works of utility, of improvement, or even of luxury.

In advocating this as the true course to follow, I am conscious of the fact that it means a larger first outlay; but it also means a very considerable decrease in the unproductive expenditure which ordinary famine relief means.

In what I have said I have rather reviewed the past, and dealt with what has been done already in the way of those material improvements, which may to some extent have counteracted the full effect of failure of harvests, from time to time, in parts of this Great Empire.

I have dealt with the accomplished facts of the past, and avoided profuse promises as to the future; for I believe the narrative of the past will carry to men's minds the conviction, that those, to whom has been hitherto entrusted the guidance of affairs in this country have not failed or neglected their duty in these respects; and this will be a sufficient earnest that this path of duty is not now likely to be abandoned.

(Private copy) R. Strachey

REPORT

OF THE

INDIAN FAMINE COMMISSION.

PART I.

FAMINE RELIEF.

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

LONDON:
PRINTED BY GEORGE EDWARD EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
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COMMISSION of INQUIRY on INDIAN FAMINES, appointed by the GOVERNMENT of INDIA, 16th May 1878.

Gen. R. STRACHEY, R.E., C.S.I., F.R.S., *President.*

JAMES CAIRD, C.B., Member of the English Enclosure and Copyhold Commission.

Hon. H. S. CUNNINGHAM, Judge of the High Court, Calcutta.

G. A. BALLARD, Madras Civil Service.

G. H. M. BATTEN, Bengal Civil Service.

J. B. PEILE, C.S.I., Bombay Civil Service.

C. RANGACHARLU, C.I.E., Controller of His Highness the Maharaja's Household, Mysore.

MAHADEO WASADEO BARVÉ, Karbari of the Kolhapur State.

} *Members.*

C. A. ELLIOTT, C.S.I., Bengal Civil Service, *Secretary.*

N.B.—Mr. BALLARD was replaced by Mr. H. E. SULLIVAN, of the Madras Civil Service, in January 1879.

Mr. BATTEN terminated his connection with the Commission in April 1879.

Messrs. RANGACHARLU and BARVÉ ceased to be members of the Commission in October 1879, in consequence of their inability to accompany the other members to England.

TABLE OF CONTENTS.

PART I.

Preliminary.

Para.
1. Secretary of State's Despatch directing appointment of Commission.
2–10. Government of India; Instructions to the Commission.
11–14. Procedure of the Commission, and plan of Report.
15–30. Geographical sketch of India, with details of provinces.
31. Population.

Rain-fall.

32. All Indian famines caused by drought.
33. Supposed periodicity of fluctuations in rainfall.
34. Want of sufficient evidence on the subject.
35. Distribution of the rain over the year.
36. Extent of rain-fall in different parts of India.
37. The three chief zones of rain-fall.
38. Parts of the country secure from drought.
39. Parts of the country most subject to drought.
40. Importance of the extension of meteorological knowledge among officials,
41. And among all classes in India.

History of past Famines.

42. Famines of last century.
43. Famine of 1802–4.
44. Famine of 1807 in Madras.
45. Famines of 1812-13 and 1824-5 in Bombay and Madras.
46. Famine of 1833 in Madras.
47. Famine of 1837–8, North-Western Provinces.
48. Famine of 1854, Madras.
49. Famine of 1860–61 in North-Western Provinces and Rajputana.
50. Famine of 1866–67, Madras.
51. " " Orissa.
52. " " Behar.
53. Famine of 1868–69, Area affected.
54. " " Rajputana and Central India.
55. " " North-Western Provinces and Punjab.
56. " " Central Provinces and Bombay.
57. Famine of 1873–74, Behar.
58. " " North-Western Provinces and Oudh.
59. Scarcity of 1875–76.
60. Famine of 1876–78, its Extent.
61. " " Policy of famine relief.
62. " " Bombay.
63. " " Mysore.
64. " " Madras.
65. " " The English charity.
66. " " Hyderabad.
67. " " The North-Western Provinces.
68. " " The Punjab.

The Characteristics and Consequences of Famines.

Para.
69. Chronological list of famines.
70. Synoptical view of famine chronology.
71. Famine statistics.
72. The number of famines and the intervals between them.
73. Liability of different provinces to drought.
74. Irregularity of the recurrence of droughts.
75. Probable greatest area of famine and extent of relief.
76. Relation between drought and duration of famine.
77. What loss of the harvest produces famine.
78. Effects of scarcity on prices.
79. Estimate of the cost of relief given in past famines.
80. Effects of scarcity on the death-rate.
81. Mortality during the famine of 1876–8, and in the last 30 years.
82. Relation of famine mortality to normal mortality.
83. The possibility of saving life in time of famine.
84. Recuperative power of the country.

General Considerations affecting the Administration of State Relief.

85. Certainty of the recurrence of famine.
86. Historical sketch of the views of Government in respect of famine relief.
87. Earliest views as to relief and interference with trade.
88. Impossibility of giving relief efficiently.
89. First attempt to relieve distress by public works.
90. Relief measures adopted in 1837–8.
91. More elaborate measures in 1860–1.
92. Failure of the administration in Orissa in 1865–6.
93. Increased activity in 1868–9.
94. Energetic efforts made for relief in 1873–4.
95. Financial effects of these relief measures.
96. More serious financial effect of the famine of 1876–7.
97. Modification of relief principles adopted in Behar.
98. General enforcement of those principles.
99. Financial provision for meeting the cost of the famine.
100. Famine relief no cause of financial embarrassment.
101. No former procedure as to famine relief to be altogether regarded as a precedent;
102. But principles can be laid down based on past experience.
103. Want of diversity of occupations in India.
104. Effects of density of the population.
105. Obligation of the State to give relief in time of famine.

Y 492. Wt. P. 1398.

Para.
106. Obligation extends to the giving relief against other great calamities.
107. Necessity of administering famine relief so as not to check thrift and self-reliance,
108. Or impair the structure of society.
109. The classes that suffer from famine.
110. How to ascertain the proper objects of State aid.
111. Labour test.

Practical Recommendations.

112. The main principles of famine relief.

I.—*Improved Administration and Statistics.*

113. A famine code to be prepared.
114. Financial control.
115. Necessity of a separate department,
116. To be called the Agricultural Department.
117. Organisation for famine relief.
118. Appointment of a Famine Commissioner.
119. Special activity required.
120. Co-operation of all departments.
121. Need of improved agricultural, vital, and economic statistics.
122. Reform among the village accountants.
123. Supervisors of village accountants.
124. Special officers in each district to supervise statistics.
125. The Director of Agriculture.

II.—*Provision of Relief for the Able-bodied.*

126. The first effect of drought is to stop the demand for labour and raise prices.
127. Duty of the State to come forward as an employer of labour.
128. Nature and locality of the relief works.
129. Management of relief works.
130. Position of the collector in relation to the Public Works staff.
131. The wage and the task.
132. Piecework.
133. Reasons for the above conclusions.
134. Miscellaneous arrangements connected with relief works.
135. Indications to be drawn from progress of relief works.
136. Relief works at different stages of famine.

III.—*Gratuitous Relief.*

137. Gratuitous relief the duty of the State.
138. To be carried out by the officers of Government.
139. Two systems of gratuitous relief.
140. Preferability of relief in villages.
141. Safeguards with which village relief should be worked.
142. Utilization of village officers.
143. Details of the village relief system.
144. Parda-nashin women.
145. Relief-houses.
146. Efficient village relief will prevent wandering.

IV.—*Village Inspection.*

147. Establishment of a system of village inspection.

Para.
148. Object of the system.
149. Nature of the organization.

V.—*Food Supply.*

150. Intervention of Government.
151. Government prohibition of export.
152. Government importation of food.
153. Activity of private trade in India.
154. Extension of railways.
155. Ability of the country to feed itself.
156. Estimate of maximum famine demand and available supply.
157. Exports and possible imports.
158. Probabilities of the future.
159. Cases in which interference is admissible: (1.) Provision of food required for relief works and gratuitous distribution; (2.) Stimulus to trade where it is sluggish; (3.) Intervention by Government where trade fails to act, (4.) or refuses to sell.
160. Proposal for Government storage.
161. Its probable cost.
162. Economical difficulties and dangers.
163. Bad effects on the people, and on trade.
164. Sufficiency of private storage.

VI.—*Suspension of Revenue and Loans to the Landed Classes.*

165. Duties of Government to the landed classes.
166. Suspension of the land revenue.
167. Suspension of rent.
168. Remission of revenue.
169. Loans to the landed classes.

VII.—*Local Financial Responsibility.*

170. Localization of the cost of famine relief.
171. Advantages of this principle.
172. Difficulty of working this principle in respect to different provinces.
173. And to the character of the men concerned in working it.
174. Modified application of the principle.
175. Sufficiency of this system.
176. How far provincial revenues can meet expenditure,
177. Or be used to guarantee interest on protective works.
178. Employment of local funds to extend communications.
179. Application of this suggestion to Madras and Bombay.
180. Financial responsibility cannot be extended to areas smaller than a province;
181. But executive responsibility can and should be extended.

VIII.—*Miscellaneous.*

182–183. Amount of food required.
184. Employment of artizans.
185. Orphans.
186. Private charity.
187. Utilization of public subscriptions at the close of a famine.
188. Treatment of subjects of Native States.
189. Migration—(1st) to preserve the cattle;
190. " (2nd) to preserve human life;
191. " (3rd) aimless wandering.
192. How to meet cost of improved administration.
193. Conclusion.

DISSENT ON CERTAIN POINTS BY MR. CAIRD AND MR. SULLIVAN - Page 64

A MAP OF INDIA

for the

REPORT OF THE FAMINE COMMISSION

SHEWING

BRITISH PROVINCES

AND

NATIVE STATES.

1879.

Scale: 128 Miles to 1 Inch.

The figures denote heights above the Sea in Feet.

REFERENCES.

Native States

British Provinces

Bengal

N.W. Provinces & Oudh

Punjab

Central Provinces

Bombay

Madras

Laccadive Islands

CEYLON

BAY OF BENGAL

ARABIAN SEA

AFGHANISTAN

BALUCHISTAN

KASHMIR

RAJPUTANA

SINDH

CENTRAL INDIA

BERAR

HYDERABAD

MYSORE

TRAVANCOR

BUNDELKHAND

CENTRAL PROVINCES

BOMBAY

MADRAS

CALCUTTA

BHUTAN

ASSAM

Gulf of Kutch

Gulf of Cambay

Palk Strait

Mouths of the Ganges

Brahmaputra R.

Indus R.

Sutlej R.

Godavery R.

Kistna R.

Cauvery R.

Nerbudda R.

Tapty R.

Mahanuddy R.

Soane R.

Jumna R.

Ganges R.

Sheet Longfield, 10, St. Bedford Street Covent Garden

REPORT

OF THE

INDIAN FAMINE COMMISSION.

PART I.

PRELIMINARY.

Instructions of the Secretary of State and Government of India.—Arrangement of the Report.—Geographical Sketch of India.—Population and Climate.

1. THE Despatch of the Secretary of State for India which directed the appointment of our Commission thus stated the general object which he had in view. Summary of Secretary of State's Despatch, dated 10th Jan. 1878. Para. 5.

"It is evident that the protection of the people of India from the effects of the "uncertainty of the seasons will constitute in the future no inconsiderable portion "of the work of the Government. It is therefore a duty to collect with the "utmost care all information which may assist future administrators in the task of "limiting the range or mitigating the intensity of these calamities." It was pointed out that information was required principally on two classes of subjects. Of these one would include all that related to the measures to be adopted where severe scarcity or famine had actually arisen, and would involve an inquiry into the results of past experience as to the best system of famine-relief, with special reference to such topics as the size and class of relief-works, the nature of the tests to be employed, the amount of wage, the quantity of food necessary to sustain health and strength in famine-labourers, and the conditions under which Government might interfere with the ordinary course of trade in the supply of food in a tract suffering from famine. The other part of the Commission's inquiry was to be directed to the question "how far it is possible for Government, "by its action, to diminish the severity of famines, or to place the people in a "better condition for enduring them." Under this head, the nature and extent of the protection to be obtained from increased irrigation and from improved communications, the manner and degree in which they can properly be extended, and the question how far the saving in relief-expenditure might justify the construction of works not otherwise remunerative, were indicated as topics especially deserving of careful consideration. Attention was directed to opinions which had been expressed that the effect of the tenure prevalent in Madras was to discourage the construction of wells, and that in some parts of the Deccan the progress of irrigation had been impeded by the poverty of the ryots; and to the importance of ascertaining how far the facts supported such views. Para. 8. Para. 10. Para. 9. Para. 11. Paras. 12–14. Para. 17. Para. 19.

2. The Government of India, when appointing the Commission, somewhat amplified the instructions conveyed in the despatch of the Secretary of State, and indicated with more distinctness several topics which it was especially desirable that the Commission should investigate. Government of India.. Resolution (Public Works Famine), 16th May 1878.

3. First, attention was drawn to the possible existence of peculiarities in the administrative system of particular Provinces, which might tend to assist or retard the action of Government in its struggle with famine. With regard to the results of famine, it was pointed out that, though it might be impossible to ascertain exactly the extent of the mortality directly attributable to famine, the Commission might obtain fairly trustworthy information as to the classes and sexes which especially suffered, the effect of famine on the birth-rate of the country, and generally "how far local influences, peculiarities of administration or tenure, climate, "soil, water, density of population, systems of cultivation, &c., have tended to "mitigate or intensify the inevitable effects of famine." It was also remarked that the inquiry into the alleged unwillingness of the Madras ryot to expend money on means of irrigation, by reason of the ryotwari tenure, might be extended so as to embrace other analogous questions, and that the task of the Commissioners would not be completely discharged unless they considered such matters as the comparative power of the agricultural population in different Provinces to resist the effects of drought, their comparative wealth, and the relation, in each case, of their well-being to the varying forms of land-tenure. Effect of local influences. Para. 3. Para. 4. Para. 5.

Y 492. Wt. P. 1398.

Character of relief works. Para. 6.

4. As regards the system of relief, after observations as to the commonly accepted necessity for applying tests of some kind before giving relief, and reference to the importance of determining what those tests should be and how they should be applied, the attention of the Commission was specially directed to the opinion at which the Government arrived after the famine of 1874, "that large works were suitable at "an early stage of distress, and smaller works subsequently, as the necessity for "them arises;" and to the policy, laid down in the Viceroy's Minute of 12th August 1877, that "at the beginning of a famine, relief employment, at a subsistence-rate "of wage, should be provided on large fully supervised works which will be of "permanent use to the country;" and the Commission was desired to report whether the experience of recent famines had tended to confirm or modify the policy thus defined, and especially whether small works near the people's homes may, under any and what circumstances, be accepted as a part of the relief system. Further,

Paras. 7–8, 10.

in connexion with this branch of the subject, many points were noticed relating to the system of relief to be followed in the future, and particularly that of the proper

Para. 9.

extent and limitation of the duty of the Government in respect to the supply, importation, and distribution of food required for districts suffering from famine.

Irrigation. Para. 11.

5. With regard to the second branch of the inquiry, it was pointed out that the questions of the degree in which irrigation may be looked upon as an efficient protection, of what has been or can be done by Government in this direction, of the actual effect of existing irrigation, and of the influence of forests on the rainfall and the denudation of the soil, had led to much controversy; and the Government desired that the whole subject should be exhaustively treated, special notice being

Para. 12.

taken of any defects of administration that may have contributed to retard the extension of irrigation in the less successful works of this nature.

Agricultural improvement. Para. 13.

6. Another field of inquiry suggested was that of practical improvements in agriculture, and of the best means of giving an impetus to the efforts of the State to encourage this branch of national industry.

Communications. Para. 14.

7. With regard to communications, we were desired to submit any information that might assist the Government in regulating its action as to the extension of railways, and in judging of the practicability of improving or adding to the internal water communications; the reduction of cost of transport obtained by these means being of primary importance in the distribution of food supplies. Attention was also directed to the difficulties which, during the recent famines, arose from the inadequacy of the existing railway staff and rolling-stock when subject to the abnormal pressure to which famine times necessarily give rise, and some other details of railway management.

Provincial responsibility. Paras. 15, 16.

8. The Commission was further reminded of the recent declarations of the Government of India, that in future the responsibility for outlay occasioned by famine relief should primarily devolve on the Provincial Governments, and suggestions were invited for developing and facilitating the execution of the policy of the Government of India in this direction.

Recent distress in North-Western Provinces. Paras. 17–19.

9. Inquiry was also suggested as to any light which the history of the distress of 1877–78 in the North-Western Provinces might throw on the question of famine relief, more particularly with reference to the expediency of supplementing relief based on works by a proper system of village inspection, and of strengthening the subordinate civil district agency for this purpose at a very early stage of threatened famine or general scarcity.

Miscellaneous. Paras. 20, 21, 22.

10. Agricultural statistics,—gratuitous relief and the restrictions under which it can be safely given,—emigration,—suspension and remission of revenue,—deficiencies in the existing district organization with regard to the supervision of relief,—and the relations to be observed with Native States in famine management, are among other topics expressly brought to the Commission's notice.

Issue of inquiries by the Commission.

11. We considered that it would be impossible to deal in any satisfactory manner with the varied and difficult subjects thus proposed for our consideration without further information, more detailed and exact than could be collected from the Government records at our command. As to many subjects no information was available: as to many others such information as could be had was deficient in accuracy or completeness, and light could be thrown on them only by means of direct inquiry from the classes of persons conversant with each. We thought, accordingly, that the first step towards a proper fulfilment of the duty laid upon us was to ascertain, with all the fulness and exactness of which the case admitted, the facts with which we had to deal, and the opinions of qualified persons upon them. A carefully-considered series of inquiries was therefore drawn out, and each of the

Local Governments was requested to entrust the collection of the required information to the officials most competent to give valuable and trustworthy replies, and to invite qualified non-official persons also to co-operate in like manner. The information thus collected has furnished us with much very valuable knowledge as to the material condition of the people, and in many important directions serves as the basis of that portion of our Report which deals with the administration of famine relief.

Tour of the Commission.

12. The Commission decided to supplement and complete these inquiries by visiting the several Provinces in turn, and there holding personal communication with some of the best-informed local officials or other persons of weight. The oral evidence thus taken, both as to the management of famine-relief and as to general administration, supplies another principal part of the body of authority on which we have formed our opinions as to the condition of the inhabitants, the best means of counteracting the results of famine, and generally of promoting the well-being of the country.

Appointment of Irrigation Committee.

13. With a view to the more thorough investigation of the various matters connected with irrigation, especially in Orissa and Madras, to which the attention of the Commission had been particularly directed, we considered it desirable that a Committee of specially-selected officers should conduct an inquiry on the spot; and the Report submitted by them throws great light on these subjects.

Plan of the Report.

14. Before proceeding further in the discussion of the questions referred to us, it will be convenient to state the order and general manner in which we propose to deal with them. We shall first give a concise sketch of the geography, population, and climate of British India, indicating generally the degree in which each part of the country is exposed to famine. Next we shall treat of the measures to be adopted for famine relief, prefacing our conclusions and recommendations by a concise historical review of past famines and the measures adopted to meet them. We shall then deal with the inquiry (to use the words of Lord Salisbury's despatch) "how far it is possible "for Government by its action to diminish the severity of famines, or to place the "people in a better condition to endure them." This part of our Report will be prefaced by a general account of the country in relation to the social and economical condition of the people, the form of administration, the progress of material improvements, and other kindred subjects, on the consideration of which our reply to this part of the inquiry must be based. The Report will be accompanied by a detailed history of all the past famines regarding which sufficient records exist, a model famine code, and appendices containing a collection of discussions on certain topics which call for fuller consideration than would have been convenient in the Report, and selections from the evidence and documents of which we have made use.

Brief geographical account of India.

15. The total area of British India is about $1\frac{1}{2}$ million square miles, and the population 240 millions. Of this nearly 600,000 square miles, containing a population estimated at 50 millions, belong to the Native States not under British administration; the remainder, about 900,000 square miles, with 190 millions of people, is under direct British rule.

British territories.

16. The distribution of area and population among the principal provinces under British administration is shown below:—

		Area in Square Miles.		Population in Millions.	
British Provinces	Bengal, with Assam	200,000		65	
	Madras	140,000		$31\frac{1}{2}$	
	Bombay	77,000		$14\frac{1}{2}$	
	Sindh	47,000		2	
	North-West Provinces and Oudh	105,000		42	
	Punjab	105,000		$17\frac{1}{2}$	
	Central Provinces	85,000		$8\frac{1}{4}$	
	Burmah	90,000		$2\frac{3}{4}$	
	Ajmir and Coorg	4,000		$\frac{1}{3}$	
			853,000		$183\frac{3}{4}$
Native States administered by British officers.	Mysore	29,000		5	
	Berar	18,000		$2\frac{1}{4}$	
			47,000		$7\frac{1}{4}$
Total			900,000		191

Native States.

17. The area and population of the chief Native States not under British administration are as follows:—

	Area in Square Miles.	Population in Millions.
States of Rajputana - - - -	131,000	10
Do. of Central India and Bundelkhand	89,000	8¼
Hyderabad (Nizam) - - - -	80,000	9
Baroda - - - -	4,000	2
Native States in Bengal (chiefly Hill States)	46,000	2½
Do. Madras - - -	10,000	3½
Do. Bombay - - -	66,000	6¾
Do. the North-West Provinces	5,000	½
Do. Punjab - - -	115,000	5½
Central Provinces - -	29,000	1
Total - - - -	575,000	49

Tracts in which the British Government is not responsible for relieving famine.

18. In considering the obligation to provide relief and protection from famine for the population of India, it must be borne in mind that the responsibility does not rest on the British Government as regards the vast area under Native rulers. Cashmere, Rajputana, Central India, the Native States in Guzerat and the Southern Maratta country, and the territories of the Nizam, have all in various years suffered from the visitation of famine, in the relief of which the British Government has not been able to interpose otherwise than by advice, except where the administration has temporarily passed into its own hands. Moreover several of the earlier famines recorded in the historical part of our Report occurred in provinces which were not at the time under British rule. The districts in the Deccan in which drought has most frequently caused anxiety to the Government and called for measures of relief, came under British administration in 1818. The parts of the North-Western Provinces which famine has repeatedly attacked were ceded or conquered in 1801 and 1803. The cession of the greater part of Orissa dates also from 1803. Bellary and Cuddapah, with the Carnatic districts of the east coast of Madras, were ceded at the beginning of the century, and Karnul was annexed in 1824. The Central Provinces passed under British administration partly by cession in 1818, partly by lapse in 1854. The coast territory between the Mahanadi and the Kistna rivers, known as the Northern Circars, was ceded in 1760; and the government of Bengal was not formally undertaken by the British until 1772. The Punjab was not annexed till 1848, nor Oudh till 1856.

Temperature.

19. India may be approximately described as lying half to the north and half to the south of the tropic. The whole country, excepting a comparatively small fraction of mountain, is subject to very great summer heat. In the southern half, though the maximum heat is less than in the north, the winter portion of the year is much less cold, so that the climate has generally a tropical character throughout the year, modified to some extent by the elevation of the central region of high land which rises to about 2,000 feet above the sea, while the provinces of the north have a distinct season of winter cold, when the climate is that of the warmer temperate zone.

Geography: The northern plain and the central elevated plateau.

20. The Northern Provinces of British India occupy a great unbroken plain which extends from the Himalaya mountains to the Arabian Sea and the Bay of Bengal, and is traversed by the Rivers Indus and Ganges and their tributaries. Of the central and southern region the larger part consists of a hilly plateau or table-land, roughly triangular in shape, which projects into the Indian Ocean. Of the western flank of this plateau, the southern half forms the mountains known as the Western Ghats, which rise abruptly from the sea to an elevation that seldom exceeds 4,000 feet, though the Nilgiri mountains, near the southern end of the range, rise to 8,000 feet; and the northern half constitutes the Aravali hills, which separate Rajputana from the plain of the Indus. The eastern margin is less sharply defined, is less in elevation, and has a greater breadth of lowlying land between its foot and the sea; the southern part is known as the Eastern Ghats, and on the north it merges in the hills of Western Bengal. The northern border of the plateau is still less sharply defined, and gradually declines in the north-west, where it breaks up into small hills, and the line which separates it from the great northern plain can hardly be distinguished.

Altitude of the plateau.

21. The average altitude of this central plateau is about 1,500 feet above the sea, being greatest in the south, where, in the Province of Mysore, it rises to 3,000 feet,

and generally greater on the west than on the east, so that nearly all the larger rivers—the Kaveri, Kistnah, Godavari, and Mahanadi—run off to the eastward, the Tapti and Narbada alone flowing to the west.

The Punjab and Sindh.

22. The territories of the Punjab occupy the north-western angle of the great plain, and extend along the Himalaya west of the Jumna, up to the frontier of Afghanistan, also stretching southward a little beyond the point where the five rivers which give the name to the province unite in the Indus. The tract lying along the foot of the Himalaya is well watered, but the rain-fall everywhere decreases as the mountain range is more distant. In the southern districts between the Satlej and the Jumna there is barely sufficient rain for agricultural purposes, and here the failure of the monsoon has frequently involved the country in droughts. The districts west of the Satlej at a distance from the northern mountains are still more deficient in rain, and rely for their cultivation almost exclusively on artificial irrigation; they are from this cause to a great extent uncultivated, for though the soil is believed to be fertile if supplied with irrigation, and the many large rivers that traverse the country afford abundant water, it has till now been but partially utilised. Between the Punjab and the sea lies Sindh, a country almost wholly without rain, and almost entirely dependent on artificial irrigation from the Indus for its agriculture and its power to support its scanty population. But here, as in the Southern Punjab, the supply of river water is not liable to such serious failure as to produce general loss of the crops, and famine from drought is hardly known.

The North-Western Provinces and Oudh.

23. The North-Western Provinces and Oudh form the upper part of the great plain of the Ganges to the west of Bengal, and lie between the Himalaya mountains and the hilly border of the central plateau, the northern margin of which comprises parts of Bengal, the Central Provinces, and Rajputana. The average rain-fall increases as we pass from west to east, and also as the Himalaya is approached. In the tract lying along the foot of the mountains much rice is grown, and it is subject to severe losses of its crops, and has at various times suffered considerably. The region between the Ganges and the Jumna is now almost completely protected from drought by its irrigation canals. But the districts south of the Jumna below Agra are poor in soil, their rain-fall is precarious, and little has been done there for artificial irrigation; and this region has been severely afflicted whenever drought has visited the province.

Bengal and Assam.

24. Bengal, which occupies the deltas of the Ganges and Brahmaputra, is flanked on the east by the hilly regions which separate it from the valley of the Irrawaddy, and on the west by another hilly tract which forms the eastern border of the central plateau already described. This province, which is chiefly a great alluvial plain producing rice, is alike the most populous and productive of any in British India. In the eastern half of it drought is unknown; in the western half and the southern portion, called Orissa, there have occasionally been severe famines, due not so much to absolute failure of the rains as to their premature cessation at a time when the rice crop particularly needs water. Assam, lying along the valley of the Brahmaputra, is a tract which has never yet been visited by drought; it contains a vast area which will in the future afford an opening for a great extension of cultivation. Sylhet and Cachar, two of the more eastern districts of the delta, and somewhat similar in character to Assam, are for administrative purposes united with that province.

The Native States of Central India.

25. Between the valley of the Narbada and the southern border of the Punjab and the North-West Provinces lie the Native States of Rajputana and Central India, occupying a tract of high and hilly land, and extending at a lower level to the west of this hilly region as far as the confines of Sindh. This western region in its main characteristics is not greatly removed from desert. The eastern tract, which is a portion of the northern plateau, is not of any remarkable fertility, and except at the south-west angle, where the rain-fall is comparatively certain, is much exposed to the risk of drought which attends the failure of the south-west monsoon.

The Central Provinces and Berar.

26. The Central Provinces and Berar include the districts lying along the upper parts of the Tapti and Narbada rivers, along several of the northern affluents of the Godavari, and along the western feeders of the Mahanadi. Berar lies between the Central Provinces and the north-eastern portion of the Bombay Deccan, and forms the northern part of the Nizam's territory, though administered by British officers. These districts, though everywhere more or less intersected by hills, include in many parts very fertile plains or valleys. The western districts of the Central Provinces lying along the valleys of the Narbada and Tapti enjoy a plentiful rain-fall which has never been known to fail; and the only tracts which have ever suffered from drought are those to the north

of the Narbada, which share the characteristics of the hilly region described in the preceding paragraph, and the eastern districts, which are contiguous and in their nature somewhat akin to Orissa.

Bombay.

27. The Bombay Presidency, the north-west portion of which, Sindh, has been already described, includes the territory of the western coast from the limits of Madras to the frontier of Baluchistan, and the portion of the upland plateau of the Deccan which borders on the Western Ghats. The narrow strip of lowland country between the Western Ghats and the sea is well watered, and where there is sufficient depth of soil is richly productive. The central Bombay districts on the Deccan plateau have a poor and shallow soil, and the portion beyond the influence of the heavy rain-fall on the Ghats is exposed to severe drought, and has frequently suffered extreme distress. Khandesh, which may be described as an extension of the Deccan at a lower level along the Tapti valley, has a richer soil. Guzerat is the still richer lowland region about the mouths of the Narbada and the other rivers which fall into the Gulf of Cambay. The Native States of Kathiawar and Kutch have a poorer soil and a smaller rain-fall than the British districts, and are therefore more liable to suffer severely from drought.

Hyderabad.

28. Hyderabad, or the territory of the Nizam, is divided into two distinct regions. On the west the country is of the same character as the Deccan districts of Bombay, and this tract, especially at its southern edge, has frequently been visited by drought and famine. The eastern part is more hilly, and shares in the influences of the north-east monsoon. It contains numerous tanks and grows much rice, and no serious drought has been recorded here.

Madras and Mysore.

29. The Presidency of Madras includes (1) a part of the Deccan plateau adjacent to the southern districts of Bombay and the territory of the Nizam; (2) the region below this plateau, which occupies a broad belt on the east coast from Orissa southwards and a narrow one on the Malabar coast, and extends from the extremity of the Peninsula to the southern termination of the table-land at the Nilgiri mountains. The districts on the Deccan plateau are, along with the native state of Mysore, which occupies the southern end of the table-land, exposed to the same danger of famine as the upland districts of Bombay; and their tank system, largely developed as it is, fails to protect the crops in seasons of extreme drought. The eastern and southern districts of Madras lie under different climatic conditions from the rest of India, as they depend more for their rain on the north-east than on the south-west monsoon. They are protected by the artificial irrigation provided from the Godavari, Kistna, Kaveri, and other smaller rivers, and a multitude of tanks, and they have not been so frequently or severely ravaged by famine as the country on the inland plateau.

British Burmah.

30. British Burmah lies on the east coast of the Bay of Bengal, its richest districts being formed by the deltaic plains at the mouths of the Irawady and Salwen rivers. This province is by its peculiar conditions of climate believed to be quite removed from danger of drought and consequent famine, and is specially deserving of our notice as supplying a source from which a large provision of food grain may always be secured for India.

Population.

31. The 190 millions who compose the population of the British provinces, regarding which alone any trustworthy information can be given, may be classified roughly as follows according to their occupations:—

Agricultural		
Traders	56 per cent.	or 106 millions.
Labourers	18 per cent.	or 34 millions.
Professional and Service	16 per cent.	or 30 millions.
	10 per cent.	or 20 millions.
Total		190 millions.

The labourers, however, are mostly employed on the land, and many of the traders and artisans have small holdings, so that the numbers interested in agriculture are really much more numerous than the above figures would show. The population of the towns (including under this title towns with 5,000 inhabitants and upwards) is about 14 millions, of which 5½ millions are collected in the 44 largest cities. The rural population is therefore 176 millions, and is distributed among 490,000 villages, having on an average 386 inhabitants each. The density of the population is, on the average of all British India, 211 to the square mile. The largest population in a rural district is about 800 to the square mile, but the numbers vary greatly in

A MAP OF

INDIA

for the

REPORT OF THE FAMINE COMMISSION

SHEWING THE

Mean annual distribution

OF

THE RAIN FALL

IN ENGLISH INCHES.

1878

Scale. 123 Miles to 1 Inch.

The figures denote heights above the Sea in Feet.

REFERENCES.

Arid Zone less than 15 Inches

Dry Zone from 15 to 30

Intermediate Zone from 30 to 60

Moist Zone. Wet Districts & Islands

The figures in Italics are the means annual Rain fall in Inches

different provinces and districts, and the fo… will give a general idea of their distribution :—

Province.	Average.	Districts …le.	Least.
Punjab - - -	17	…	51
North-Western Provinces -	37	…	109
Bengal - - -	39	…	92
Central Provinces - -	91	…	45
Bombay - - -	131	…	90
Madras - -	226	…	118

Of the rate of increase of the population little is known at present. The enumeration has nowhere been such as to be altogether free from doubt, and in only two provinces, has more than one regular census been taken. In one of these, the North-Western Provinces, the rate of increase during the interval between the censuses appeared to be ·52 per cent. per annum, and in the other, the Central Provinces, ·33 per cent.

All Indian famines caused by drought.

32. The devastating famines to which the provinces of India have from time to time been liable, are in all cases to be traced directly to the occurrence of seasons of unusual drought, the failure of the customary rain-fall leading to the failure of the food crops on which the su… e of the population depends. It is desirable, therefore, before proceeding to … scussion of the matters which will constitute the substance of our Report, … icate what is known as to the rain-fall of the different parts of the country … ts variations from year to year, and what prospect there is of rendering such k… e practically available for the purpose of meeting, or avoiding the conseque… extreme drought to which so many parts of India are subject.

Supposed periodicity of fluctuations in the rain-fall.

33. The fluctuations of the total rain-fall f… ear to year in all parts of the country are very considerable, variations of a… as 50 per cent. on either side of the average being often registered. An… has recently been put forward by persons qualified by their scientific knowl… udge of such matters, that there is evidence of these fluctuations being in… easure synchronous with those periodical variations in the condition of the… ch are indicated by the varying extent or number of sun spots; and the r… cycle of about 11 years, with which prolonged observation has shown th… eriod of sun-spot variation on the average accords, has been thus considere… pond to the annual variations of the rain-fall, the maximum and minim… he one approximating in period to those of the other.

Want of sufficient evidence on the subject.

34. These views, however, cannot be said … any sufficient degree established, still less to be generally accepted by scientific … cities, or to be of present practical value. They have been contested on various … ds, such as that the evidence is directly opposed to them, that the data are i… ent to establish any such general conclusions, and that the maximum rain-fall in … cases coincides with the minimum sun-spot period and not with the maximum. … e whole it is not possible for us in the present state of knowledge to say more t… hat the subject is one deserving of careful investigation, and that it does not see… ntrary to reasonable expectation that some relation should be established between th… variations of the rain-fall from year to year and those of the conditions of the sun's surface, on the heat derived from which, unquestionably, all terrestrial meteorological phenomena closely depend. For various reasons India is a country in which the investigation of this matter may be carried out with especial facilities, and for this reason (though other grounds are not wanting) we would urge that, as the expense of such researches would be small, the measures which have recently been taken by the Government of India to carry them out should be continued, and even extended in the future. Further information on the scientific aspect of this question will be found in the Appendix* to our Report.

*App. No. I.

Distribution of the rain over the year.

35. Although the existence of any true periodical or cyclical variation of the rain-fall is thus left open to doubt, the general phenomena of its distribution during the progress of the year, and over the different parts of the country, are sufficiently well established and understood. A strongly marked yearly periodicity is everywhere

observed, the chief fall occu … few exceptions, in the summer months, between May and October, in the s … monly known as the south-west monsoon. On a part of the Madras coast … ast of the peninsula, heavy rain falls after the cessation of these summer … he months of November and December, at the beginning of what is terme … son of the north-east monsoon. In the more northern provinces, again, a … ll-marked season of winter rain occurs, commencing about Christmas and extendi … to February, but its effects hardly reach south of the tropic, and it has no sensibl … influence on the agriculture of Southern India. The main agricultural operations … f the country correspond with these principal seasons of rain, and their relative in … portance is in a great degree dependent on the local distribution of the rain-fall … t the various seasons of the year, as the period and amount of rain differ much in … he several provinces of India.

Extent of rain-fall in different parts of India.

36. The annexed map show … the general features of the distribution of annual rain-fall. The fall on the Western … Ghats and on the tract between them and the sea is very heavy, being from 70 to … 00 inches at the sea level, and as much as 250 inches on the mountain face exposed to the south-west rain-bearing winds. Along the east coast of the Bay of Bengal, and in the eastern districts of the Bengal Province, as also along the foot and outer slopes of the Himalaya throughout its whole extent, the rain-fall is also extremely heavy, reaching 100 inches or more. Subject to these exceptions it may be said generally that the portion of India east of the 80th meridian has a rain-fall of more than 40 inches, while the portion west of the same meridian has less than 40 inches. The region in which the fall is less than 30 inches includes almost the whole of the Punjab … a considerable part of the North-West Provinces, a large part of Rajputana and Kattiawar, as well as almost the whole of the Deccan and Mysore. In Sindh and in the … outhern portion of the Punjab and most western part of Rajputana the rain-fall is ext … mely sm… and irregular, being less than 15 inches.

The three chief zones of rain-fall.

37. Of the area in which the … all is below 15 inches it may be said that it is either actual desert, or that agric… e is impossible without artificial irrigation; and hence it has followed that whe… rain is least copious the population has made itself in a great degree indepen… of the local rain-fall. In the opposite direction it is also generally true that … the rain is most abundant, exceeding 40 or 50 inches, the occurrence of su… ught as will cause serious scarcity is rare. The region in which the average ra… s between 20 and 35 inches is that which suffers most from droughts. Here, the… he average of years the rain is sufficient to support an agricultural populati… reater deficiencies which reduce the quantity below what is essential, as well… aller which seriously damage the crops, are so frequent as to lead to repeti… of scarcity of greater or less severity.

Parts of the country secure from drought.

38. The parts of the coun… from the abundance and certainty of their rain-fall, or from other conditi… ate or their geographical features, are exempt from the risk of drought and … nt famine are: (1) the eastern districts of Bengal and Assam, which enjoy s… e and regular a rain-fall and such abundant river inundation as to ensure the … of the crops in the driest years; (2) Burmah, which, like Eastern Bengal, is n… ithout a rain-fall or inundations more than sufficient for its luxuriant rice cr… ; (3) the narrow strip of country lying between the Western Ghats and the sea, a… he tract immediately eastward of the summits of that range; (4) the upper valle… the Narbada; (5) Sindh, in which, owing to the very small rain-fall, agriculture al… wholly depends on artificial irrigation from the Indus, the supply of water from … h never so far fails as to cause a general loss of crop.

Parts of the country most subject to drought.

39. The tract which is most subjec… o drought includes (1) the western and southern parts of the North-Western Provinces and that portion of the Punjab territory which lies east of the Satlej; (2) the western and northern States of Rajputana and of the central plateau which border on the North-Western Provinces; (3) the districts of Bombay above the Western Ghats, and the districts of Madras above the Eastern Ghats, together with the southern and western region of Hyderabad and all Mysore, except the strip lying close along the Western Ghats; (4) the districts of Madras along the east coast and at the extremity of the peninsula. The more detailed account of the known droughts of the past hundred years, which we shall give, will show how frequently the region whose total rain-fall is from 20 to 35 inches has been subject to severe scarcity, and that within it have occurred the great famines of 1837–38 in the North-West Provinces, of 1868–69 in Rajputana, and of 1876–77 over nearly the whole of the peninsula of Southern India. These droughts were mainly due to the failure of the south-west monsoon. The drought of 1865–66, and some of the earlier scarcities in Madras, arose from failures of the rain of the north-east monsoon on the

A MAP OF INDIA.

for the

REPORT OF THE FAMINE COMMISSION

SHEWING THE FAMINES OF

1802-3 IN BOMBAY

AND 1803-4 IN THE NORTH WEST PROVINCES.

Severe *Intense*

1879.

Scale: 128 Miles to 1 Inch.

The figures denote heights above the Sea in Feet.

Longitude East of Greenwich

Bolamy Saunders Geogr.

Drawn by Longmans, 4th 22 Bedford Street Garden

24

east coast, a failure which in 1865–66 extended into Western Bengal. The famine of 1873–74 in Northern Bengal was exceptional, and is an instance of a great scarcity suddenly arising in a region of abundant average rain-fall. This drought arose from a premature cessation of the rain, apparently due to an abnormal extension to the eastward of the margin of the comparatively dry area of North-Western India.

Importance of the extension of meteorological knowledge among officials,

40. As at present no power exists of foreseeing the atmospheric changes effective in producing the rain-fall, or of determining beforehand its probable amount in any season, such as would admit of timely precautions being taken against impending drought, the necessity becomes the greater for watching with close attention the daily progress of each season as it passes, for ascertaining with accuracy and promptitude the actual quantity of rain in all parts of the country, and for forming the best and earliest judgment possible from the facts as they occur, whether the supply will be sufficient or otherwise. For the present at least, so far as the rain-fall directly affects the subject under consideration, these are the only precautions that appear possible. Within the last few years a very satisfactory system of meteorological observations has been established all over British India, and in our opinion it is of primary importance that it shall be maintained in complete efficiency, and shall so far be strengthened and improved as to ensure the early and punctual supply of information to the executive governments, and to the officials in all departments concerned with the agriculture of the country or the preparations required to meet famines, as to the actual progress of the periodical seasons of rain in all parts of the provinces for which those governments or officers are respectively responsible. So far as it may become possible, with the advance of knowledge, to form a forecast of the future, such aids should be made use of, though with due caution.

and among all classes in India.

41. We are also satisfied of the importance of the diffusion of more sound and accurate knowledge of the causes and mode of occurrence of the periodical rains, on which the well-being of India is so largely dependent, not only among the officers of the Government, but also among all classes of the community. Any measures which the Government may find possible with a view to the publication and diffusion of such knowledge cannot fail to be highly beneficial.

Famine Relief.

History of past famines, their general characteristics and consequences.—Review of former measures of relief.—General considerations affecting the administration of State relief.—Practical recommendations.—Systematised action and adoption of a code.—Improved statistics.—Creation of an Agricultural Department.—Employment of the able-bodied.—Gratuitous relief.—Village inspection.—Government action in respect to food-supply.—Suspension of land revenue and loans to the landed classes.—Local responsibility for the cost of famine relief.—Miscellaneous suggestions.

Famines of the last century.

42. Regarding the famines that occurred before the British occupation of India not enough is known to enable us even to make out a correct list of the years or the causes of these visitations. Some of those of which we find mention were due to war rather than to drought; in all probability some have been altogether forgotten, since the object of Indian historians was generally rather to record the fortunes of a dynasty than the condition of a people. Even regarding those famines which took place at the end of the last century in territories administered by British officers, the information is too scanty for us now to define the area or the degree of the calamity. The famine of 1770 in Lower Bengal and Behar was extremely severe, and it was officially estimated at the time that a third of the population (or say 10 millions) had died. In 1784 another famine which visited Upper India was probably even more acute, and certainly covered a larger area than that of 1770; but the country was not at that time under British jurisdiction, and very little is known of the facts of the case. In Madras 1781 and 1782 were years of severe scarcity, caused mainly by the devastation of the war with Hyder Ali, but partly also by drought. In 1791 a severe drought afflicted the northern districts of the same Presidency as well as Hyderabad and the southern districts of Bombay, and in 1792 the famine there was intense. It was on this occasion that relief-works were first opened by the Madras Government for the support of the famine-stricken.

Famine of 1802–4.

43. In 1802 there was a failure of rain, severe in the Bombay Presidency and in Hyderabad, partial in the northern districts of Madras; this was followed next year by famine in the former case and by scarcity in the latter. In the same year (1803) a similar failure, but more decided, occurred in the North-Western Provinces, which led to a very serious and widely extended famine in 1804. In Bombay the effects of the drought were greatly enhanced by the ravages of the army of Jaswant Rao Holkar

Y 492.

and the Pindaris in his train. Grain was imported by the Government into Bombay and sold at a fixed price to the public, exportation being prohibited; and public works and hospitals were started for the relief of those who flocked into the towns of Bombay and Surat. In the North-Western Provinces the tract severely afflicted was the country ceded by the Nawab of Oudh in 1801, and known as the Ceded Province, with a population of about 10 millions of people. It comprised the central part of the present North-Western Provinces. The measures taken by the Government of the time to relieve the distress consisted in making large remissions of the revenue, in giving loans and advances to the landowners, and in offering a bounty on all grain imported into Benares, Allahabad, Cawnpore, or Fatehgarh.

Famine of 1807 in Madras.

44. In 1806 there was a widespread failure of rain in the Madras Presidency, especially in the tract known as the Carnatic (which includes the more southern districts lying along the east coast of that Presidency), and in the parts around Madras, though the northern or Deccan districts were less heavily visited; and during the winter of 1806 and the early part of 1807 the distress caused by this drought grew to be very severe. This was the first occasion on which we have distinct evidence of a fact which, as shown by later and more accurate observation, has characterised all subsequent famines in India. Large crowds of emaciated people flocked into the town of Madras, attracted thither by the existence of a charitable association, and by the hope of obtaining gratuitous help without limit. There was a good deal of discussion as to the proper measures to be taken, some authorities advocating the opening of works to give employment to the people close to their homes, others advocating the importation of grain by Government into the interior; but the mortality among the cattle prevented this being done. The Government at the outset declared against any interference with private trade, but in the end they conceived it necessary to purchase, guaranteeing a minimum price to importers; when the famine came to an end through the plentiful rain-fall of 1807, large stocks were left on hand, and had to be disposed of at a loss.

Famines of 1812–13 and 1824–5 in Bombay and Madras.

45. The principle of non-interference with trade declared by Madras was followed by the Government of Bombay in 1812–13 when another drought occurred, entailing famine in Guzerat and the adjoining countries. On this occasion the Governor refused to sanction the prohibition of export, or to import grain on Government account, declaring his belief that unassisted trade, if left to itself, could do more to relieve distress and to effect an equable distribution of supply than Government could do with all its resources. The famine extended to Rajputana, where it is reported to have been very severe, and to the trans-Jumna districts of the North-Western Provinces. In a subsequent scarcity of 1824–5, which, though not very acute, extended over nearly the whole of Bombay and the north part of the Madras Presidency, the same question arose again. Mr. Mountstuart Elphinstone, who was then Governor of Bombay, at first inclined to the policy of offering a bounty on imported grain, or guaranteeing a fixed minimum price to importers; but after some discussion he became convinced that it was wiser to adhere to the general principle of non-interference. In Madras the Government similarly proclaimed their intention of not interfering directly with trade, but offered a bounty on all grain imported from a distance to the distressed locality. On this occasion the drought visited Madras in 1823, Bombay in 1824, and the North-Western Provinces in 1825.

Famine of 1833 in Madras.

46. The Madras Presidency was the seat of the next great famine—that of 1833, though on this occasion the northern districts suffered most, and especially the Gantur district, in which the mortality was so terrible that this was known as the Gantur famine. The total population severely affected was about five millions, and the area about 38,000 square miles. On this occasion the Government appears to have been taken by surprise, and the severity of the calamity was not recognised till too late. Very little was done to relieve distress except by the distribution of gratuitous food in the towns to which the sufferers from starvation flocked. It was estimated that 200,000 persons died in Gantur out of a population of 500,000, and it was many years before the falling-off of the land revenue due to this loss of life was effaced. The adjacent parts of Bombay (that is, the Southern Mahratta country), of Mysore and Hyderabad, also shared in the calamity, though to a less degree. The drought of 1832 in the South was followed by drought in Upper India in 1833, which produced scarcity, but not famine, in the North-Western Provinces.

Famine of 1837–8, North-

47. The year 1837 witnessed the first very severe famine of the century in Upper India. It affected the whole country between Allahabad and Delhi, being most severe between Cawnpore and Agra, and it was also felt in the adjoining Native

A MAP OF INDIA

for the

REPORT OF THE FAMINE COMMISSION

SHEWING THE

FAMINES OF 1833 AND 1837-38.

1833

Slight — Severe — Intense

1837-38

Slight — Severe — Intense

1879.

Scale: 128 Miles to 1 Inch.

The figures denote heights above the Sea in Feet

AFGHANISTAN

BALUCHISTAN

RAJPUTANA

SINDH

PUNJAB

KASHMIR

HIMALAYA MOUNTAINS

NEPAL

SIKKIM

BHUTAN

ASSAM

GARO

KHASIA HILLS

BENGAL

BAY OF BENGAL

ARABIAN SEA

Gulf of Cutch

KATHIAWAR

BOMBAY

CENTRAL INDIA AGENCY

BUNDELKHAND

CENTRAL PROVINCES

Satpura Hills

Vindhya Hills

Chutia Nagpur

HYDERABAD

MYSORE

MADRAS

TRAVANCORE

Laccadive Islands

CEYLON

Palk Strait

Gulf of Manar

Mouths of the Ganges

Indus R.

Ganges R.

Brahmaputra R.

Satlej R.

Jumna R.

Godavari R.

Mahanadi R.

Narbada R.

Kistna R.

Cauvery R.

Sone R.

Tapti R.

Irrawaddy R.

Sittang R.

Salween R.

Tista R.

Mountains of the Moon

Sea of Oman

Persian Gulf

Malabar Coast

Coromandel Coast

Orissa

Cuttack

Calcutta

Madras

Bombay

Hyderabad

Lucknow

Benares

Allahabad

Agra

Delhi

Lahore

Multan

Bhawalpur

Jeypur

Jodhpur

Jaisalmir

Karachi

Hyderabad

Quetta

Kandahar

Ghazni

Kabul

Peshawar

Leh

Thok Jalung 16900

Gyanak 19600

Kailas

Shigatzi

Lassa 11830

Everest 29002

Kinchinjunga 28156

Dhawalagiri 26826

Nanga Parbat 26629

Dapsang 28265

Godwin Austen 28265

Aconcagua 23080

Chimborazo 21424

Mont Blanc 15784

Ben Nevis 4406

Snowdon 3571

Scafell 3210

Helvellyn 3118

Skiddaw 3054

Cross Fell 2901

Ben Lomond 3192

Ben Macdui 4296

Cairngorm 4084

Ben Wyvis 3720

Ben More 3843

Schehallion 3547

Goatfell 2866

Slieve Donard 2796

Carrantuohill 3414

Galtymore 3018

Mangerton 2756

Snowdon 3571

Plynlimmon 2463

Cader Idris 2914

Arenig Fawr 2802

Moel Siabod 2861

Carnedd Llewelyn 3469

Carnedd Dafydd 3426

Glyder Fawr 3279

Glyder Fach 3262

Tryfan 3010

Pen-y-Gadair 2624

Pen-y-Fan 2907

Cadair Arthur 2802

Black Mountain 2660

Brecon Beacons 2862

Sugar Loaf 1955

Table Mountain 3582

Mount Pleasant 2850

Mount Nelson 2200

Mount Misery 2200

Mount Wellington 3200

Mount Arthur 4200

Mount Cook 12349

Mount Egmont 8260

Mount Ruapehu 9175

Mount Tongariro 6458

Mount Ngauruhoe 7515

Mount Tarawera 3770

Mount Edgecumbe 2780

Mount Taranaki 8260

Mount Ruapehu 9175

Mount Ngauruhoe 7515

Mount Tongariro 6458

A MAP OF INDIA

for the

REPORT OF THE FAMINE COMMISSION

SHEWING THE

FAMINES OF 1860-61 AND 1854.

1860-61

Slight — Severe — Intense

1854

Severe — Intense

1879.

Scale: 128 Miles to 1 Inch.

The figures denote heights above the Sea in Feet.

Longitude East of Greenwich

Printed by Dangerfield, 34th N. Bedford St Covent Garden.

States of Rajputana as far west as Jaipur. The area of the famine was about 113,000 square miles, 56,000 of which were in British territory, and the population affected about 28,000,000. The cause of the famine was the almost total failure of the rains of 1836, following after some irregular, though not exceptionally bad, years. The agricultural statistics at this period were very deficient; but the Government early took alarm, and set itself to consider seriously the principles on which relief measures should be administered. The views then adopted were that the main duty of Government was to offer employment to those who could work, but that the relief of the helpless and infirm members of the population was the business of the charitable public. Wherever there was a large demand for employment public works were to be opened at very low rates of pay, but without limit of expenditure; at the same time relief committees were formed, and subscriptions called for to feed those who were unable to work. Where the pressure on these charitable funds was exceptionally great, some assistance was given from the treasury, but not as a matter of right. Remissions and suspensions of revenue were freely granted, the remissions amounting to about Rs. 95,00,000, or nearly half the land revenue demand in the affected tract. But loans and advances were discouraged except for the purposes of permanent improvements or for seed grain, as it was held that they led the people to rely too little on themselves. There was immigration from the Native States, especially to Agra; but it was more than counterpoised by the extensive emigration to Central India. Violent agrarian disturbances and robberies of grain carts and grain stores were so rife that the troops had in several cases to be called out. The statistics of the various measures of relief are very incomplete; but it appears probable that about 100,000 people were employed on relief works for several months at a total cost of about Rs. 20,00,000, and that on charitable relief about Rs. 3,50,000 were spent. The rains of 1838, though so late in coming as to cause renewed anxiety, were abundant when they came, and distress ended with the harvesting of the autumn crop. Prices during this scarcity rose to about three times their ordinary rate, but they seldom stood higher than 20 lbs. of ordinary grain per rupee. They did not, as a rule, reach a height which we should now consider as indicating extreme tension, which may be put at about 16 lbs. or less per rupee. Nothing is known with exactness as to the mortality due to the famine. It was calculated by Colonel Baird Smith, long after, at about 800,000; but this is probably much under the mark. The extremity of suffering endured by the population was such as to leave behind a widespread and lasting recollection of the horrors of the famine; and it was some years before its effects ceased to be legible in the lessened figures of the land revenue. Western Provinces.

48. In 1854 a famine, severe, though limited in area, visited the northern part of the Madras Presidency; but its intensity was confined to the Bellary district, and the south part of Hyderabad, an area of about 30,000 square miles, with a population of about three millions. The rain-fall of 1852 had been light, and that of 1853 was extremely deficient. The harvest was reckoned at only half an average crop. Relief was administered only by means of public works; but abundant employment was thus given—so much so that crowds of applicants flocked in from the Nizam's dominions, and for about nine months more than 50,000 people obtained relief on these works. The supervision was at first exercised by civil officers, and was very lax; but by degrees it was brought under the charge of an engineer, with special officers under him, and the discipline and out-turn of work improved, while the wage, which had been fixed too high, was cut down to a minimum rate. The total expenditure on the works was about Rs. 12,28,000. When the famine was closed by a plentiful rain-fall in the autumn of 1854 followed by a fair harvest, a valuation was made of the work done, and it was found to be worth about 38 per cent. of the money expended on it. The loss of land revenue and other income amounted to 42 lakhs of rupees, including the decrease in the receipts during the next two years, which was due chiefly to the loss of cattle and the consequent inability of the people to plough the land. It was estimated that in the worst part of Bellary four-fifths of the village cattle had died. Nothing definite is known as to the mortality among the inhabitants; but a census taken in 1856–7, in the imperfect form in use at the time, seemed to show that the usual rate of the growth of the population had received a serious check. Famine of 1854, Madras.

49. From the close of the famine of 1837–38, the North-Western Provinces and the Punjab entered on a period of good seasons and of agricultural prosperity until the Mutiny of 1857. In that time of disturbance much property was destroyed and much land remained untilled. The seasons of 1858 and 1859 were irregular and unfavourable; and in 1860 the monsoon was so extremely deficient that the autumn harvest was to a great extent lost, and the ground was too hard and dry to sow the Famine of 1860–61 in North-West Provinces and Rajputana.

winter crops. The winter rains also were entirely wanting. Although the absolute failure of the crops was believed to have been as complete as in 1837, the area of this drought was very limited. It was intense only in the country between Agra and Delhi, inhabited by about 5½ millions of people; and its entire range extended in British territory to 19 millions of people and an area of 48,000 square miles. Some of the adjoining Native States also suffered, especially Alwar; but on the whole the area of distress was surrounded to a remarkable extent by countries enjoying much prosperity; for the crops in Bengal, Benares, Oudh, and the west part of the Punjab were fully up to, and in some cases above, the average. Whether from this cause, or, as it was held at the time, from the increased material prosperity of the country, the sufferings from the famine were far less than those of 1837-38. One result of the smallness of the famine area was an active emigration from the drought-stricken tract, in which it was estimated that half a million people took part. The Government early began to take steps to meet the expected distress. The principles of relief were the same as had been adopted in 1837, viz., that the duty of the State is to provide employment for those who can work, and of the public to support by charitable assistance those who cannot. But both these principles were carried out in a more provident and thorough manner than before. Ten large relief-works, selected as being of permanent utility, were opened, under the supervision of professional officers; the labourers were not paid by the piece, but at a low rate of daily wages, a fixed task of work being demanded in return. Besides these, minor works were opened to provide for the employment of people unable to travel far from their homes, the wages in such cases being given not in cash but in cooked food. Altogether about 12½ lakhs of rupees were expended, and about 35,000 persons employed daily for a period of ten months on these works. Gratuitous relief was mainly carried on at the expense of the charitable public, aided by contributions from other parts of India and from England; it was generally distributed in the form of cooked food to persons who submitted to the condition of residence in an enclosed poor-house. This system was first introduced in Moradabad by Sir John Strachey, who was at that time Collector; it was generally adopted throughout the North-Western Provinces, and was believed by those who administered the relief measures to be not unpopular among the people relieved, the opinions of the native members of relief committees being, according to Colonel Baird Smith, unanimous in favour of it. In some cases applicants were admitted to relief on personal inquiries made by competent committees, but relief at their homes was as a rule only given to those women of respectable position by whom appearance in public would be felt as an intolerable degradation. About 80,000 persons were relieved daily for nine months, by these means, at the cost of about 14 lakhs of rupees. The distress was ended in November 1861 by the autumn harvest, which was a good one. This was the first occasion on which a famine formed the subject of a special inquiry; for during its progress Colonel Baird Smith was deputed to examine into and report on the causes, area, and intensity of the famine, the economic facts it disclosed, and the best measures to be adopted for its relief.

Famine of 1866–67, Madras.

50. The drought of 1865 was felt along the whole eastern coast of India from Madras upwards; and it extended to some distance inland, visiting Mysore, the districts of Madras above the Eastern Ghats, Hyderabad, the hill country in the south-west of Bengal, and Behar; but it was most intense along the coast in the districts of Ganjam and Orissa. The area severely affected in Madras was about 43,000 square miles, with a population of about six millions. The Madras Government and its officers had now become familiar with the warnings of famine and the steps necessary to meet it, and were prepared to start the usual machinery of relief-works, relief-houses, and public subscriptions. But the distress was not at all pronounced, and in all probability would have passed off with little notice had not the rain-fall of the following year also, 1866, been so late as to cause general alarm and excitement, and so insufficient as to produce a very inferior crop. It was not till June or July that the need of relief became pressing, and works were then opened in considerable numbers, under civil officers. Prices rose to an extraordinary height, 10 and 12 lbs. per rupee for rice being not uncommon, while coarse millets sold at 12 to 15 lbs. per rupee; and the sufferings of the people in Ganjam and Bellary were severe. Still, in spite of unusually high wages and the absence of task-work, the numbers employed on relief-works never were large and averaged only 12,000 daily for 15 months. Gratuitous relief was given to 31,000 persons daily for 16 months, mainly in the form of cooked food and in relief-houses, managed to a large extent on the system introduced by Sir John Strachey and made

known by Colonel Baird Smith's report. In Ganjam alone was there evinced any extreme dislike to this form of relief, and there only by the ryots and more respectable classes, to whom uncooked food was accordingly given. The prolongation of distress, due to the second failure of rain, caused the relief operations to last on till the next monsoon set in, in June 1867; the entire expenditure amounted to about 12 lakhs of rupees, of which two were contributed by the public and the rest fell on the Government. Not much is known as to the mortality; but the prolonged duration of high prices must have told severely on the population; and there are indications that the number of deaths in the last six months of 1866 increased by about 450,000, or was double the usual average.

Orissa.

51. This drought fell with far greater intensity on Orissa in Bengal, where, as no such calamity had occurred in the whole province for nearly a century, it had to be dealt with by a body of officials necessarily ignorant of the signs of its approach, unprepared to expect it, and inexperienced in the administration of relief measures; nor were the native inhabitants of Orissa in any respect more aware of what was coming on them than the British officers. The area most affected was about 12,000 square miles, with a population of about four millions. The rain-fall of 1865 was scanty and ceased prematurely, so that the out-turn of the great crop of winter rice, on which the country mainly depends, was reckoned at less than a third of the average crop. Food stocks were low, both because export had been unusually brisk of late, and because the people had not been taught by precarious seasons to protect themselves by retaining sufficient stores at home. When the harvest failed, so totally new to them was the situation that no one realised its meaning and its probable results. The Local Government and officials not taking alarm and misconceiving the gravity of the occasion abstained from making special inquiries; prices long remained so moderate that they offered no temptation to importers, and forced no reduction in consumption on the inhabitants, till suddenly the province was found to be almost bare of food. It was only in May 1866 that it was discovered that the markets were so empty that the jail prisoners and the Government establishments could not be supplied. But the southern monsoon had now begun and importation by sea or land became nearly impossible. Orissa was at that time almost isolated from the rest of India; the only road, leading to Calcutta across a country intersected by large rivers and liable to inundation, was unmetalled and unbridged, and there was very little communication by sea, for what trade there was had hitherto been a purely export trade, carried on in the months of fine weather. No relief could be obtained from the south, where lay the district of Ganjam, itself severely distressed. By great exertions and at enormous cost the Government threw in about 10,000 tons of food grain by the end of November, and this was given away gratuitously, or sold at low rates, or distributed in wages to the starving population, saving no doubt many thousands of lives. But meanwhile the mortality among those whom this relief did not reach, or reached too late, had been very great; and it was estimated that about a third of the population, or nearly a million persons, had died. Nor did the troubles of Orissa cease with 1866. The rain-fall of the year was so heavy as to cause great floods in the River Mahanadi; and while the harvests in all the higher lands were excellent, in all the low lands the inundations drowned the crop. In the ensuing year, 1867, after a brief respite during which hopes were entertained, which were not to be realised, that the distress had come to a close, the work of relief had to be taken up again. Then, as an apparent result of the reaction following the want of foresight and activity in affording help in the preceding year, the relief operations were marked by a profusion and absence of check hitherto unexampled. Altogether about 40,000 tons of rice were imported, of which even the lavish use made of it could not dispose of half; and, while it cost four times the usual price, the residue had to be sold for almost nothing when the monsoon of 1867, followed by an unusually fine harvest, had altogether put an end to the famine in 1868. The total amount of money expended in Orissa was about Rs. 1,45,00,000, so that in this famine the relief seems to have been at once less efficient and more costly than that given on any previous occasion.

Behar.

52. The drought of 1865 was not confined to Orissa, but extended also to Behar and Northern Bengal, where, for a time, in 1866, there was great suffering; relief-works were opened, and the gratuitous distribution of food, mostly in raw grain, was undertaken. But the system of relief was defective and devoid of uniform organization; the wages given on the work, and the amount of food at relief-centres, differed in every district, and the food was seldom given in sufficient quantities for sustenance. About 12,000 persons were employed on relief-works, and about 25,000 received gratuitous

food daily, for the four bad months, June to September. By that time the early autumn crop, which was unusually abundant, was harvested, and famine was at an end. The total expenditure on both the forms of relief was Rs. 2,30,000. There are no records of the mortality among the general population; but the police reported that about 135,000 persons died of starvation and of diseases arising from it.

Famine of 1868-69.

53. Only a year after the abundant monsoon of 1867 put an end to the distress which had prevailed so long in the eastern half of India, the rains failed again over the greater part of Western and North-Western India, and the drought was followed by one of the most widespread and grievous famines on record. The seat of its greatest intensity was in the Native States of Marwar and Bikanir and in Ajmir. It was extremely severe in most of the other Native States of Rajputana and Central India as far east as Rewah, in the Jhansi division of the North-Western Provinces, in a small tract on the northern edge of the Central Provinces, and in the Hissar division of the Punjab; and it visited, though with less virulence, large tracts in the Central Provinces, the whole western half of the North-Western Provinces, the eastern region of the Punjab north of Hissar as far as the Sutlej, and the Guzerat province and north Deccan districts of Bombay. Altogether the area affected by this famine was about 300,000 square miles, and the population of that area was about 45 millions.

Rajputana and Central India.

54. In Rajputana the rains failed so completely that the autumn crop (the chief harvest in those parts) was almost entirely lost, and, what was worse, there was an utter dearth of grass for pasture or fodder, and in some parts of water; so that it was impossible for the cultivators to feed their cattle, or for traders to import grain on bullocks or carts or by any other means than camels. Thus the communications of Rajputana with the adjoining country were as much cut off as those of Orissa in 1866. The only resource open to the people of the Native States was emigration; and they emigrated in enormous numbers, taking their cattle with them,—some southward to Malwa, Guzerat, and Sindh, some northwards to the Punjab and to the Sub-Himalayan forests of the North-Western Provinces and Oudh. It was calculated that out of a million and a half inhabitants of Marwar a million had emigrated in this way. Those who set out on the first warning of calamity generally left their homes in good condition and found room for their cattle to graze; among those who clung to their homes till all their resources were exhausted and then fled, the mortality was very great; they were enfeebled by emaciation before they started, and found all the grazing-grounds occupied by the herds which had preceded them. The area sown with winter crops was small and the crops were poor and blighted. An epidemic of cholera broke out in April and spread in all directions with fatal effect. Little could be done to help the famine-stricken population. Relief-houses were opened in the large towns and the British cantonments, and many of the Chiefs exerted themselves to give employment to the distressed; but they had neither the organization nor the wealth to enable them to do this on any large scale. In Ajmir, a small British district surrounded by the Rajputana States, relief-works were opened at the charge of our Government. But the number of applicants was so great that it was found impossible to exercise proper supervision, and the labourers were paid at piece-work rates. The result of this was that only the skilled and able-bodied were taken on, and those most in need of relief were either refused admission or found themselves unable to earn a living. At last the civil officers had to open minor works to meet the wants of these classes. The rains of 1869 delayed their coming till the middle of July; and then the survivors of the emigrants returned. But just when the fields began to promise a plentiful harvest swarms of locusts visited the country and devoured almost all the produce of the ground; and a violent epidemic of fever carried off many of those who had survived the troubles of the past year. There was, however, abundant grass for the cattle, and a brisk importation of grain set in, which brought down prices. At last a good spring harvest in 1870 put an end to the famine.

North-Western Provinces and Punjab.

55. The drought of 1868 affected nearly the same part of the North-Western Provinces and the Punjab as had been visited in 1860; but it was less severe, except in the Muttra, Agra, Jhansi, and Lalitpur districts of the North-Western Provinces, in the western half of Rohilkhand, and in the Hansi, Hissar, Rohtak, and Karnal districts of the Punjab. Elsewhere there was some return from the autumn harvests, though a poor one; and the winter crop, though sown on a reduced area, was so good that at one time it was thought that the famine would come to an end in February 1869. This hope was frustrated by the indirect effects produced upon the two provinces by the intensity of famine over so great an area

as that of Rajputana, which raised prices to an excessive height and drained away the diminished food stocks; while the influx of emigrants from those parts added to the severe strain on the charity of the public. The coming difficulty had been early foreseen by the Governments of both provinces, and relief measures were planned in good time. In their general outline they corresponded with those which had been adopted on previous occasions; but there were certain alterations in the principles laid down. It was now declared for the first time that the object of Government was to save every life, and that district officers would be held responsible that no preventible deaths should occur. It was found necessary to depart, in some degree, from the old principle, that it is the duty of the public to provide for the gratuitous relief of the infirm and weak, seeing that so large a proportion of these were foreigners and not the local poor; and the Government declared that it would supplement private subscriptions by whatever sum might be necessary for the support of persons incapable of work. Relief of this kind was given in the shape of cooked food, conditional on residence in a poorhouse, agreeably to the system of 1861. Relief to the able-bodied was not confined, as in 1861, to large works of permanent utility under professional officers. There were indeed several of these, but there was also a larger number of minor works under civil officers, which, in some cases, in the opinion of those officers, had the effect of attracting people who were not in immediate need of relief. Wages were fixed at a very low rate, and orders were given to discourage piece-work, but to induce the labourers by constant supervision to turn out a fair amount of work. In the North-Western Provinces about 65,000 persons were employed daily for 12 months on works and about 18,000 daily received gratuitous relief; the total cost was about Rs. 46,00,000. The Punjab expenditure on relief-works is not on record, but about 23,000 received gratuitous relief daily for nine months at a cost of Rs. 4,25,000; and about 3 lakhs of rupees of land-revenue were remitted. The vital statistics in these two provinces were at this time very imperfect; but the result given by them indicates an excess mortality of about 1,200,000, due mainly, not to direct starvation but to diseases obscurely connected with drought and famine—cholera, small-pox, and fever.

Central Provinces and Bombay.

56. The north part of the Central Provinces (the northern half of the districts of Saugor Jabalpur and Damoh) was visited by the same drought; and there was a deficient rain-fall in the south-eastern district (known as the Chatisgarh division) which mainly grow rice. The long duration of high prices and the influx of starving immigrants also caused distress to the poorer classes in most parts of the province. The inhabitants, however, are at once too thinly scattered and generally too well-off and independent to be eager for State relief; and the numbers employed on public works or fed gratuitously were very small. The total expenditure, including advances for seed-grain and plough cattle, amounted to about Rs. 10,00,000. In Bombay the rain-fall of 1868 was very light in Khandesh and Ahmednagar, while great destruction was caused by inundation in Ahmedabad and Kaira; and these difficulties, followed by the general rise of prices and the influx of starvelings from Marwar, caused considerable distress, though hardly amounting to famine. The total expenditure on relief measures was about Rs. 6,30,000.

Behar famine of 1873-74.

57. The monsoon of 1873 was not abnormal during the three months, June, July, and August, but in Northern Bengal it ceased prematurely in September; and much of the winter rice crop, which ripens in November, was consequently lost. The Bengal Government, from inquiries instituted for the purpose, was led to believe that the inevitable effect of this loss would be to involve the inhabitants of a large part of the province in a severe famine; it accordingly set about making preparations with the utmost energy to carry out relief measures on a scale and with a thoroughness which had never been equalled before. The principles adopted by the Government were very different from those accepted on any former similar occasion. It was considered that the operations of private trade could not be relied on, and therefore that it would be necessary to accept the responsibility of providing the distressed districts with the whole quantity of food likely to be required. After elaborate estimates had been framed it was decided, with the approval of the Government of India and the Secretary of State, to import 480,000 tons of rice; and the greater part of this stock was purchased for the Government in Burma, sent up-country by railway, and distributed to depôts scattered over the famine area by the agency of Government officers. The estimates provided against every possible contingency, the failure of contractors, murrain among the cattle, the recurrence of drought in the ensuing monsoon. Relief was administered mainly in the form of employment on works and of gratuitous

assistance to the infirm; but under rules which in their details were very different from those previously followed. Tests were not to be stringently enforced in localities where the distress was excessive and widespread. In place of the self-acting tests which on previous occasions had been held to be useful and to some extent necessary, reliance was placed on personal knowledge, on the part of the relieving officer, of the applicant's condition and wants. A large special establishment of inspecting officers was appointed, and the country subdivided among them, in the hope that, with the help of the resident zemindars and leading ryots, they might obtain such personal knowledge of the condition of every village and its inhabitants. The intention having been formed of preventing loss of life at any cost, so far as practicable, tests or restrictions were relaxed in respect to the wages, the amount of work done, and the character of the work offered; and sufficient money or grain for their sustenance was allowed to all comers who were prima facie in want. Cultivators were invited to take loans of money or rice repayable without interest. About 340,000 tons of grain were disposed of in the relief operations, a quantity sufficient to provide sustenance for not less than three millions of people for seven months. The famine area was estimated at 40,000 square miles, and the population affected at 17 millions. Of these 735,000 were employed on works for nine months, 450,000 received gratuitous relief daily for six months, and 3,200,000 bought grain at low rates enough to support them for seven months, or received advances of grain or cash, large part of which was repaid to the Government. When all pressure had passed away the surplus stock of grain left on the hands of the Government amounted to more than 100,000 tons, the provision of a reserve having been designedly made when the original purchase was effected. This had to be sold at a great loss, adding not a little to the total cost of the relief measures, which reached six and a half million sterling, or as much as the total expenditure on all past famines in all parts of India from the beginning of the century up to that time. The result of inquiries specially made on the subject was to indicate that no mortality whatever was due to the famine, and that the bountiful relief given did not have the effect of rendering the population indisposed to return to their usual labours when it ceased.

North-Western Provinces and Oudh.

58. The failure of rain in 1873 extended also to the strip of country on the northern edge of the North-Western Provinces and Oudh which corresponds in position with the most distressed tract in North Behar; and the loss of the rice crop was almost complete. It was thought necessary to take some measures for the relief of distress on the same system as that followed in 1868–69. In the Gorakhpur and Basti districts, where works were opened in February or March 1874, although the wages were low, the discipline was lax and the task slight, and the numbers employed rapidly rose to more than 200,000. On this becoming apparent, the wage was reduced till it provided only a bare subsistence, stricter discipline and supervision were introduced, and the labourers were no longer allowed to go to their homes at night. Shortly after this the rains set in, and owing to these combined causes the great crowds melted away more rapidly than they had collected, and it was found that there was hardly anyone who really needed relief.

ty of 76.

59. The alarm raised in 1875 of a threatened scarcity in Behar hardly deserves mention here, except as an illustration of the risk of over-estimating the effect of a failure of the rain-fall where the means of obtaining sound knowledge of the condition of the country do not exist, and profuse expenditure has once been permitted. The rains ceased prematurely, much as they had done in 1873, and anticipations were expressed of a famine which should affect 17 millions of people, and be severe in an area inhabited by 8 millions; and large proposals were made as to measures of relief involving very heavy outlay. The Government of India, however, resisted what seemed to be a premature alarm on the part of the Bengal Government, and further inquiries gradually narrowed the area of expected distress till nothing remained of it. Eventually prices ruled lower than in ordinary years in the very tract where severe famine had been prognosticated.

Famine of 1876–78.

60. The great famine in Southern India, which has so recently come to an end, has been, in respect of the area and population affected and the duration and intensity of the distress, the most grievous calamity of its kind experienced in British India since the beginning of the century. The failure of the summer rains of 1876 extended over about half of the Madras Presidency, the distress being most intense in the same tract, that lying above the Eastern Ghats, which suffered in 1833 and in 1854. The scarcity was felt with great severity over the whole of Mysore (except the hilly tracts that lie along the western Ghats), the southern half of the Hyderabad State, and all the Deccan districts of the Bombay Presidency. The area thus affected was about 200,000 square

miles containing a population of 36 millions.* But this great famine was not wholly restricted as to extent and duration to the effects of the drought of 1876. The monsoon of 1877 was a most irregular one. In the Southern Provinces it began late and feebly, but ended with an excessive downpour, which did great injury to the crops. In part of the Central Provinces, in the North-Western Provinces, and in part of the Punjab, the registered rain-fall was less than any ever before recorded. The autumn crops were almost entirely withered up, and the possibility of sowing the winter crops was only just secured by an extraordinary fall of rain in October, which occurred when almost all hope had gone. The calamitous season of 1877 was accompanied by an extremely high range of prices over all India, due partly to the deficient harvest, and partly to the reduction of the food stocks through export from the Northern Provinces to the south and to Europe. These two causes together prolonged the distress in Madras, Mysore, and part of Bombay over a second year, and created great suffering among the poorer classes in the Upper Provinces. The years of famine were also exceptionally marked by a great mortality, partly attributable to virulent outbreaks of cholera, small-pox, and fever. Thus, though the whole area affected by the famine of 1868 exceeded that of 1876–78, the area of great intensity was larger and the duration of excessive pressure was longer in 1876–78.

Policy of famine relief.

61. In the earliest stage of the famine a difference of opinion arose between the Supreme Government and the Governments of Bombay and Madras regarding the character of the relief works to be set on foot. The local Governments advocated large works of permanent utility, while the Supreme Government upheld the system of opening small and scattered works which should not involve the Administration in a large expenditure if the anticipated famine should not turn out very severe. These objections were, however, withdrawn as soon as the gravity of the impending calamity was realised, and at the same time, in January 1877, Sir R. Temple (selected on account of his experience in Behar in 1874) was sent as famine delegate of the Government of India to inspect the distressed districts, and to communicate personally with the two Governments concerning the measures to be taken for the relief of distress. The instructions given him are of importance as showing the opinions of the Government regarding the nature of their responsibility for the relief of famine. The principle was re-affirmed that the Government would spare no efforts "to save "the population of the distressed districts from starvation, or from an extremity "of suffering dangerous to life," but they would not "attempt the task of preventing "all suffering and of giving general relief to the poorer classes of the community." "Every one," it was said, "admits the evils of indiscriminate private charity, but the indiscriminate charity of a Government is far worse." The Government held that "the task of saving life, irrespective of the cost, is one which it is beyond their power to undertake," but believed that "from the history of past famines, rules of action "may be learnt which will enable them in the future to provide efficient assistance "for the suffering people without incurring disastrous expenditure." The Secretary of State approved these instructions, adding that "in the interests of the distressed "population itself, as well of the taxpayers generally, the Government of India was "bound to adopt precautions against indolence or imposition, similar, as far as the "circumstances of India will permit, to those with which in this country it has "always been found necessary to protect the distribution of public relief from abuse."

Bombay.

62. Although the Bombay Presidency has had no serious famine since 1812, it has frequently been visited by local scarcities, and the generally precarious rain-fall of the Deccan upland has accustomed its officers to the prospect of famine and the question of relief. The Bombay Government had before them the records of the Behar famine of 1873–74, and were ready, when the monsoon failed signally in 1876, with a systematic plan of action. They resolved to relieve the distress almost entirely by large public works, and they at once selected several such undertakings of permanent utility to be set in hand. Following the policy approved by Colonel Baird Smith in 1861, they placed these works under the control of professional engineers, rejected the mode of payment by piece-work, fixed the daily wage at a rate just sufficient to support the labourer, and relied on supervision and discipline

	Area.	Population.
* Madras	83,800	19,400,000
Bombay	64,000	10,000,000
Mysore	27,100	5,100,000
Hyderabad	30,700	1,900,000
Total	205,600	36,400,000

Y 492.

to get as much useful work done as possible, and they explicitly declared that relief should not be made attractive, but should be so arranged as to secure to all a quantity of food just sufficient for a bare subsistence, with a slight margin over. When the labourers on relief-work struck against the wage and left in large numbers, the Government refused to yield to what they considered unreasonable demands, ordering the district officers to watch over the condition of the men on strike, and to see that they did not linger in their villages so long as to become emaciated. There was no direct interference of the Government in the supply of grain, except on a very small scale in exceptional circumstances. The numbers employed for 13 months on these works were 285,000, and the cost was 93 lakhs of rupees. There was no novelty in the management of gratuitous relief, which was organised in the villages as the pressure arose, the only point to notice being that it was considered unadvisable to distribute it to people at their homes, except when bedridden or unable to leave the house. All others had to submit to the test of coming to relief centres to procure it. The cost of gratuitous relief was 10 lakhs of rupees, and the number relieved daily for 13 months was 33,300. Altogether the cost of the famine administration up to the end of 1877 was Rs. 1,14,00,000. Since that time there has been an unexpected prolongation of distress, the bad season of 1877, followed by a plague of rats, preventing the people from recovering as quickly as had been hoped from the depressed condition into which they had fallen; and the expenditure on relief in 1878 and 1879 was about 14 lakhs of rupees. Two and a quarter lakhs of land revenue were remitted, and about 30 lakhs suspended, of which about 14 were still outstanding at the end of 1879; and it is probable that a considerable portion of this sum will have to be ultimately remitted. The deaths of the two years 1877 and 1878 are estimated for the whole Presidency, excluding Sindh, to have been 800,000 in excess of the usual number. The population of the districts affected by the famine was rather larger than that of the non-affected districts; and in 1878 the mortality in the famine and the non-famine districts was nearly equal. The heaviest death-rate occurred in those districts to which there was no direct access by railway or water, being in the case of Kaladgi as high as 102 per mille for the year 1877.

Mysore.

63. In Mysore the rain-fall of 1875 had been very deficient, and the food-stocks of the country were largely depleted before the catastrophe of 1876 fell upon it. The failure of the harvest of 1876 was extremely serious, not more than a third of an average crop being gathered over the whole province, and less than a quarter in the most afflicted parts. This indicated a great deficiency in the food-supply, which could only be met by ample importation. It was evident that the purchasing power of the people would be subjected to a severe strain, and that what was most required was the means of earning wages on large and well-arranged relief-works. The local administration was not blind to the danger, nor slow in setting on foot what were conceived to be sufficient measures of relief; but the arrangements made fell short of the real requirements of the case. Proposals to carry out large works were at first discouraged by the Government of India, and no such undertakings were put in hand till the time for them had almost passed away. No alteration was made at the outset in the ordinary method of carrying out works under the Public Works Department, so that, although some fresh works were opened they were not adapted for any but able-bodied labourers, and the numbers thus relieved were but slightly in excess of those ordinarily employed. All other persons needing relief were considered to be in charge of the civil officer, who was expected to employ them on minor local works, such as were ordinarily carried on under civil officers, as close as possible to their homes. From various causes these works fell into great confusion, and afforded no real support to the people, who gradually drifted into a state of emaciation in which they were only fit for gratuitous relief. Nor was the administration of this form of relief effectual. Cooked food was given liberally at certain centres to all-comers, no conditions of residence being imposed, and too little provision was made for medical assistance. When the rains of 1877 again threatened to fail, and held off during July and August, the crowds at the relief centres and the mortality became very great. It was in these circumstances at the beginning of September that the Viceroy visited Bangalore, and directed the adoption of a system of relief based on that followed in Bombay. The labourers were to be concentrated on large works, and the relief establishment was greatly augmented. A fortunate change of weather prevented the effects of these orders being practically tested. Rain began to fall, and the numbers on relief diminished at once with great rapidity. By the time the monsoon of 1878 set in the need of famine relief was at an end. But it will be some time before the province recovers its losses, which have been estimated at about a million of lives a quarter of a million of cattle, and crops the value of which would have been

39

9¾ millions sterling. The number relieved on works and gratuitously was about 150,000 for the 11 worst months, and the total expenditure incurred was about 70 lakhs of rupees, besides remissions of land revenue which amounted to 28 lakhs of rupees. No direct importations of grain were made by the Government, the supply needed for the local gratuitous relief being purchased locally.

Madras.

64. The Government of Madras has not yet sent in any report on the famine in that Presidency, and we have not had the same facilities as in the cases of Bombay and Mysore in our attempt to trace the history of the distress and the measures of relief in detail. The first peculiarity in the management of the Madras famine was that, following the example of Behar in 1873, the Local Government at an early period in the famine thought it necessary to provide against deficient activity of private trade, or the failure of the supply of food in the less accessible districts, by purchasing 30,000 tons of rice to be stored in places where the demand for relief was expected to be large; and at the same time they proposed to put in hand several large works of permanent utility. The Government of India disapproved of both these steps, and decided, as already described, that at this stage of the distress minor local works which would not take the people far from their homes should be organised. The purchased grain was partly used for purposes of relief, and the remainder was sold at the close of the famine. A few large works were opened under the Public Works Department, for the employment of the famine-stricken at an early period, and others were started in the middle of 1877, but the greater part of the applicants were received on works under the supervision of the civil officers of the district. The scale of wage was fixed in accordance with, but somewhat below, the rates which had been adopted in Behar. The numbers on relief soon became very large, and by January 1877 had risen to over a million. In that month, when Sir R. Temple visited the famine districts, he was of opinion that relief was given both on too liberal a scale and to persons who did not stand in absolute need of it. He advised the Government of Madras to reduce the rate of wages, and they adopted the scale which was being introduced into Bombay, the amount of the money wage being made to vary with the price of food grain. After these changes, and on the introduction of stricter discipline, the numbers on works were at first considerably reduced; but they began to rise again shortly, those on gratuitous relief rising at a still higher rate, so that the total exceeded a million in May, and reached the maximum figure of 2,218,000 in September. The effect of the reduced wage was a subject of considerable discussion and difference of opinion, and it was strongly opposed by many of the officials, including the Sanitary Commissioner, as providing less than subsistence for the labourer. After the orders for its adoption had been in force for three months, the balance of opinion being unfavourable, it was abandoned, and a higher rate substituted at the end of May. At the same time it was decided that all weakly persons, and all who were incapable of performing 50 per cent. of a full task for a man in normal condition, should be removed from the relief works and supported at their homes; and a system of house-to-house relief was introduced, under which a dole of money was given sufficient for the support of the pauper. The test of fitness was the certificate of the head village official, submitted to the village inspector, whose proceedings again were under the control of the relief officer of the Taluk, so that opportunities for abuse might be minimised. In the end of August, when it became apparent that relief operations would have to be continued at least till the end of the year on a very large scale, the Viceroy visited Madras, and after consultation with the Governor of that Presidency certain important changes of system were resolved upon, while the main principles on which relief was to be administered were repeated with additional emphasis. It was announced that "a large scheme of useful public works under departmental supervision should be the backbone of the relief system," and a great expansion of such works was ordered, combined with the restriction of gratuitous relief in their villages to "those who are both incapable of work and without other adequate means of support." The direction of all matters connected with the famine, which had hitherto passed through the channel of the Board of Revenue and the Council, was taken by the Governor under his sole charge, who issued his orders directly to the district officers; and a large additional staff of officers was introduced from Northern India to strengthen the supervising agency. These arrangements were hardly complete when, as in Mysore, the long-expected rain began to fall abundantly; the hearts of the people revived, and they dispersed so rapidly that the numbers, which in September had been 2,218,000, had fallen in December to 444,000, and in March 1878 to 215,000. A considerable body of debilitated persons remained, however, on the hands of Government till the harvest of 1878 was ripe, in October or November. The abnormal mortality of the two famine years has been estimated at two millions, and there was

a decrease of 800,000 in the births of the two years 1877 and 1878; nor did the effects of this decrease come to an end in the latter year. The average number of persons relieved was 787,000 daily for the space of 22 months; and the total cost of the famine is estimated at eight millions sterling. The land revenue remitted was about 118 lakhs of rupees, and the outlay on relief about 675 lakhs.

The English charity.

65. Towards the close of 1877 charitable contributions began to flow in from the public in Great Britain and the Colonies, amounting in all to the sum of 678,512*l.*, and were of great service in relieving the distress of those not absolutely suffering from starvation or receiving relief from Government. One quarter of the sum received was allotted to Mysore, and three-quarters to the Madras Presidency. In distributing the grants, about two thirds of which went to agriculturists and one third to non-agriculturists, the object kept generally in view was to give to the recipients the means of repurchasing the implements of their trade or profession, and of starting again in their former self-supporting mode of life.

Hyderabad.

66. In the Hyderabad State the famine was intense in the tongue of land which runs in between the Sholapur and Bellary districts of Bombay and Madras, and it was severe in the whole southern half of the country. Relief was given as far as possible on the pattern of the British administration by opening public works and centres where cooked food was distributed. About 20,000 persons were employed and 10,000 fed daily for 10 months, at a total cost of nearly 11½ lakhs of rupees; 32 lakhs of land-revenue were remitted.

The North-Western Provinces.

67. In the North-Western Provinces and Oudh the failure of rain in 1877 was more complete than any previously recorded, and the autumn crop was almost entirely lost (except on irrigated lands) in all but the eastern and southern districts of the province. Rain, however, in October, enabled the winter crop to be sown over a very large area, and though the continuous rainy and cloudy weather in January and February injured it, yet the out-turn was on the whole an average one. The province was thus preserved from what would otherwise have been an intense famine. Arrangements for relief by works and in poor-houses were made early in September 1877, but the rain-fall of October and the briskness of field labour prevented many from coming to the works till December, when the winter rains put an end to the need of artificial irrigation, and thus threw out of work hundreds of thousands of people employed upon it. Large numbers then flocked to the relief-works under the pressure of high prices. The spring harvest again offered employment in March 1878, and the people left the relief-works in large crowds, to return again in May, and to increase in numbers and despondency as the rains again showed signs of holding off in June and July. In August, however, there was a plentiful downfall which secured the harvest; the people rapidly dispersed to their homes and by the end of October relief was almost everywhere at an end. The total cost was about 20 lakhs of rupees: the average daily number on relief-works for 12 months was 55,700, in poor-houses 13,750. The highest number on relief-works was in August, 126,800, and in the same month the number in the poor-houses also reached its maximum of 26,350.

The history of this famine brings out some points of interest. The relief-works were for the first time placed more entirely under the officers of the Public Works Department, with little control from the local civil officers, and the effect of this was not good. Gratuitous relief was administered exclusively on the principle of giving cooked food in a poor-house at which residence was required, and this was found to be very unpopular, and some of the persons who accepted this form of relief were put out of caste. No system of village inspection was adopted, the distress not having been regarded as of such a nature as to require it. About a quarter of the land revenue (or 46 lakhs of rupees) was suspended at the end of 1877, but when the spring harvest turned out a good one the Government ordered arrears to be got in as far as possible, and by the time the autumn crop was ripe the collections were deficient by about 12 lakhs only. Lastly, the mortality in the province was extremely great, amounting to very nearly double the average, in the 14 months from November 1877 to December 1878, or to an excess number of about 1,250,000 deaths. Small-pox, fever, and bowel diseases were the chief registered causes, and these epidemics were extremely virulent, but doubtless a large portion of the deaths was due to the pressure of want. At the same time, it is important to record that the amount of ordinary grain procurable for a rupee never fell much below 26 lbs.

The Punjab.

68. The failure of the monsoon of 1877 was very complete in the Punjab; but the autumn crop is less important there than in any other part of India, and the rain of October made it possible to sow the usual area with spring crops. Moreover, the preceding years had been very prosperous, and the export of wheat, which had greatly

increased in the years 1876 and 1877, brought large sums of money to the province. The scarcity, however, became serious in some places through the height to which prices had risen in consequence of the famine of the south, and by reason of the influx of starving people from Kashmir. The parts which suffered most from the drought were those districts of the Delhi and Hissar divisions not protected by the Western Jumna canal, which are always among the first affected, and the hill district of Hazara, which had not been known to suffer in any earlier famine. The distress was, however, nowhere intense; the ordinary measures were taken to supply relief, and with the rains of 1878 all fear of famine passed away. The mortuary returns, however, which indicate an excess mortality of about 340,000 above the average during the year 1878, afford reason for fearing that the high prices had a grievous effect on the poorer classes of the population.

Chronological list of famines.

69. The following table shows in chronological order the years in which the principal droughts since 1769 have occurred, and the provinces affected by consequent scarcity:—

Year.	Area of Drought.	Area of Famine or Scarcity.
1769	Drought in Bengal.	
1770	- - - - -	Famine in Bengal.
1782	Drought in Bombay and Madras.	
1783	Drought in Upper India - - -	Famine in Madras and scarcity in Bombay.
1784	- - - - -	Famine in Upper India from the Karamnasa to the Satlej.
1791	Drought in Bombay, Hyderabad, and Madras.	
1792	- - - - -	Scarcity in north part of Madras. Intense famine in Hyderabad and Southern Mahratta country. Severe famine in Deccan, Guzerat, and Marwar.
1802	Drought in South Hyderabad, and in Deccan.	Famine in Deccan and Hyderabad.
1803	Drought in Ceded Province of North-Western Provinces and in Central India.	
1804	- - - - -	Famine in North-Western Provinces, and scarcity in Central India and Rajputana.
1806	Drought in Central Districts of Madras, from Trichinopoly to Nellore.	
1807	- - - -	Famine in Central Districts of Madras.
1812	Drought in Guzerat, Kutch, and Kathiawar, and to some extent in Madras; also in Rajputana and Central India.	
1813	- - - -	Famine in Kutch and Kathiawar; intense in parts of Rajputana. Scarcity in parts of North-Western Provinces and of Madras.
1823	Drought in Madras.	Famine in Madras, chiefly in the north.
1824	Drought in Bombay - - - -	Scarcity in Bombay, chiefly in Guzerat and the Northern Deccan.
1825	- - - -	
1832	Drought in Northern districts of Madras, except Ganjam, in the south of Hyderabad, and the Southern Mahratta districts of Bombay.	
1833	Drought in north part of Bombay, in Rajputana, and parts of Punjab and North-Western Provinces.	Famine in Northern districts of Madras; intense in Gantur. Scarcity in Hyderabad and Southern Mahratta districts.
1834	- - - -	Scarcity in North Deccan and Guzerat, in Rajputana, the Hissar division of Punjab, and the trans-Jumna districts of North-Western Provinces.
1837	Drought in North-Western Provinces, Eastern States of Rajputana, and south-east part of Punjab.	

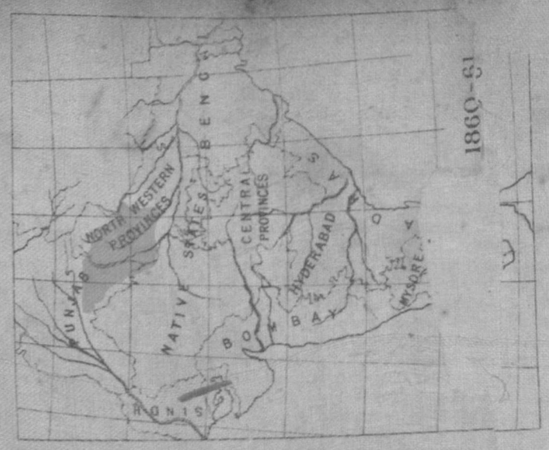
Year.	Area of Drought.	Area of Famine or Scarcity.
1838	Drought in Guzerat, Kutch, and Kathiawar -	Intense famine in Central Doab and trans-Jumna districts of North-Western Provinces, and in Delhi and Hissar divisions of Punjab.
1839	- - - - -	Scarcity in Guzerat, Kutch, and Kathiawar.
1844	Scanty rain-fall in Deccan.	
1845	- - - - -	Scarcity in Deccan.
1853	Drought in Ceded districts of Madras, in South Hyderabad, and Sholapur and Kaladgi districts of Bombay.	
1854	- - - - -	Famine in Bellary. Scarcity in adjoining parts of Madras, Hyderabad, and Bombay.
1860	Drought in part of North-Western Provinces and Punjab, and neighbouring States of Rajputana.	
1861	- - - - -	Famine in Upper Doab of North-Western Provinces, in Delhi and Hissar divisions of Punjab, and in adjoining parts of Rajputana. Scarcity in Kutch.
1865	Drought in northern part of Madras, in South Hyderabad and north part of Mysore; in South Mahratta districts of Bombay, in Orissa and Behar, and all Western Bengal.	
1866	- - - - -	Famine in Ganjam and Bellary districts of Madras, in Orissa (intense), and in Behar. Scarcity in all adjacent parts of Madras, Mysore, Hyderabad, and Bombay, and in Central and Western Bengal.
1868	Drought in Rajputana, trans-Jumna districts of North-Western Provinces, north and south-east districts of Central Provinces, and in Punjab from Jumna to Indus.	
1869	- - - - -	Famine in Western Rajputana (intense), in trans-Jumna districts of Allahabad and Delhi, and Hissar divisions of Punjab. Scarcity in adjacent parts of North-Western Provinces and Punjab, in Guzerat, Kutch, and North Deccan, and in the north and south-east districts of Central Provinces.
1873	Drought in North Behar and a part of North-Western Provinces and Oudh.	
1874	- - - - -	Famine in Behar and scarcity in the strip of North-Western Provinces and Oudh adjacent.
1876	Drought in all Madras and Deccan, Mysore and south part of Hyderabad.	
1877	Drought in Central Provinces, North-Western Provinces, and Punjab.	Famine in Madras, Mysore, Bombay, and Hyderabad.
1878	- - - - -	Famine in North-Western Provinces and Cashmere. Scarcity in Punjab.

Synoptical view of famine chronology.

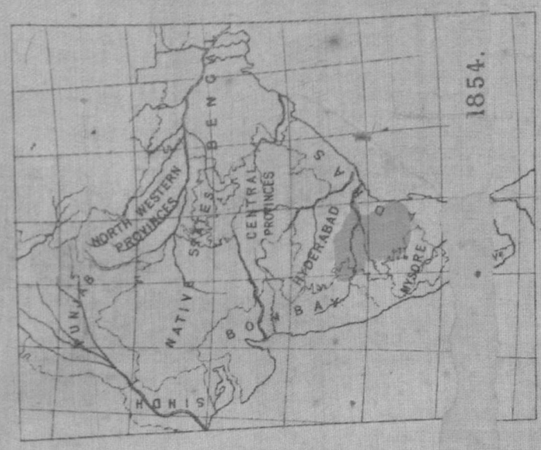
70. The following table, which embraces the period from 1769 to 1878, or 109 years, shows the years in which famines and scarcities have occurred in the chief provinces of India, the degree of intensity and the duration of each, the intervals of

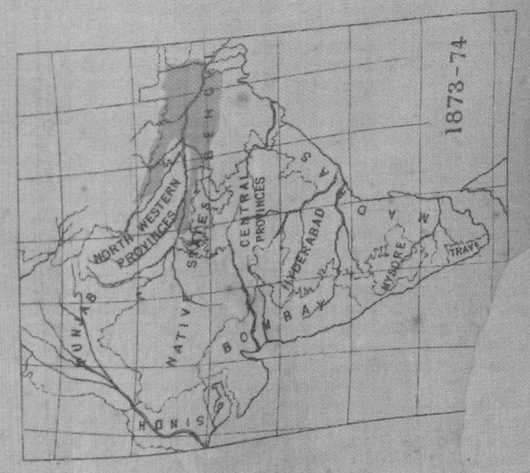
PAST FAMINES.

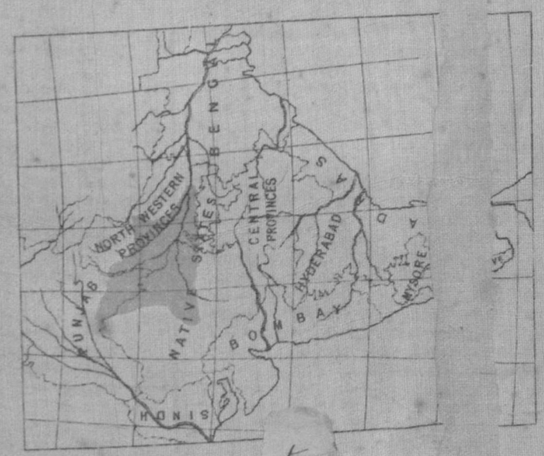
INDEX MAPS OF

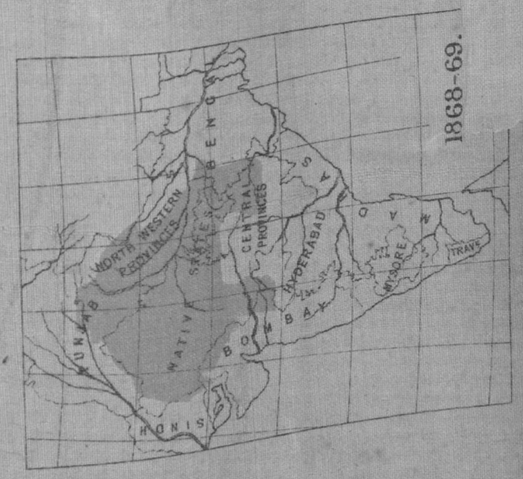




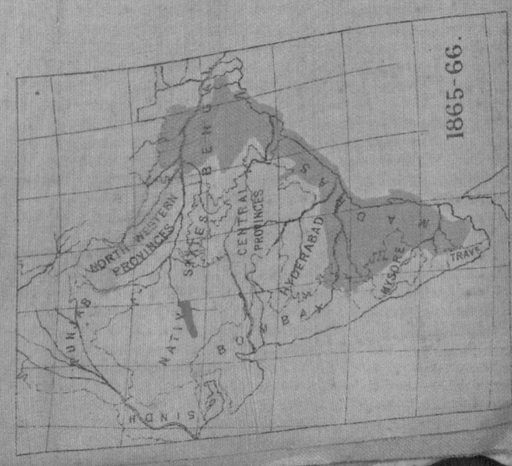












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time between their occurrence, and the resulting averages as regards each province and the whole of India:—

	Bengal.			N.W. Provinces and Punjab.			Rajputana and Central India.			Bombay.			Madras.			All India.		
		Years.			Years.			Years.			Years.			Years.				Years.	
	Severity.	Duration.	Interval.	Severity.	Duration.	Interval.	Severity.	Duration.	Interval.	Severity.	Duration.	Interval.	Severity.	Duration.	Interval.	Severity.	Duration.	Interval.
1769–70	***	1	.	.	.	.	.	.	.	.	.	.	.	.	.	***	1	.
1782–3	.	.	.	.	.	.	.	.	.	**	1	13	**	2	13	**	1	12
1783–4	*	1	13	***	1	14	.	.	.	.	.	.	.	.	.	***	1	.
1791–2	.	.	.	.	.	.	**	1	22	***	1	8	**	1	7	***	1	7
1802–3	.	.	.	.	.	.	.	.	.	**	1	10	.	.	.	**	1	10
1803–4	.	.	.	**	1	19	**	1	11	.	.	.	.	.	.	**	1	.
1806–7	.	.	.	.	.	.	.	.	.	.	.	.	**	1	13	**	1	2
1812–13	.	.	.	*	1	8	*	1	8	**	1	9	.	.	.	**	1	5
1823–4	.	.	.	.	.	.	.	.	.	.	.	.	**	1	16	**	1	10
1824–5	.	.	.	.	.	.	.	.	.	*	1	11	.	.	.	*	1	.
1832–3	.	.	.	.	.	.	.	.	.	.	.	.	***	1	8	***	1	7
1833–4	.	.	.	*	1	20	*	1	20	*	1	8	.	.	.	*	1	.
1837–8	.	.	.	***	1	3	**	1	3	.	.	.	.	.	.	***	1	3
1838–9	.	.	.	.	.	.	.	.	.	*	1	4	.	.	.	*	1	.
1844–5	.	.	.	.	.	.	.	.	.	*	1	5	.	.	.	*	1	5
1853–4	.	.	.	.	.	.	.	.	.	.	.	.	**	1	20	**	1	8
1860–1	.	.	.	**	1	22	*	1	22	.	.	.	.	.	.	**	1	6
1865–6	***	2	81	.	.	.	.	.	.	.	.	.	**	1	11	***	2	4
1868–9	.	.	.	**	1	7	***	2	7	.	.	.	.	.	.	***	2	1
1873–4	**	1	6	*	1	4	.	.	.	.	.	.	.	.	.	**	1	3
1876–7	.	.	.	.	.	.	.	.	.	***	2	31	***	2	10	***	2	2
1877–8	.	.	4	**	1	3	*	1	7	.	.	.	.	.	.	.	.	.
Total No. of Famines or Scarcities	4	.	.	9	.	.	8	.	.	9	.	.	8	.	.	21	.	.
Total No. of Years affected by Famine	.	5	.	.	9	.	.	9	.	.	10	.	.	10	.	.	24	.
Total No. of Years of Interval without Famine	.	.	104	.	.	100	.	.	100	.	.	99	.	.	99	.	.	85
Average No. of Years of Interval without Famine	.	.	26	.	.	11	.	.	13	.	.	11	.	.	12	.	.	4

N.B.—One asterisk denotes a severe scarcity.
Two asterisks denote a famine.
Three asterisks denote an intense famine.

Famine statistics.

71. The following table shows the area and the population affected and the numbers relieved in each of the principal famines of this century, the sums expended on relief of different kinds, the remissions of the land revenue, and the amount by which the income from other sources was diminished, so far as data exist for such a statement. The blanks more frequently mean that there is no information on record than that nothing ought to be entered under the heading in question.

		Area in square miles.	Population affected.	Average Numbers employed daily on Relief-works.	For how many Months.	Average Number daily relieved gratuitously.	For how many Months.	Cost of Relief-works.	Gratuitous Relief: Cost to Government.	Gratuitous Relief: Contributed by the Public.	Cost of Importation of Grain.	Advances to the Landed Classes.	Loss of Land Revenue.	Other Expenditure and loss of Income from other sources.	Total Cost to Government.
								Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1865.	North-Western Provinces.	20,000	8,000,000	—	—	—	—	—	—	—	—	16,00,000	32,00,000	—	42,00,000
1824-5	Bombay	50,000	8,000,000	—	—	—	—	—	—	—	—	—	8,95,000	—	—
	Madras	60,000	10,000,000	—	—	—	—	—	—	—	—	—	9,00,000	2,25,000	—
	Total of 1824	110,000	18,000,000	—	—	—	—	—	—	—	—	—	17,95,000	2,25,000	20,20,000
1832-3	Madras	76,100	16,000,000	—	—	—	—	—	3,00,000	—	—	—	—	—	—
	Bombay	28,500	4,400,000	—	—	—	—	—	—	—	—	—	77,50,000	13,32,000	—
	Hyderabad	25,200	1,100,000	—	—	—	—	—	—	—	—	—	6,81,200	—	—
	Total of 1832-3	129,800	22,100,000	—	—	—	—	—	3,00,000	—	—	—	—	—	—
1837-8	North-Western Provinces.	80,100	21,500,000	—	—	—	—	19,64,000	8,000	3,50,000	—	—	87,21,200	15,32,000	1,66,62,200
	Native States	37,500	6,600,000	—	—	—	—	—	—	—	—	—	93,00,000	—	—
	Total of 1837-8	118,600	28,100,000	—	—	—	—	19,64,000	8,000	3,50,000	—	—	—	—	—
1845.	Bombay	25,400	3,400,000	—	—	—	—	—	—	—	—	—	66,00,000	—	1,14,72,000
1853-4	Madras	8,000	800,000	56,500	9	—	—	12,28,000	3,72,000	—	—	—	6,47,800	—	6,47,800
	Hyderabad	24,000	2,000,000	—	—	—	—	—	—	—	—	—	30,75,600	11,25,000	—
	Total of 1853-4	32,000	2,800,000	56,500	—	—	—	12,28,000	3,72,000	—	—	—	—	—	—
1860-1	North-Western Provinces.	31,100	14,000,000	25,100	10	33,800	9	9,14,200	2,00,000	3,50,400	—	3,05,000	30,75,000	11,25,000	56,00,000
	Punjab	16,700	4,200,000	9,000	10	50,000	9	3,25,000	3,11,800	3,22,200	—	3,28,000	2,34,700	3,80,000	—
	Native States	5,700	1,200,000	—	—	—	—	—	—	—	—	—	14,00,000	2,60,000	—
	Total of 1860-1	53,500	20,300,000	34,100	—	83,800	—	12,39,200	5,12,400	6,72,600	—	6,31,000	—	—	—
1865-6	Bengal	64,800	24,300,000	6,650	21	35,200	17	13,48,000	1,000	18,33,000	62,12,000	—	16,34,700	5,40,000	45,57,300
	Madras	83,200	18,200,000	16,580	11	45,060	11	6,60,000	2,33,000	2,75,000	—	—	15,84,000	37,00,000	—
	Mysore	6,700	1,000,000	—	—	—	—	—	—	—	—	—	15,00,000	—	—
	Hyderabad	7,000	700,000	—	—	—	—	—	—	—	—	—	—	—	—
	Bombay	18,700	3,400,000	—	—	—	—	1,23,000	—	—	—	—	—	—	—
	Total of 1865-6	180,400	47,600,000	23,230	—	100,860	—	21,31,000	2,34,000	21,08,000	62,12,000	—	—	—	—
1868-9	Rajputana	173,800	14,700,000	—	—	—	—	—	—	—	—	—	26,84,000	37,00,000	1,53,61,600
	North-Western Provinces.	44,300	16,700,000	65,670	12	18,670	9	25,56,000	2,33,000	1,95,000	—	—	—	—	—
	Punjab	19,400	5,000,000	7,180	12	22,800	9	—	1,70,000	2,55,000	21,000	10,16,000	2,20,000	—	—
	Central Provinces	41,500	4,400,000	5,780	12	6,100	12	4,89,200	2,75,000	61,400	—	8,51,000	3,00,000	3,50,000	—
	Bombay	17,200	3,000,000	—	—	—	—	5,44,000	48,000	46,000	—	2,23,700	500	—	—
	Total of 1868-9	296,200	44,400,000	71,430	—	—	—	35,89,200	7,26,000	5,09,400	21,000	20,76,700	—	—	—
1873-4	Bengal	40,100	17,750,000	661,500	10	452,300	6	1,90,90,000	31,71,000	—	3,92,44,000	15,09,000	5,20,500	3,50,000	72,85,400
	North-Western Provinces.	11,200	2,900,000	119,000	4	2,760	9	8,16,600	41,600	52,500	—	14,200	25,000	30,60,000	—
	Oudh	2,900	750,000	50,000	5	—	—	3,17,100	17,900	27,000	—	46,000	75,100	—	—
	Total of 1873-4	54,200	21,400,000	810,500	—	455,060	—	2,02,23,700	32,30,500	79,500	3,92,44,000	15,54,200	1,20,200	—	—
1876-8	Madras	83,800	19,400,000	460,000	22	327,500	22	—	—	—	—	—	2,53,500	30,60,000	6,75,95,700
	Mysore	27,100	5,100,000	53,500	20	56,400	20	29,50,000	31,25,000	—	—	—	1,18,60,000	—	—
	Hyderabad	30,700	1,900,000	22,800	9	16,300	6	8,38,000	2,44,000	—	—	—	29,50,000	20,00,000	8,60,30,000
	Bombay	64,000	10,000,000	285,000	15	32,687	13	1,05,00,000	12,00,000	—	—	—	22,50,000	2,50,000	1,66,75,000
	North-Western Provinces and Oudh	84,800	18,400,000	95,724	12	13,754	12	16,00,300	3,91,900	—	—	—	15,50,000	11,40,000	46,25,000
	Punjab	16,900	3,500,000	—	—	—	—	—	—	—	—	—	—	—	1,43,40,000
	Total of 1876-8	287,300	58,300,000	877,024	—	446,641	—	1,67,88,300	49,60,900	—	—	—	—	—	19,93,200
													1,95,60,000	35,25,000	11,19,48,500

The number of famines and the intervals between them.

72. The first lesson taught by this review is that (except in Burmah and the most eastern parts of Bengal, where the rain has never been known to fail, and Sindh, in which the population is wholly dependent on river-irrigation) hardly any part of our Indian Empire has escaped the visitation of severe famine during the last century, and that over considerable portions acute distress has recurred frequently. Taking all the 21 famines and scarcities recorded in the last 109 years in any part of India, the proportion is 24 years of bad seasons to 85 years of good, or about two bad to seven good; in each case on an average one-twelfth of the population of the whole country, that is about 20 millions, may be approximately taken as the portion affected, so that the result might be said to be equivalent to a famine or scarcity over the whole country once in 54 years. Of these calamities, 8 may be classed as intense famines, 9 as famines, and 4 as severe scarcities.

Omitting severe scarcities, there have been 17 famines, affecting 20 years, and occurring at an average interval of 5 years.

There have been eight greater famines, affecting 11 years, and occurring at intervals which have varied from 2 or 3 to 40 years, and which average 12 years. Of these, five have occurred in the present century, and have affected 202 millions of people, so that each on an average has been felt by 40 millions, or one-sixth of the population of India. As, however, one-fifth of that population is not under British rule, a corresponding reduction must be made from the figures above given in order to indicate the liability which falls upon our own Government.

Liability of different provinces to drought.

73. The liability of the several provinces to severe drought appears to be as follows. In Bengal, during the 110 years over which our records extend, four droughts only have occurred, of which two were very severe. Previous to the Orissa famine Bengal had enjoyed complete immunity from famine for 81 years, and on this occasion, as well as in 1783–4, only the western parts of the province were affected. In the North-West Provinces nine droughts are recorded, of which two were intense and three very serious. The two greatest famines in this part of the country, those of 1783 and 1837–8, were separated by an interval of 53 years, but there was a frequent and highly irregular occurrence of less important droughts. In Bombay nine seasons of drought appear, of which two were extreme. In Madras there were eight such seasons, of which two were excessive. Excluding Bengal, the average interval between the several recorded droughts, great and small, in any one province, is about 11 to 12 years, and between those of the severest type about 50 years, but the deviations from these averages are very large, and the records are not sufficiently accurate to give more than approximate results.

These conclusions may be otherwise summed up by stating that the Government of India must be prepared for the occurrence of scarcity, in some degree of severity and in some part of the country, as often as two years out of every nine; and that great famines may be anticipated at average intervals of 12 years. The danger of extreme famine in any one province or locality arises on the average not oftener than once in 50 years; though drought followed by severe distress must be expected as often as once in 11 or 12 years. The records are not of a nature to enable us to form any decided opinion whether droughts have recurred more frequently of late years than formerly; but, bearing in mind the far greater attention paid to these visitations recently, our general conclusion is adverse to such a supposition.

Irregularity of the recurrence of droughts.

74. Whatever may be the ultimate result of scientific discussion as to the existence of a true periodical fluctuation in the rain-fall, to which we have already alluded, we can now only conclude that no such knowledge yet exists as to afford any ground for administrative action based on well-founded anticipation of the quantity of the rain-fall from year to year; and that whatever preparations we make to meet seasons of scarcity must rest on the presumption that, though their recurrence is inevitable, they will come upon us with very little warning and at very irregular intervals.

Probable greatest area of famine and extent of relief.

75. It is manifestly important to form the best possible estimate of the greatest area and largest population likely to be visited by famine at any one time. The experience of the past shows that seasons of drought do not occur simultaneously in Southern and Northern India, though some tendency is shown for a bad year in the north immediately to follow a bad year in the south. No deficiency at once so serious and so widespread in its effects as that which from 1876 to 1878 was experienced in various parts of the country had previously occurred in the century. The total area which suffered from famine in Southern India during 1877 was about 200,000 square miles, with a population of 36 millions. In the next year an area of 52,000 square miles in the North-West Provinces and the Punjab, with a population of 22 millions, was afflicted by a failure of the rains, though it suffered to a far less degree.

Distinguishing the three degrees of famine as intense, severe, and slight, the famine in Southern India was intense in an area of 105,000 square miles, inhabited by a population of 19 millions; it was severe in an area of 66,000 square miles, with a population of 11 millions; and it was slight in an area of 34,000 square miles, with a population of 6 millions. Where the distress was but slight the necessity for giving relief arose only in isolated localities, and the administration of famine relief on such a scale as to need special measures was in practice confined to the tracts where the famine was intense or severe. Relief was afforded to 780,000 persons or 5 per cent. of the population of the more afflicted area in Madras for 22 consecutive months, and in Bombay to 320,000 persons, or 3½ per cent., for 13 months. The maximum number relieved during the worst month was about 500,000 daily in Bombay and 2¼ millions in Madras, or from 6 to 15 per cent. of the population severely affected.

In Bengal, in 1873–4, the area severely affected was 21,000 square miles, and the population of that area was 10 millions: of that population about 10 per cent. received direct relief for an average period of 9 months, and the highest number in receipt of direct relief at any one time was about 20 per cent., or 2 millions daily.

The famine of 1868–9 is the one which came nearest to that of 1876–8 in severity; indeed, it surpassed that calamity in extent, for it covered the space of 300,000 square miles. It was intense over an area of 113,000 square miles, but of these 110,000 square miles were in the Native States of Rajputana, and were thinly inhabited, the population of this tract being only 7¾ millions. The famine was severe over 112,000 square miles (only half of which was in British territory), and among a population of 21 millions, two-thirds of whom were British subjects. The famine of 1865–6 ranks third in respect of the area it covered, and the population it affected was even larger than that in 1868–9, or in the Southern Peninsula in 1876–8, but the distress it caused was not nearly so grievous. The area of intensity was the Province of Orissa and the neighbouring districts to north and south, a tract which contained only 31,000 square miles, with a population of 6 millions, and the famine was severe in 50,000 square miles more, with 11½ million inhabitants. In the rest of the country afflicted by it the distress was slight, and little or no relief was called for. Hence, in spite of the wide area of the drought, this famine was less generally disastrous than either of the two great calamities which succeeded it.

Looking then to those parts of the country in which there have been the worst famines and the greatest distress, we find in the history of the past no case which has surpassed the famine of 1876–8 in intensity; and it seems reasonable to conclude that it is not likely to be exceeded in the future, either in the extent of British territory affected or in the degree of relief that will be required. On this presumption it may be estimated that the largest population likely to be severely affected by famine at one time may be put at 30 millions. To arrive at the numbers likely to come on relief, we may safely take a proportion slightly lower than that of the Behar famine, say 15 per cent., or four and a half millions, as the maximum number likely to be in receipt of relief in the worst months, and about 7 or 8 per cent., or from two to two and a half millions, as the average number likely to require relief continuously for the space of a year. These proportions provide for relief on a scale about double that actually given in Madras and Bombay in 1876–78.

Relation between drought and duration of famine.

76. The duration of periods of scarcity (a matter greatly affecting their severity and the consequent cost of relief) is naturally connected with the length of the intervals between the harvests, or between the time of one harvest and the succeeding season for sowing, the greatest pressure being frequently relieved when a favourable rain-fall has given practical evidence of the prospects of the coming crop being good. In Upper India, in the Central Provinces and Bombay, and wherever the two harvests of the year are of nearly equal importance as regards the food they produce, if the monsoon is so deficient that the autumn crop is lost, but if the spring crop can be sown over a fairly large area, the severity of the loss will be greatly mitigated, though it may not be wholly relieved when that harvest is secured, but is liable to a partial revival as long as field labour is not required. If, however, the spring crop also cannot be sown, the pressure due to the failure will certainly be felt till the next autumn crop begins to ripen. In Bengal the great winter rice crop is the one liable to suffer from early cessation of the rain, and if it is lost the spring crop will afford a material alleviation of the calamity so far as regards Behar; but in Central Bengal and Orissa hardly anything is grown at this time, and these regions will probably continue to suffer till the next year's early rice ripens in September,

and the prospects of the winter rice are well assured. In Madras and Mysore, if the crops grown under the south-western monsoon are lost, much may be retrieved if the N.E. monsoon is good and fills the tanks and rivers, so that a large area of rice land can be artificially irrigated; if this too fails, no crop will come in materially to assist the people till the succeeding autumn. Experience shows that extreme pressure does not arise till local stocks have been somewhat reduced, and famine is thus hardly known to begin, as a consequence of a failure of the south-west monsoon, before the month of November. Again, when the prospects of the next harvest are practically assured, hope and credit revive and reserved stores of food are released, and thus the effects of famine may be expected to wear off a month or two before the crops are actually cut. From these considerations it may be gathered that the pressure caused by drought in a single year will generally last for about eight or nine months, and when the pressure is relieved in a shorter time, the recovery is proportionally rapid. A scarcity extending over two years is rare, but the intensity of the suffering caused by such a famine is greatly aggravated as the period is prolonged.

What loss of the harvest produces famine.

77. From what is known of famines in respect to which any materials for a detailed estimate exist, it is calculated that from a half to three-quarters of the ordinary out-turn of the food grain of the year has been lost in the tracts most severely affected. It may therefore be inferred from the experience of the past that a year which yields more than 50 per cent. of a full crop will produce food enough for the population under the stimulus to economy caused by high prices, and that, taking into account the grain stores and the probable importation, there will be no such pressure as to require special measures of relief. When the crop is so reduced that the whole out-turn of the year is diminished to 25 per cent. of a full crop, it may be taken as certain that intense famine will prevail. Great uncertainties, however, surround all estimates of failure of crops in such a country as India, and it may easily happen that the particular circumstances of a province will render the effect of a drought more than ordinarily disastrous. An estimated failure of even a third of the year's out-turn will always demand the utmost vigilance and preparedness on the part of the authorities, as relief measures may at any moment become necessary.

Effects of scarcity on prices.

78. There is much difficulty in estimating in any precise way the effect of a short harvest on prices, but it may be said approximately and generally that, in time of very great scarcity, prices of food grain rise to three times their ordinary amount, so that whereas in ordinary years the price of the food grain of the mass of the people may be from 20 to 30 seers per rupee (or 20 to 30 lbs. per shilling, equivalent to 25 to 17 shillings per quarter of 500 lbs.), in time of great scarcity it will rise to 8 or 10 seers per rupee (or 8 to 10 lbs. per shilling, which is 63 to 50 shillings per quarter), and even higher. Much caution, however, is requisite in regarding prices as a sound standard by which to estimate the severity of famine or distress, not only in making comparisons between periods and places considerably separated, but in all circumstances. It is a well-ascertained fact that prices which would be regarded as indicating famine in one part of the country are quite compatible with undisturbed prosperity in another.

Estimate of the cost of relief given in past famines.

79. The figures given in the table in paragraph 71 show all that can now be ascertained as to the cost of the relief given to the population that has suffered in Indian famines. During the first quarter of the present century the position of the British in the country was not such as either to create any sense of a general obligation to give relief, or to supply the means of affording it. During the next 30 or 40 years, as the country became settled and all branches of the administration improved, the sense of this obligation was developed and more and more fully acted on; but there can be little doubt that on many occasions the wants of the people were very incompletely met, and that much suffering and mortality must have ensued. Allowing for the cases in which no records exist, it may be estimated that for the first 70 years of this century about 3 millions sterling were spent in direct State relief, and a somewhat larger amount was contributed as a remission of land revenue, for a total population rising from 100 to 200 millions. The far larger sums which have been spent more recently on similar objects, amounting during the six years 1873–1879 to not less than 14½ millions in direct outlay and 2½ millions in loss of revenue, are still small when compared with the cost of the relief of the poor of England, which for a population of 34 millions amounts to about 7 or 8 millions in a single year. But relatively small as the amount expended in India has often been, the administration of even such restricted measures of relief has, in the

absence of a clearly defined set of principles and rules, and under the conditions which necessarily attend these measures, taxed to the utmost the powers of the Government.

Effects of scarcity on the death-rate.

80. There is great difficulty in forming any trustworthy estimate of the mortality directly consequent on famine. It is only within recent years that systematic registers of deaths have been commenced in any part of India; everywhere they are still very incomplete, and in many cases hardly more than rough approximations to the truth. In the two provinces in which more than one census has been taken the results are such as to show that much prolonged experience is required before any trustworthy generalizations on the laws of life in India can be based on actual facts; and all others are no better than speculation. No statistics exist as to the distribution of deaths among various classes of the people in time of famine, though it is certain that the labouring classes and village artisans are those that suffer most. The registers now kept suffice, however, to give positive proof of the greatly increased mortality that accompanies seasons of scarcity, though conflicting opinions exist as to the degree in which the two phenomena can be regarded as standing to each other in the relation of cause and effect. Great epidemics almost invariably follow upon seasons of severe scarcity. To some extent famine and pestilence are the twin-offspring of the drought, which, while it withers the crops, exposes the diminished water supply to pollution; and it may be reasonably supposed that the atmospheric disturbances which prevent the occurrence of the summer rains, and those which follow as a consequence of the failure of the rains, such as abnormal conditions of temperature and humidity, may be hostile to human life and favourable to the spread of malignant disease. But, in any case, famine, if not the direct cause of epidemics, greatly increases their destructiveness; inasmuch as if the people are in an unfavourable condition—and there can be no condition more unfavourable to health than that of being in want of food—then this condition must have an influence, and in all probability a very great influence, on the extent and severity of the prevailing sickness, by whatever name it may be called. The diagnosis of disease recorded in the vital statistics is, moreover, very incorrect, and deaths arising from starvation are no doubt often attributed to other causes, such as cholera, small-pox, dysentery, and fever. Death from famine is not as simple and easily recognizable a matter as was formerly supposed. The effect of chronic starvation is to induce functional morbid changes in the intestinal organs which, when they have gone to a certain length, are incurable, and which manifest themselves in symptoms that often imitate those of other diseases.

Mortality during the famine of 1876–8, and in the last 30 years. *App. No. II.

81. It has been estimated, and in our opinion on substantial grounds,* that the mortality that occurred in the provinces under British Administration during the period of famine and drought extending over the years 1877 and 1878 amounted, on a population of 190 millions, to $5\frac{1}{4}$ millions in excess of the deaths that would have occurred had the seasons been ordinarily healthy; and the statistical returns have made certain, what has long been suspected, that starvation and distress greatly check the fecundity of the population. It is probable that from this cause the number of births during the same period has been lessened by two millions; the total reduction of the population would thus amount to about seven millions. Assuming the ordinary annual death-roll, taken at the rate of 35 per mille on 190 millions of people, to be $6\frac{1}{2}$ millions, the abnormal mortality of the famine period may be regarded as having increased this total by about 40 per cent.

Such a famine, however, as that of 1877–78 is almost unprecedented in severity extent and duration, and so great a mortality, it may reasonably be hoped, is likely to be of extremely rare recurrence. Taking the famines of the last 30 years, as to which alone an estimate of any value can be made, it would perhaps be safe to say that from 1848 to 1878 the abnormal deaths which occurred in years of famine did not fall short of 10 millions. This would give an increased mortality of about 300,000 per annum, which, spread over a population of about 200 millions, would be less than 2 per mille. Even if this estimate is in error to the extent of one-half of the truth, the effect of famine would, when viewed in relation to the fluctuations due to other causes and to its ultimate effect on the growth of the population, be much less important than might at first sight have been supposed.

Relation of famine mortality to normal mortality.

82. The true significance of these figures will be better appreciated when they are considered with reference to the ordinary fluctuations in the mortality of the country. There is no doubt not only that the general death-rate when compared with that of England is high, but that it is liable to far greater variations. The yearly death-rate of many Indian towns (where registration can be more exactly conducted than in the country) appears from the reports of recent years to have risen occasionally for many months together to rates varying from 40 to 100 per mille, and even higher. In the

months of September and October 1879 a mortality was registered in the North-West Provinces which in some districts suddenly raised the death-rate from its ordinary total of about two or three per mille per month to nearly 40, and the ratio for the whole province for the month of October rose from 3·4 to 10 per mille. The abnormal mortality had not wholly ceased by the end of December 1879, and the effect of this was that in the district that suffered most the actual death-rate of the year 1879 rose from an average of 40 to 118 per mille, implying an increased mortality of 78,000 on a population of a million; and in the whole province, the actual mortality of the year rose from an average of 23 to 45 per mille, which indicates an increase of 924,000 deaths on a population of 42 millions. These rates are considerably in excess of those which have prevailed in districts suffering most acutely from famine. In the worst month of 1877 the death-rate only reached 49 per mille per annum for the entire Bombay Presidency, and 60 per mille for the entire Madras Presidency. If special districts are compared, the highest rate in the worst month in the worst district of Madras was 13 per mille per month, and in the worst district of Bombay it was 12 per mille; in the two worst districts of the North-West Provinces in 1879 it rose to the extraordinary height of 37 per mille. Even these rates are exceeded by some which have been reported at times in some towns of the Punjab. It is certainly to other causes than a deficiency of food that such mortality must in many cases be referred. In 1879, in the districts just referred to, no scarcity whatever existed, prices throughout the whole country were moderate, the autumn harvest had been exceptionally good, and the mortality was attributed by the sanitary authorities to a severe outbreak of malarial fever. We are therefore forced to conclude that the population of India is exposed continually to destructive agencies, which under more favourable conditions might be regarded as preventible, but against which society has at present neither the means nor the knowledge necessary to secure its protection. Large numbers of the people live in so primitive a condition, irrespective of anything that can properly be called poverty, as to render them liable to diseases against which they have no effectual remedy or defence. Epidemics may sweep them off by tens of thousands without attracting attention, because these agencies are incessantly at work. Famine, which intensifies their activity, is more conspicuous from its less regular recurrence, but it is really only one, and perhaps not the most deadly, of numerous influences by which at present human life among the people of India is cut short, and which can be effectually counteracted only by the general advance of society in wealth, knowledge, and material resources.

The possibility of saving life in time of famine.

83. In these circumstances the hope that any human endeavours will altogether prevent an increase of mortality during a severe famine is untenable. It is impossible for the State entirely to counteract the effect of high prices, the cessation of wages, the disturbance of the ordinary routine of life, the general results of shortened food-supply to millions of people. No imaginable system of relief will completely meet all the various degrees of privation and suffering which a famine produces, and which are all more or less prejudicial to the public health and life, though many are too indefinite and obscure to be dealt with by any machinery of official charity, however elaborate and well contrived. There must always be suffering and want which will escape notice; and however extensive be the measures of public aid, and however reasonable be the terms on which it is offered, there will always be classes who, from fixed habits or social institutions of various sorts, or from their personal character or ignorance, will neither help themselves nor be helped, and who, though they suffer from extreme want, will linger on without applying for or accepting relief till it is too late to save their lives.

Recuperative power of the country.

84. But great as is the loss of life which has attended these terrible visitations, we are not without hope that their effects will in future be gradually diminished in intensity, partly by the more efficient character of the relief given, partly by the extension of the means of communication and development of internal trade, and partly by that greater preparedness of the people to meet them which grows from the increase of thrift and resourcefulness, and the accumulation of capital due to a settled and civilised Government. It is, we believe, demonstrable that the effects produced by the famine of 1876–8 on the general prosperity of the country have been less disastrous than those of former calamities, none of which were more grievous and most of which were not to be compared to it in severity. The famine of 1770 resulted in wide-spread desolation of the most afflicted districts, so that we read of "depopulation and ruin," "the thinness of the inhabitants," "many hundreds of villages entirely depopulated," "half the ryots credibly reported to have perished," and a complete disorganisation among the landed classes which lasted for

many years. The famine of 1803 struck such a blow at the prosperity of Khandesh and Ahmednagar that even in 1867 the traces of its ravages were still visible in the ruins of deserted villages which had not been repopulated. In the famine of 1833 so much land went out of cultivation in the Guntur district that even in 1850 the land revenue was only three-fourths of what it had been in 1832. In 1837, in the North-Western Provinces, "the pressure was so great that the ordinary bonds of society seemed to be broken by it. In 1841, the still deserted lands and abandoned houses" in the Etawah district bore evidence to the devastation and waste of life, and during the next five years the land revenue continued to be less by 12 per cent. than in the period preceding the famine. Col. Baird Smith, from whom the above quotation is made, testified that similar effects were hardly noticeable in 1860–1, and this he attributed to the increased power of resistance and self-support among the landowners following the introduction of long-term settlements, which dated from about 1840. Still more remarkable are the facts recorded in the agricultural statistics of Bombay and Madras for the year 1877–8. In Madras the area occupied exceeded by 50,000 acres that of 1874–5, and the land revenue was eight lakhs of rupees in excess of the average demand before the famine. In Bombay there was an actual increase of 70,000 acres of revenue-paying occupied land in excess of the previous year, and the land revenue was increased by one lakh over that of 1876–7, and by 4½ lakhs over the average of the last 10 years. "Thus," as the Secretary of State remarked, "in a year itself of deficiency of crops, depression of trade, and general unhealthiness, "which immediately succeeded the most calamitous famine of modern times, the "facts testify to a remarkable development of the power of the agricultural classes to "resist and recover from the effects of unfavourable seasons." We may hope that the same recuperative power of the country will manifest itself more and more clearly in future; and that it will, by degrees, extend from the landowning classes to all parts of the population.

Despatch, 26 Feb. 1880.

Certainty of the recurrence of famine.

85. We now pass to the consideration of the general character of the action of the Government in times of famine. A very long period elapsed before the conviction was attained that Indian famines are necessarily recurring calamities, against which such precautions as are possible must be taken beforehand, and that it is the duty of the Government to do its utmost in devising some means of protecting the country, and to persevere in its attempts till some solution of the problem has been obtained. This result was no doubt due to the almost total absence, until within comparatively recent times, of trustworthy statistical knowledge as to the numbers of the people, the rates of their deaths and births, and the influence on these rates of epidemic disease or local distress, combined with an equally insufficient insight into their economical condition, and particularly an absence of agricultural statistics in an accessible form. We fear that even yet the vast importance of knowledge of this description is but imperfectly appreciated in many quarters. The want of it has been experienced by us in almost every part of our inquiries, and we feel it to be necessary thus emphatically to call attention to the subject, as such knowledge is, in our opinion, one of the principal instruments on which the Government must rely in preparing for its conflict with famine.

Historical sketch of the views of Government in respect of famine relief.

86. An equally remarkable change in the manner of viewing the obligations of the Government in dealing with famines is indicated by a comparison of the measures of relief offered to the country 50 years ago with those now considered necessary. This change has been the direct consequence of a greatly increased knowledge of the real condition of the people. As the officers of the Government have gradually become more alive to the actual consequences of extreme scarcity and to their terrible character, and have painfully obtained by experience an insight into the manner in which these calamities arise and in which they are to be met, in the same proportion has the sense of the grave duty that rests upon the State to avert the results of famine been quickened and the action of the Government stimulated. No sterner warning could be given of the paramount necessity of obtaining a true knowledge of the condition of the great population which we have undertaken to govern in British India, than is to be found in the history of the famines that have desolated it. We must not permit ourselves to be deceived by the vain hope that the famines of recent years have been more difficult to deal with than those of the past, nor have we any right to suggest that those who have gone before us were less humane than ourselves, for there is direct evidence to the contrary. The lesson of experience is that it is vain to attempt to deal successfully with these calamities without a liberal expenditure of money, that in order to be effectual this expenditure

must be applied with careful attention to the exact conditions under which these visitations arise, and that as a primary condition of success in the administration of relief a more thorough insight into the vital and economical statistics of the country is absolutely essential.

Earliest views as to relief and interference with trade.

87. The miseries of famine, and the possibility of its mitigation by State interference, were at the earliest period of the British Administration of India the topics of official consideration. The great famine which in 1770 desolated parts of Lower Bengal gave rise to a special inquiry and to plans for the alleviation of similar future disasters, and the authors of the Permanent Settlement were keenly sensible of the serious character of Indian droughts, and hoped that one of the effects of that measure would be to put the country and the people in a better position for enduring them. In the famines of 1782, 1792, and 1807 in Madras, 1784 in Bengal, and 1792 and 1803 in Bombay, the Government, following the opinions commonly held at the time, appears to have acted on the belief that the proper remedies were to be found in prohibitions of the export of grain, penalties on merchants who hoarded it or enhanced its price, and other interferences with the course of trade. It was not till the famines of 1812 in Bombay and of 1824 in Madras that the Government adopted the principle of non-interference with trade as a cardinal rule of policy.

Impossibility of giving relief efficiently.

88. But the idea of systematised and effectual action to prevent the suffering and mortality incidental to famine belongs necessarily to later times. While the Government was still unconsolidated,—while wars from time to time still carried destruction into almost all the provinces of India,—while the area, population, and resources of the country were unknown quantities,—while only the rudest guesses could be made at the effects of climatic disturbance on its food crops,—while no machinery existed for the collection of agricultural, economical, or vital statistics, or for the rapid transmission of such information as was locally available,—and, above all, till improvements in the means of communication by roads and railways rendered feasible the transport of grain in large quantities and for long distances, a famine was regarded, and with good reason, as a calamity wholly transcending the powers of man to counteract or even materially to mitigate its effects, and which had to be endured, like other natural phenomena, in passive submission to an overpowering agency. The Native Governments whom the first British administrators represented, and to whom they ultimately succeeded, scarcely attempted anything beyond occasional and unsystematic acts of almsgiving, and the earlier despatches of the Bengal Government, while breathing a tone of sincere compassion for the sufferings occasioned by famine, are busied rather with its fiscal results, as affecting the responsibility of the Company towards its shareholders, than with schemes, which would have seemed wholly visionary, for counteracting the inevitable loss of life.

First attempt to relieve distress by public works.

89. As early, however, as 1792 we find the Madras Government adopting for the relief of the famine distress of that year the system of employment on public works, which has been invariably followed by the administrators of later times. In a subsequent famine which visited that province in 1806 the question of the most expedient form of relief gave rise to a controversy as to the opening of works near the people's homes, and the importation of grain by Government, which has repeatedly been renewed on subsequent occasions, and cannot be said even now to be concluded.

Relief measures adopted in 1837–8.

90. The famine of 1837 in Upper India was characterized by the larger scale on which arrangements were made to meet distress, and by further progress towards formulating the principles on which the administration of relief ought to be based. It was accepted as the general rule for apportioning the responsibilities of the Government and the public with regard to relief, that to the former belonged the duty of offering employment to the able-bodied, while that of giving relief to the helpless and infirm attached, as in ordinary times, to the community at large. This doctrine, with modifications, re-appeared on various subsequent occasions, was distinctly reaffirmed by the Orissa Famine Commissioners, and has only in quite recent times been abandoned in favour of the view that the State cannot divest itself by delegation to others of the responsibility of providing the necessary relief for every class of a famine-stricken population, including that class which is certainly the most helpless.

More elaborate measures in 1860–1.

91. The famine which twenty-three years later visited the same province was the subject of still more careful treatment and elaborate investigation. Large public works for the able-bodied, employment near their homes for such as could not travel far from their villages, and gratuitous aid, generally in inclosed poor-houses, and mainly at the expense of the charitable public, were the chief measures of relief. The searching inquiry which was instituted into its history and results, as described in the well-known Report of Colonel Baird Smith, throws much light on the whole subject

of famine relief administration, and is justly regarded as having contributed largely towards the more adequate fulfilment of this class of State obligation.

Failure of the administration in Orissa in 1865–6.

92. In Bengal a long immunity from famine had encouraged a belief in the improbability of its occurrence, and had left the local officers without any direct experience as to the proper methods of relief. The province of Orissa, to which neither nature nor art had supplied the means of constant communication, found itself in 1865, on the almost total failure of its rice crops, suddenly devoid of sustenance, and a very large mortality ensued before the tardy action of the Government afforded any material assistance. The results of this calamitous season concentrated public attention on the disastrous nature of Indian famines, and the inadequacy of the means available for counteracting them. The events of that year proved with lamentable distinctness that neither the Government nor the local administration possessed an adequate knowledge of the facts or the appliances necessary to offer relief with promptness and efficacy.

Increased activity in 1868–9.

93. The painful lesson taught by this calamity sank deep into the minds alike of the rulers of the country and of the English public, and its results were apparent in the administration of the famine, which three years afterwards visited the North-Western Provinces, and still more in that which in 1873–4 was experienced in Behar. In 1868 every district officer in the North-West Provinces was reminded that "he "would be held personally responsible that no death occurred from starvation which "could have been avoided by any exertion or arrangement on his part or on the part "of his subordinates," and an outlay on a very large scale was incurred in the measures adopted by the Government for the employment and relief of the population.

Energetic efforts made for relief in 1873–4.

94. These influences were still more apparent in the famine of 1873–4. The memories of Orissa led to the resolution that, so far as money, zeal, and skill could avail, no such effects should be produced by the similar visitation in Behar. The whole energies of the Government were strained to the utmost, and every appliance at the command of the State was brought to bear on the task before it. Prudential considerations were subordinated to the paramount necessity of relieving distress and obviating mortality; life was preserved, but money was spent profusely, and a famine of unusual brevity and no exceptional severity was found to have involved an expenditure of about 6½ millions, or as much as had been spent in every form of relief in the previous famines since the commencement of the century.

Financial effects of these relief measures.

95. These results brought prominently to notice the position of the Indian Exchequer with reference to future claims upon it of like nature, and the Government of India came to the conclusion that the periodical recurrence of famine ought henceforth to enter into its calculations when making provision for its ordinary wants from year to year, so that the expenses involved in famine relief—which it was fully recognized must certainly be large—should no longer be permitted to add to the permanent debt of the country, and thus to throw a constantly increasing burden on posterity.

More serious financial effect of the famine of 1876–7.

96. It was in these circumstances that the Government found itself when the drought of 1876 came upon Southern India. The great magnitude of the difficulty to be met became apparent before the end of that year; a calamity had to be faced, which, judging from the area affected and the completeness of the failure of the harvests, seemed likely to exceed in gravity anything that had occurred in the present century. With the experience of 1873–74 fresh in their memories the Government conveyed to their officers engaged in conducting the measures of relief a warning as to the extreme importance of guarding against wasteful expenditure. The prudence of such a caution was shown by the fact that in consequence of the long duration of the famine and the extensive area over which it spread, the direct outlay on relief eventually reached the sum of nearly 8 millions, thus raising the whole amount spent in five years between 1873 and 1878 to no less than 17 millions sterling, besides about 1¼ millions lent to Native States to assist them in carrying out measures of relief.

Modification of relief principles adopted in Behar.

97. It is a matter of notoriety that an impression had become widely prevalent in India that the desire to afford proper relief to all distress in the Behar famine had led to a lavish expenditure by Government in the importation of grain, and to some relaxation of the precautions without which all relief, and especially that which is gratuitous, is liable to be misapplied. Though it was not directly so declared, there can be no doubt that the advisers of the Government of India were influenced by these views. More particularly, the considerations which had, in the case of Behar, been held to justify the purchase of grain by the direct agency of the State in order to supply the requirements of the population affected by the scarcity, were decided not to be applicable to the circumstances of Southern India, and the movement made in this direction at Madras was at once stopped.

General enforcement of these principles.

98. The result of these convictions was a declaration by the Government that while on the one hand no effort should be spared, consistently with the resources of the State, to prevent deaths from famine, on the other it could not undertake to prevent all suffering and to give general relief to the poorer classes of the community. The mission of Sir Richard Temple to the distressed districts, there to confer with the local authorities and to offer his advice, insured the utilisation, as far as circumstances admitted, of the experience obtained in Behar; and subsequently, as Governor of Bombay, he directed the relief operations in that Presidency. It is understood that the Madras Government in the management of the famine of 1876–77 in that province aimed at substantial conformity to the principles adopted in Behar in 1873–74; and it does not appear that the theory of the obligation of Government in regard to famine relief followed in Bombay differed materially from those principles, though in practice important modifications arose from the adoption of the policy of leaving the supply of food grain to the ordinary operations of trade, and from the greater anxiety shown to avoid profusion of expenditure and to secure the useful application of labour.

Financial provision for meeting the cost of the famine.

99. The experience of 1876–77 led to the re-affirmation and more complete carrying out of the financial policy initiated in 1874 of regarding the liability to meet the necessary outlay for famine relief as one to be provided for from annual income, and provision was accordingly made in 1878, by a re-adjustment of the public income and expenditure, for securing a yearly surplus of 1½ millions sterling to discharge this obligation. This arrangement, while it has offered a pledge of the recognition by the State of its responsibility for giving relief on a scale commensurate with the wants of the people, has at the same time supplied the source from which such relief may be henceforth afforded with confidence and promptitude, whenever the necessity arises.

Famine relief no cause of financial embarrassment.

100. The sums spent in 1873–74, and in 1876–77, though very much larger than anything before thought necessary, are still not such as to justify the fear that famine relief will hereafter be a cause of financial embarrassment, if it be remembered that severe famines as a rule affect limited areas, that considerable portions of the country are naturally exempt or have been artificially protected from them, and that such great emergencies are of rare occurrence, intervals of 11 or 12 years commonly elapsing between the scarcities of second-rate intensity, and more than double that period between the severest famines. Nor should it be forgotten that certain causes of large outlay, such as that which was considered obligatory in Behar in 1873, may most likely be avoided in the future, and that even if in some directions increased expenditure may be required, in others economy may be obtained by a better application of means to the end in view. Taking the figures before arrived at (par. 75) as indicating the probable maximum number of persons to be relieved in the worst famine for an average time of one year to be 2½ millions, and reckoning the cost per head, including all contingencies, as not likely to exceed 50 rupees, or 5*l*., the maximum charge in any future year would be 12½ millions sterling. But such extreme cases would be of rare occurrence, and the average numbers for a series of years would be far less, not amounting to more than 250,000 yearly. This estimate is obtained from the calculation that the average number affected annually in all India is, as shown in para. 72, one fifty-fourth of the entire population, or 4½ millions; and of this, four-fifths, or 3½ millions, are British subjects. Taking 7 per cent. (as in para. 75) of the affected population to be the proportion that stand in need of relief measures, the number to be supported on an average for one year will be 245,000; and the cost of their support at 5*l*. a head would involve a yearly average charge of 1½ millions. Considering the doubts that must necessarily surround any such estimates, the accordance of the sum thus obtained with the 1½ millions adopted by the Government of India in 1878 seems to justify the belief that this last-named amount is not likely to be exceeded as the average charge for famine relief over a series of years. This sum of 1½ millions per annum roughly approximates to ½ per cent. on the value of what we estimate (in para. 155) to be the average annual out-turn of food grain in the country.

No former procedure as to famine relief to be altogether regarded as a precedent.

101. On a consideration of the measures adopted for the relief of past famines it seems impossible to declare that the procedure followed in the treatment of any one of them was altogether successful, or such as should be entirely accepted as a precedent for future guidance. We cannot doubt that the measures taken in the famine of 1873–74,—though they must be recognized as successful so far as the absence of mortality can be received as a test,—exceeded the necessities of the case, but in default of precise information as to the loss caused by the drought, both taken absolutely and in comparison with the loss on other occasions, it is impossible to estimate the degree in which the adoption of a different set of measures would have produced a different result from that which actually occurred. Regarding the famine of

1876–78, it can scarcely be asserted that the system adopted was altogether satisfactory or efficient; nor is it possible to say precisely in what degree the calamity was susceptible of mitigation. So great are the necessary uncertainties which surround such matters, that opinions may reasonably differ as to the relative or absolute extent and severity of the different scarcities, as to the actual number of deaths properly attributable to famine or want, and as to the extent to which the intervention of Government really led to saving of life, or in which administrative mismanagement resulted in suffering and mortality, which might have been prevented under a better system.

But principles can be laid down based on past experience.

102. But this negative conclusion need not interfere with the practical utility of the inquiry on which we are engaged. Our task is, by careful consideration both of the shortcomings and successes of the past, to ascertain and lay down the general principles of a sound and efficient system of relief; and we find no serious difficulty in coming to conclusions in this sense which we generally approve and submit for the consideration of the Government.

Want of diversity of occupations in India.

103. A main cause of the disastrous consequences of Indian famines, and one of the greatest difficulties in the way of providing relief in an effectual shape, is to be found in the fact that the great mass of the population directly depends on agriculture, and that there is no other industry from which any considerable part of the community derives its support. The failure of the usual rain thus deprives the labouring class, as a whole, not only of the ordinary supplies of food obtainable at prices within their reach, but also of the sole employment by which they can earn the means of procuring it. The complete remedy for this condition of things will be found only in the development of industries other than agriculture and independent of the fluctuations of the seasons. With a population so dense as that of India these considerations are of the greatest weight, and they are rendered still more serious by the fact that the numbers who have no other employment than agriculture, are in large parts of the country greatly in excess of what is really required for the thorough cultivation of the land. So far as this is the case, the result must be that the part of the population which is in excess of the requirements of agriculture eats up the profits that would otherwise spring from the industry of the community. It is not surprising that in a country thus situated material progress is slow.

Effects of density of the population.

104. This density of the population, though greatest in the districts which are most productive and least liable to suffer from drought, is yet generally such as to afford proof that the effect of famines in checking the increase of numbers is less than is often supposed. The greater density of the population of the richest rural districts of India, as compared with that of corresponding tracts in Europe, can hardly be otherwise accounted for than by the greater ease with which the immediate requirements of human life—food and warmth—are satisfied in the climate of India. It would be to travel beyond the limits of our present inquiry to attempt to compare the physical ease and comfort of an average Indian peasant with those enjoyed by one of the same class in Northern Europe, but the advantage would probably be greatly in favour of the former, though his life may be shorter and is subject to greater risks. To this same advantage of the Indian peasant in respect to the ease with which the wants of life are met is, doubtless, due his relatively slower progress in all the arts which have for their aim the protection of man against physical discomfort, and which in their aggregate are among the principal constituents of what is termed civilization; and to this fact, and to the larger and less usefully employed population in which it has resulted, must in great measure be attributed the slower accumulation of national wealth.

Obligation of the State to give relief in time of famine.

105. The precise circumstances under which it becomes right and necessary that the resources of the State should be applied to the relief of want or suffering must differ in different countries, but the general conditions by which the obligation is governed appear to be these: (1), that the calamity shall be one which places it beyond the power of an individual to obtain the requisite relief or efficacious remedy otherwise than with the aid of the State; and (2), that the intervention of the State is likely to produce a practically beneficial result. There can be no doubt that a calamity such as famine, exceptional in its nature and arising from causes wholly beyond human control, which deprives an entire population of its customary food supply, and arrests the ordinary employments of the wage-earning classes, is one which in a country such as India wholly transcends individual effort and power of resistance. It accordingly becomes a paramount duty of the State to give all practicable assistance to the people in time of famine, and to devote all its available resources to this end; and this duty is emphasized by the fact that the

Government stands in the place of landlord to the agriculturists, who form the great mass of the population. We need not entangle ourselves in vain speculations as to the point at which the consequences of giving relief on some imaginary scale of magnitude would become a more grievous evil to the country than the destruction that would follow if famine were left without relief, or with relief known to be insufficient. No such alternative is at all events at present before us.

Obligation extends to the giving relief against other great calamities.

106. It is, however, desirable to point out that an obligation such as that above stated cannot be confined to the protection of the community against the loss of life or the extreme suffering consequent on famine, but necessarily extends to the provision of similar help against other calamities, such as the destruction caused by the inundations which attend cyclones, by great epidemics, or other causes of suffering and mortality. As the gradual enlargement of the scale of relief in time of famine has followed on the more complete recognition of the possibility of meeting the evil, so, no doubt, will it be with respect to these other visitations. In the fulness of time it may be hoped that sanitary and other precautions will take a more prominent place among the practical measures by which the community protects itself against various destructive agencies, some of which are hardly less deadly than famine, though the form which they assume may be less apparent and may produce less effect on the imagination.

Necessity of administering famine relief so as not to check thrift and self-reliance.

107. To secure compliance with the second condition, which prescribes that the interference of the State shall be practically beneficial, there are certain important limitations by which the administration of relief must be restricted. The British administration of India, with so many of the latest appliances of civilization and science at its command, has in many respects fundamentally changed the position of the people for the better; it has given a check to some of the great causes of mortality at work among them, it has provided many inestimable advantages, and has added much to the power of the community to improve their condition. It must be remembered, however, that all such advantages tend at the same time to favour the increase of the population, and to add to the pressure on the means of subsistence. It becomes, therefore, especially important that the Government, when it has to deal with calamities such as famines, should so frame its measures as to avoid every tendency to relax in the people the sense of the obligation which rests on them to provide for their own support by their own labour, to cultivate habits of thrift and forethought, and as far as possible to employ the surplus of years of plenty to meet the wants of years of scarcity. The great object of saving life and giving protection from extreme suffering may not only be as well secured, but in fact will be far better secured, if proper care be taken to prevent the abuse and demoralization which all experience shows to be the consequence of ill-directed and excessive distribution of charitable relief.

Or impair the structure of society.

108. The structure of Indian society is, in some ways, admirably adapted for common effort against a common misfortune. The ordinary form of life in the Hindu family makes each individual a member of a corporate body, in whose possessions, rights, and duties he participates, and to which he is legally entitled to look for assistance in time of need. Even where the legal right does not exist, the moral obligation of mutual assistance is scarcely less distinctly recognized. Apart from family ties, there are other relationships, such as those of landlord and tenant, master and servant, employer of agricultural labour and employed, alms-giver and alms-receiver, which are of the utmost importance in binding the social fabric together, and enabling it to resist any ordinary strain. There are, too, salutary habits of frugality and foresight, the precious result of traditional experience, which have an all-important bearing upon the power of Indian society to pass comparatively unscathed through periods of dearth. Any form of relief calculated to bring these rights into obscurity or desuetude, or to break down these habits by showing them to be superfluous, would be an incalculable misfortune. In the same way anything which diminishes the reluctance which the people exhibit to accept public charity, and the eagerness with which at the earliest opportunity they recur to their own unaided labour for support, would be a certain cause of future grave evil.

The classes that suffer from famine.

109. The first effect of drought is to diminish greatly, and at last to stop, all field labour, and to throw out of employment the great mass of people who live on the wages of such labour. A similar effect is produced next upon the artizans, the small shop-keepers, and traders, first in villages and country towns, and later on in the larger towns also, by depriving them of their profits, which are mainly dependent on dealings with the least wealthy classes; and lastly, all classes become less able to give charitable help to public beggars, and to support their dependants. Such of the agricultural

classes as possess a proprietary interest in the land, or a valuable right of occupancy in it, do not as a rule require to be protected against starvation in time of famine unless the calamity is unusually severe and prolonged, as they generally are provided with stocks of food or money, or have credit with money-lenders. But those who, owning only a small plot of land, eke out by its profits their wages as labourers, and rack-rented tenants-at-will living almost from hand to mouth, are only a little way removed from the class of field labourers; they possess no credit, and on them pressure soon begins. Thus the classes who are the earliest in point of time to feel the need of relief are (1) the actually landless class who live on the wages of labour, and the smallest proprietors or occupiers; (2) artizans and small traders; (3) infirm persons and beggars who ordinarily live on the charity of the public or of individuals; and (4) the dependants of all persons who by reason of their own distress can no longer support them. These classes again fall into two chief categories: (1) those who are accustomed and able to perform work of some sort; and (2) those who from any cause are incapable of labour.

How to ascertain the proper objects of State aid.

110. Such being the general character of the calamity to be met, and of the classes who need relief, we have to consider the manner in which the proper recipients of the public charity can be most effectually ascertained. The problem to be solved is how to avoid the risk of indiscriminate and demoralising profusion on the one hand, and of insufficient and niggardly assistance on the other—how to relieve all who really need relief, and to waste as little public money as possible in the process. In England it has been considered that the economical administration of public charity is best secured by placing the responsibility for relief directly upon those who have to pay for it, and who from their local knowledge are in the best position to judge in each particular case whether assistance is required. No such system has ever been adopted in India, or could, in the present condition of the country, be adopted without risk of disastrous failure. Again where limited numbers have to be dealt with, and there is a numerous and efficient staff of officials, it may be possible to ascertain by personal inquiry the circumstances of every applicant for relief sufficiently for the purpose of admitting or rejecting his claim. But in an Indian famine the Government has to deal not with limited numbers, but with millions of people, and the official machinery at its command, however strengthened for the occasion, will inevitably be inadequate to the task of accurately testing the individual necessities of so great a multitude. Nor again is it possible to entrust the administration of public charity to a subordinate agency without providing sufficient checks against dishonesty and neglect on the part of its members. Some safeguards then are essential in the interests of the destitute people no less than of the public treasury, and they are best found in laying down certain broad self-acting tests by which necessity may be proved, and which may, irrespective of any other rule of selection, entitle to relief the person who submits to them.

Labour test.

111. The chief of these tests, and the only one which in our opinion it is ordinarily desirable to enforce, is the demand of labour commensurate in each case with the labourer's powers, in return for a wage sufficient for the purposes of maintenance but not more. This system is applicable of course only to those from whom labour can reasonably be required; it provides a plain and intelligible method of relief for the great mass of the population; it affords the means of ascertaining necessity, detecting imposition, and procuring for the State some useful return for its expenditure, and it avoids to a large extent the demoralising influences of purely eleemosynary aid. It requires, in order adequately to meet the case, as will be seen hereafter, to be accompanied by various other measures of relief; but for those who are able to work, we can feel no doubt that it is the safest and most efficacious form of State help, and that, to use the language of a great administrator* of famine relief in modern times, "the best and most useful kind of alms consists in providing means of earning them." The great bulk of the applicants for relief being thus provided for, we believe that it will be possible for an efficient staff of officers to control with success the grant of relief, on the basis of personal inquiry and knowledge of the individual circumstances of each applicant, among the comparatively small numbers of destitute persons to whom the test of labour cannot be applied.

*Turgot.

The main principles of famine relief.

112. The following are the principal rules of action which we consider are most likely to conduce to the efficient administration of relief in times of famine:—

I. To lay down a definite system of procedure, to be embodied in a famine code, which the Local Governments will carry out, subject only to financial control on the part of the Government of India. At the same time to provide, by the aid of a special department of the Government, an improved system of recording information

on subjects connected with famines, and of collecting and dealing with the statistical returns relating to the weather, the agriculture, the health, and the well-being of the people, and thus to secure the most prompt and accurate knowledge attainable of a probable failure of crops, and of the extent and consequences of any failure that actually takes place. Further, to concentrate the control of the various branches of the Administration concerned in famine relief, and to render their action more efficient.

II. To provide for the offer of employment at the cost of the State to persons capable of work and deprived of the means of earning their livelihood by reason of drought, such employment being offered in time to secure them against the danger of falling into an enfeebled condition through want, and being adapted to the capacity of the labourers.

III. Simultaneously to offer gratuitous relief, as far as possible, in their villages, or, if the case shall so require, in poor-houses, to persons who in such times are left without the means of support, and are from any cause incapable of providing for themselves; attention being given to the great importance of avoiding anything that may tend to weaken the coherence of the village community, of working through the village officers or head men, where such authorities exist, and of making use of any available local help for superintending the relief operations.

IV. To organise a suitable system of village inspection and control, through which the condition of the country and the efficiency of the measures of relief may be ascertained, and defects brought to light and corrected, and the people encouraged to avail themselves of the measures offered.

V. To maintain a policy of non-interference with the ordinary operations of trade unless in some very exceptional condition of affairs when there may be evidence that without such interference the supply of food will not be maintained; but to keep a constant watch over the food supply of the people in time of threatened or actual scarcity, and to remove any impediments in the way of the free movement of trade; measures being also taken in anticipation of the time of need to extend and improve to the utmost, and in all parts of the country, those means of communication on which the distribution of the food directly depends, and those means of irrigation by which its production may be profitably increased and secured.

VI. To grant aid to the land-owning classes in two ways:

First, to relax the demand for land revenue at a time of widespread loss of the harvest, suspending it freely in proportion to the degree of that loss, on the condition that a proportionate relief is given to tenants and others who hold subordinate rights in the land:

Secondly, to give loans both to small landed proprietors who are in need of such assistance, and also to larger proprietors who may be trusted to apply the money usefully.

VII. To lay down with precision the limits within which the principle of local responsibility for meeting expenditure on relief shall be applied to provincial governments; and to require the municipal authorities in the towns, and the local committees in the districts, to co-operate in carrying out relief measures for the local population.

I.—*Improved Administration and Statistics.*

A famine code to be prepared.

113. Every Government which has administered relief measures in time of famine has felt the need of issuing general orders, both to secure uniformity of system and also to avoid the risks that would arise from any of its officers not possessing personal experience of this particular kind of work. At first orders of this description were promulgated from time to time as occasion arose, but of late years there has been a tendency to bring them into the form of a permanent code of instructions, and in more than one province such a body of rules has been drawn up. It is certainly desirable that a further step should now be taken in this direction. The duties involved in relief measures are complicated and multifarious; their successful performance necessitates the utilisation of large stores of accumulated experience and a carefully considered and prepared plan; they cannot be safely left to individual energy and resource, or be dealt with on a system improvised only when the emergency has arisen. Prompt and decided action in carrying out these measures is of primary importance, and by considering well beforehand the principles that should guide them, much of that hesitation and uncertainty of purpose, which have been found to be so detrimental in the past, will be avoided in future. We recommend, therefore, that the Government of India should, as soon as possible, issue

a set of rules embodying the main principles that should govern the administration of famine relief, and that these rules should be authoritative in all parts of British India. The broad principles being thus fixed, it would be the duty of the several local Governments to apply them by drawing up a famine code, containing detailed instructions suitable to the varying wants and administrative systems of the different provinces, and embracing, as far as human foresight can go, all matters falling within the scope of relief administration. We append to this report a draft of the rules which we suggest for the adoption of the Government of India, and a model of such a code. The latter will no doubt require modification to meet local peculiarities, but will, we trust, be of great use, since its clauses contain the pith of all the valuable suggestions that have been made to us. The local codes of famine relief should be laid before the Supreme Government, and when they have received its sanction the local Governments should be left free to act upon them, whenever occasion arises, without the necessity of any fresh reference as to matters for which provision has been made, just as they apply other rules of administration. The entire responsibility should rest upon them that everything is done that is needful in the matter of giving relief, and that, as far as the State can prevent it, no one shall be allowed to die for want of food, the only control retained by the Government of India over their measures (other than the general power of correcting errors) being the financial check over expenditure, and over the means adopted to supply the necessary funds.

Financial control.

114. Such a control as this it is clearly essential to retain. So long as the cost of relief is not wholly charged against local resources, it would be impossible to permit any one province to incur on its sole authority large expenditure, to meet which it would need the help of the rest of British India, without the supervision and knowledge of the Supreme Government, which alone can impose burdens on the general taxpayer. Even if it be hereafter thought desirable to provide locally, wholly or in part, the funds required for famine relief, the same principles that govern the raising of loans or taxation for ordinary purposes of administration must be applied to this case. The limits of local authority in the matter of spending money for relief, and the occasions on which reference must be made for sanction or assistance to the Government of India, should therefore be clearly defined at the outset.

Necessity of a separate Department.

115. It is not to be anticipated that any system of measures could now be framed which would secure all that is wanted in the future. What is desired is that the experience dearly bought in the past may, as far as possible, be rendered available as a guide for the future, and that a system may be established on which may be engrafted any improvements of practice which the changed condition of the country or prolonged experience may hereafter indicate to be desirable. The administration of famine relief would therefore be more effectually carried out and controlled if the measures it requires, instead of being started afresh as each occasion arises in the manner which at the moment seems most convenient, were not only conducted on a well-considered and prearranged plan, but also were placed definitely and permanently under some special branch of the secretariat, both in the Government of India and in the local Governments. Such an office in each province would have charge of all the records of past famines, and take note of all that is being usefully done or learnt in neighbouring provinces, so that the gathered results of past experience might be collected and made accessible, which has hitherto been hardly possible. Through this office should be brought together the more comprehensive and exact record of the agricultural, vital, and economic condition of the people, to the urgent necessity of which we have already drawn attention. Especially when a famine is thought to be impending would such an office become important, as it would supply the Government with all statistics bearing on this subject, and would be responsible for working out from them the conclusions on which the decision as to future action would mainly rest. When a famine is in progress, all the information relating to relief measures, their extent, their cost, their results, would be collected in it and presented in a uniform and intelligible manner, and through it all orders of the local Government relating to famine administration would be issued. A corresponding branch of the secretariat of the Government of India would occupy a similar position in relation to the Viceroy and his Council, as regards collecting and recording information, advising the Supreme Government, and conveying orders to the local Governments.

To be called the Agricultural Department.

116. The creation of such offices would not necessarily involve any great increase of expenditure; much of the work to be done in ordinary years is now scattered over several offices, and would merely have to be concentrated in one; while the needful

expansion in time of famine would be provided, as is now done, by adding temporarily to their strength as long as unusual exertion is required. As the duties to be discharged in ordinary times would mainly consist in the collection of facts relating to the condition of the agricultural community, and the agricultural produce of the country, they would almost as a matter of necessity fall within the province of an Agricultural Department, and as we are of opinion that such a department should be organised under all the Governments, we shall hereafter speak of the special office we have suggested by the name of the Agricultural Department.

Organisation for famine relief.

117. The recurrence of famine being an event altogether exceptional in its character, and taking place at irregular and often greatly prolonged intervals, we consider that the performance of the duties that fall upon the Government in relation to it must be entrusted to one of the departments charged with the ordinary machinery of administration, and the most suitable of these would be the Agricultural Department. For the same reason the administration of the measures for famine relief must mainly devolve on the ordinary establishment appointed to carry out the normal work of government in the country, and not on any special organization expressly created for the purpose; and what must be aimed at is a system which may be worked by the ordinary official staff, supplemented when necessary to meet the special circumstances of the case.

Appointment of a Famine Commissioner.

118. Experience has shown that the measures required to meet occasions of severe famine fall under so many heads and require the co-operation of so many officers in different departments of the Government, that much injury to the public interests has often arisen from want of a central authority by which the varied requirements of relief on a large scale can be considered in relation to one another, and uniformity of action secured. The gradual expansion of the measures of relief of late years, and the recognition of the liability to provide for all classes of the community in all parts of a tract suffering from famine, have left it no longer doubtful that in future, when such a calamity occurs on a large scale, a special officer should be nominated, who might be called the Famine Commissioner, in whom should be centred the responsibility for directing all branches of famine relief, under the immediate orders of the head of the local Government, and in immediate connection with its Agricultural Department. Such an officer should be specially selected for his energy and general aptitude for administration; he should, if possible, have had previous experience of famines; and he should possess the entire confidence of the local Government, so that in every case of emergency he may act without hesitation, in the full knowledge that he may expect support. He should exercise constant supervision with a view to securing uniformity and efficiency in the manner in which the code of instructions is being followed. He should be ready to move at any moment to any place where his presence is called for to originate measures of relief, to correct errors, or to meet unforeseen difficulties; and by aid of suitable reports by letter or telegraph should keep himself thoroughly informed of the whole course of events, and maintain his confidential accord with the head of the Government. The orders of the Government on all relief measures should issue under his name, and arrangements should be made to ensure their reaching the local executive officers with the least possible amount of official routine likely to cause delay, all needful care at the same time being taken to provide for their being thoroughly understood by the responsible supervising authorities.

Special activity required.

119. That relief operations in a period of extreme famine will try the administrative staff to the utmost is certain, and in proportion as the officers who compose it are energetic and intelligent will be the probable measure of their success. On such occasions the local Government should not hesitate to make whatever distribution of the officers at their disposal will be likely to lead to the best general results, and to subordinate all other considerations, however deserving they might be of attention in quieter times, to doing what will conduce most to the preservation of the people from the dangers of famine. The district officers should, on the approach of famine, apply themselves to study vigilantly the condition of the people, putting aside all less important duties which may interfere with the attainment of this object, and taking any steps that may be suitable towards procuring the best and fullest information by visiting the threatened or affected localities, making personal inquiries from the most intelligent inhabitants, and arranging for rapid and uninterrupted communication with the subordinate officials and native gentlemen. At the same time it should be the care of the Government to strengthen the hands of their district officers by a staff of special assistants proportioned to the needs of the case, and

as far as practicable to place the most energetic and efficient officers in charge of the districts or areas where famine is most severe. In the same way the officers of the Public Works Department placed in charge of relief works should be selected not only for their capacity as engineers, but also on a consideration of their knowledge of and sympathy with the people, and their powers of organization under peculiar and trying circumstances. The Commissioners of Revenue and other superior supervising staff of all departments should in like manner redouble their watchfulness, and take special care that while they assist all subordinate to them with their advice they avoid all causes of delay in the communications which pass between the Government and the local executive officers. It should be one of the most important duties of the Famine Commissioner to see that no officer is allowed to remain in charge of any branch of the relief operations, whether in duties of supervision or in immediate management of work, or otherwise, under whom, whether from misconception or incapacity of any kind, bodily or mental, the administration of relief is not successfully carried on; and the Government should firmly support his action in this respect. It is moreover of great importance that the civil administration of the country should be so arranged that the local areas which form the units of executive authority should not be so great as to exceed the power of a single person to control effectually, and the reduction of districts to a moderate size is on this account most desirable. Any other administrative improvement which will strengthen the sense of responsibility among the executive district officers, simplify their communications with the superior controlling authority, remove friction, and expedite the transaction of business, should be sought for and carried out.

Co-operation of all departments.

120. But, apart from demands arising in relation to direct measures of relief, unusual strain will almost certainly be placed on many branches of the administration by the occurrence of severe famine. Such a time will necessarily be one of financial pressure calling for special caution in every province; additional attention will be required to the preservation of order, lest the suffering population should be driven by want to commit acts of violence. The medical and sanitary officers of Government should be especially busy in inspecting the condition of all persons in need of relief, and even in the districts not seriously affected watchfulness will be needed in respect to the public health. The dependence of an uninterrupted food supply on the efficiency of the local means of communication and the railway administration throughout the country must be closely watched to see that all possible facilities are given for the importation and distribution of grain by their means. Where irrigation is practised from works managed by the Government increased care will be essential to secure the utilization to the utmost of the available water supply for the preservation of the food crops and for their extension as far as possible. On some of these points further remarks will be made in a subsequent part of our report, and here it is only necessary to add that a period of severe drought and famine in any part of India should be an occasion when those provinces which are exempt from the calamity should be ready to contribute all their resources to give any assistance that may be required.

Need of improved agricultural, vital, and economic statistics.

121. The efficiency of such a special department as we have proposed will depend mainly on the completeness and accuracy with which the agricultural, vital, and economic statistics with which it has to deal are collected in each village, and compiled in each sub-division and district throughout the country.

Reform among the village accountants.

122. With regard to agricultural statistics, we have shown elsewhere* what amount of information can at present be collected from the existing data, and what are the defects in the data, and in the method of preparing them. The revenue system in the greater part of British India is such as to present unrivalled means of ascertaining in the fullest manner all necessary facts relating to agriculture, and to the different incidents of landed tenures in every village; but those means have nowhere been completely utilised or made as efficient as they might be. We recommend that the body of village accountants should everywhere be put on a sound and satisfactory footing as responsible public officers, with a clearly defined set of duties, but with due consideration to the importance of their permanent connexion with their own villages; and that where, as in parts of Bengal and Sindh, the class has ceased to exist through [illegible] it should be resuscitated. Officials of this class should be appointed [illegible] whether the estates are free from assessment, or pay a quitrent, or pay [illegible] fully; and the same annual returns should be prepared for all [illegible] under the permanent or temporary settlement. The field [illegible] of all agricultural statistics, should be pushed on

* App. No. III.

in the provinces where it is now in progress, and should be set on foot in Bengal, where hitherto it has not been introduced. In that province the expenditure, or the major part of it, should be borne by the landholders, who alone derive advantage from the increasing value of the land, and who cannot without such a survey properly perform the duties imposed on them by their position.

Supervisors of village accountants.

123. Over the village accountants there should be a staff of active subordinate officers, employed in keeping them to their duty, inspecting their work, visiting each village in turn, and checking the accuracy of all the items recorded concerning it.

Special officers in each district to supervise statistics.

124. Above these there should be a special officer in every district who would be, as a rule, of the rank of a deputy collector, and whose main or only duty should be to take charge of all matters connected with the economic condition and well-being of the people. He would test and compile the agricultural returns and examine the market prices, and ascertain from these and other data the relative value of each year's crop, according as it is below or above the average. From such a continuous record of the harvests he would obtain data for judging whether the landed classes were in a depressed or a prosperous condition, and how far they were prepared to meet a calamitous season. It would be his object to obtain similar information as to all sections of the population, and to learn what are the causes of depression, and what classes would be the first to succumb under the pressure of scarcity and high prices. The accurate registration of vital statistics and the investigation of the causes of any abnormal mortality would lie within his province, and he would be the agent of the health officer of the district for the purpose of scrutinizing the record of births and deaths. The extent of the food stocks, the ebb and flow of local trade, the current rates of interest charged on loans to different classes, the deficient or superabundant supply of any kinds of labour, and the customary wages paid to each kind—these and other kindred topics, on which information is at present far from precise, would fall within the scope of his inquiries. These officers, while generally subordinate to the collector or chief officer of the district in which they are placed, would be specially under the orders of the Agricultural Department, in respect to the system on which their returns are to be prepared and checked.

The Director of Agriculture.

125. A Director of Agriculture should be appointed in each province as executive head of this department, chosen for his knowledge of the condition of the people, and particularly of the agricultural classes. He would directly control the special statistical officers, and would be the adviser of the local Government on all matters relating to agriculture and statistics. In ordinary times he should discharge these duties and superintend all measures designed to improve the agriculture of the country; and in times of famine he would be the officer responsible for warning the Government as to the agricultural outlook, and for preparing such a forecast as should guide it in issuing instructions, and setting on foot measures of relief. A corresponding officer should perform analogous duties under the Government of India, assisting it in its dealings with the local Governments in the Agricultural Department, and in the supervision of the local Directors of Agriculture. All these officials, and a certain proportion of the special officers in each district, should have been prepared for their duties by a technical training in scientific and practical agriculture. A more detailed consideration of the measures that we suggest for attaining this end, and for originating and stimulating improvements in agriculture, will be found in another part of this report.

II.—*Provision of Relief for the Able-bodied.*

The first effect of drought is to stop the demand for labour and raise prices.

126. The ordinary position of the country in seasons of scarcity is that, the population being for the most part engaged in agriculture, and a large section being dependent on the wages of field labour, paid either in money or in kind, a drought which more or less completely destroys the crops, somewhat in the same proportion deprives the labouring class of their usual occupation and means of subsistence. This result ensues in part directly from the fact that field labour has become useless or impracticable, and to some extent indirectly from the fact that the employers of labour lose their ordinary means of paying wages, which are derived from their produce in possession or in prospect. The stores of grain held by the landowners are in such seasons much more strictly retained for their personal wants; and the price of food rises to two or three times its ordinary rate, so that, even if the usual wage were obtainable, it would be insufficient to support life.

Duty of the State to come forward as an employer of labour.

127. In such circumstances it becomes necessary for the State to replace for the moment, as far as may be needed, the ordinary employers of labour, and to furnish work and the wages for work to the labouring classes, with a view to enabling them to earn a livelihood so long as their ordinary occupations are necessarily interrupted. The relief thus given should be tendered promptly, and before the people have begun to lose strength from want of food, and the needful steps should be taken to induce all destitute persons able to work to come to the places where employment is offered them as early as possible. It will at the same time be necessary to see that the cost to which the community as a whole is put by the employment of persons in want is no more than the case strictly requires.

Nature and locality of the relief-works.

128. The employment thus offered by the State can hardly be other than some form of simple labour, such as is required on the ordinary public works carried on under the officers of the Public Works Department. The works selected should be of permanent utility and capable of employing a considerable number of persons (a large proportion of whom would be unskilled labourers) for a considerable period of time. Their position must be regulated by various circumstances, to all of which proper weight should be given, such as convenience of access to the distressed population, facilities for the provision of food and for supervision, and healthiness of situation. The selection of these works should be the duty of the Public Works Department in each presidency or province, acting under the orders of the local Government, and that Department should be held responsible for keeping a list of such works ready to be put in hand without delay when any such emergency occurs. If possible one such work should be opened in each sub-division of a district in which severe distress prevails. It is not necessary, and may often be undesirable, to offer to every one work close to his door, but on the other hand it is unreasonable to expect people to travel great distances in order to obtain relief, or to make such a journey a condition precedent of their being received on relief works; and we think that such a test should not be applied.

Management of relief-works.

129. The immediate direction of these works should be entrusted to the officers of the Public Works Department, whose special training best qualifies them for such a duty, and who would be responsible for enforcing discipline and directing the labour. It is to be clearly understood by these officers that their duty is not, as in ordinary times, to get the greatest quantity of work done at the cheapest rate, but to give effectual relief to the labouring population, inasmuch as the work is undertaken not for its own sake but for the sake of the people employed on it. Labourers of all kinds and of all degrees of working capacity and working power should be received on these works if they apply for admission, and civil officers should be appointed to co-operate with the Public Works officers in classifying the labourers and seeing that they are properly paid and tasked according to their strength. The other duties of the civil district officers will be so numerous and important that it is not expedient that the ordinary relief-works should be carried on by them, unless in the case of the Public Works Department being unable to supply officers for that purpose. Work might, however, be carried on under the Civil officers for the purpose of giving employment to persons who have been in the receipt of gratuitous relief, and who, though beginning to recover from debility, are not yet strong enough to be sent off finally to the regular relief works.

Position of the collector in relation to the Public Works staff.

130. The collector of the district should exercise general supervision over all works, as over all other arrangements for giving relief within his district, and should be responsible to Government for their efficiency. Pending reference to the Government or other superior authority, his decision should be accepted by the Public Works officers in all matters relating to the task and wage of the people employed, as well as in opening or closing works, and generally in everything except arrangements of a merely technical nature.

The wage and the task.

131. It has been proved by experience that when there is little to do in the fields, large numbers of people are apt to flock to get employment on Government works although there is not any such general need as to justify the offer of work to all comers. This is particularly the case if the task is light and discipline slack, and too easy terms may even have the effect of drawing labour from its legitimate sphere, and discouraging the continuance or resumption of ordinary agricultural occupations. It is therefore necessary that proper discipline should be maintained, and that, though all applicants should be received, certain self-acting tests of wage and labour should be enforced to prevent the relief work from being so light or unduly attractive as to induce any to remain who are not really in want. The wage should be adjusted from time to

52

time so as to provide sufficient food for the labourer's support, allowing him one day's rest in the week; and separate rates should be prescribed suitable for the various classes of persons as well as for different ages and sexes. A margin should be left with the view of giving security against accidental error on the side of deficiency, not with the view of providing the labourer with the power of saving, and care should be taken that penalties for wilful idleness, in the form of deductions from the wage, should not be so large or so often repeated as to have the effect of reducing the food of the labourer below what is necessary for subsistence. The wage should be paid if possible daily, otherwise at intervals of not more than three or four days, and the payment should be superintended by a thoroughly trustworthy officer. The labour would be a task fixed according to the capabilities of the labourers, who should be divided into suitable classes for this purpose, and care should be taken to classify and employ them so as not to break up families, which should as far as practicable be enabled to work together. In apportioning the task, the fact that a large proportion of the labourers are doing unaccustomed work, that many may be physically and morally depressed, and that the disruption of their ordinary life, and the novelty of their position on relief-works probably act injuriously on their bodily powers, should be borne in mind. The full task demanded from such persons should not be more than 75 per cent. of that commonly performed by labourers in ordinary times, and from the less capable labourers a still smaller task should be required.

Piecework.

132. The contract system in its ordinary form, under which the labourers become the servants of the contractor, on whom all responsibilities for their payment rest, should be prohibited on relief-works, as it is incompatible with that direct supervision and control on the part of the supervising officer, and that free communication between him and the labourers, which are essential to secure the effectiveness of the relief. The method of payment by the piece may, however, be introduced with advantage, provided that it is optional with the labourers to choose between it and the daily wage. One or more piecework gangs might therefore be attached to each large relief work, in which all who are both able-bodied and skilful labourers should be classed, and to which those who are improving in strength and skill may, if they wish it, be transferred. The rates should be so fixed (with reference to the price of food grain) as to give a little more than the ordinary daily wage in return for the quantity of work likely to be performed. Such increased earnings may tend to encourage a spirit of industry among the labourers which will be beneficial to all; but it should be remembered that it is not expedient to add to the outlay on relief, or to the consumption of food beyond what is essential, and that no object is to be gained by the early completion of any work put in hand. Again, at the end of a famine, if any able-bodied labourers are disinclined to go back to their ordinary work, a system of piecework may be used, with lowered rates, to induce them to go.

Reasons for the above conclusions.

133. We have arrived at these conclusions after careful consideration of the arguments of those who advocate systems differing in some one or other respect from that which we recommend. Of these suggestions, one of the most important is that all relief works should be on the piece-work system; that work should not be employed as a test of necessity, and as a condition of relief, but that it should be offered to all persons whose labour is "remunerative," that is, labourers capable of earning a living on works carried out on the usual system of the Public Works Department, at rates adjusted to the price of food. We are of opinion that experience has proved that the portion of the population not accustomed to work for wages on public works will not spontaneously seek such employment until forced to do so by want, and that it must be anticipated that many will be reduced in strength, and, at first at all events, incapable of earning a livelihood on the public works, assuming that the work to be done to earn a livelihood by everyone must be that of an able-bodied labourer. An unusual proportion will certainly be women, and a large fraction will consist of children unfit for labour, the aged and infirm, and those who are unaccustomed to the sort of work and otherwise unable to work up to the standard performed in the case of skilled labourers in ordinary times. Any attempt, therefore, to make these classes earn their living by ordinary piece-work could not fail to result in great suffering and mortality. If to avoid this the rate be adjusted to meet the powers of the least capable, it will make the works enormously costly, or if it were adjusted to the different degrees of strength of the labourers, the result would be to introduce a variety of rates suited to varying capacities, and so end in something not really differing from task work. If again, only those who can be employed profitably on works are so employed, a great mass of people will be thrown on the Government

demanding gratuitous relief, but absolved from all necessity for showing that they are really in want. On these grounds we think that the only safe course for providing for proper management and economy on the one hand, and the interests of humanity on the other, is to give all those who can do a reasonable amount of work a task carefully adjusted to their powers, and pay them a wage on which life and health can be maintained; piece work being employed only under the conditions mentioned in the preceding paragraph, and gratuitous aid, as described in the succeeding section, being confined to those who are incapable of working.

Miscellaneous arrangements connected with relief-works.

134. A hospital should be attached to all large relief works, and care should be taken that all who fall sick on the work receive proper medical attendance and food, either as in-door or out-door patients. Attention should be paid to hutting the labourers in such a manner as to respect their feelings and the requirements of health and decency. The temporary markets attached to the works should be carefully supervised in respect to the quantity, quality, and price of the food offered. A special allowance should be made to those children of labourers who are of too tender an age for work; if possible, in the form of a diet adapted to their wants.

Indications to be drawn from progress of relief-works.

135. The course of events on these works should be carefully watched by the officers in charge, and periodically reported to superior authority, as it will form one of the safest indications of the degree of the prevalent distress. If works carried on under adequate precautions for discipline and for enforcing a sufficient task and wage are thronged by applicants, and especially if those applicants be persons belonging to other than the ordinary labouring classes, there will be a strong presumption that the pressure is very severe, and that still larger relief operations may be necessary. If, on the other hand, few persons apply, and if there has been nothing in the management of the work to explain their reluctance, it may be accepted as an indication that the distress is not acute. Both of these presumptions may, however, prove to be erroneous in certain cases. On the one hand, as has been noticed, there are portions of every year when field work is at a standstill, and when large numbers of the population will gladly accept work though not in distress. On the other hand, there are seasons, such as those which precede sowing or harvest time, when the people can hardly be induced by any pressure of want to go to work at a distance from their villages, and there are classes with whom apathy or ignorance will produce the same result. Conclusions founded on such evidence must therefore be drawn with much caution, and with a reference to the usual habits of the people.

Relief-works at different stages of famine.

136. The extent to which employment should be provided will vary according to the severity of the famine, and it is therefore most necessary that the probable extent of the calamity should be ascertained as early and as carefully as possible. If it only amounts to severe scarcity the Government will commonly find it sufficient to enlarge its ordinary works, so as to offer employment to greater numbers than usual, but without any change of system; and this, with the addition of some help in the villages to those incapable of work, will probably enable the people to tide over the season of distress. If scarcity passes into famine, employment must be offered on a larger scale on special works, such as have been described. In every case care should be taken to avoid throwing workpeople out of employ, even temporarily, in re-arranging a system of works so as to supply the wants of the country; and, as far as possible, occupation should be given on these works to skilled mechanics. A corresponding expansion must also be given to the arrangements made for the gratuitous relief of the incapable. However intense and widespread the famine may become, we believe that this system of administering relief will still hold good; even if the whole of the labouring population of a great tract of country should become applicants for employment, it should not be beyond the power of the Government to furnish work for them, provided the calamity does not find it unprepared, and proper precautions are taken in the early stages of the distress. If, indeed, it should in any exceptional case become apparent that a sufficient stock of food to feed the people does not exist in and cannot be imported into the famine tract in time enough to meet the demand for it, it may become necessary to consider whether it will not be proper to reduce the consumption of food to the utmost by stopping the relief works, and distributing to the famine-stricken population at their homes a reduced ration, sufficient only to support them without labour, and so to economise the difference between what would thus be given and what would be required to support them when engaged in labour. It cannot be said that such a condition of things might not arise in some peculiarly situated locality, and

considering its extreme gravity we have thought it right thus to allude to it, and to a possible means of alleviating it. But we do not lose sight of the risk that the increase in the number of claimants for relief thus given might in the end more than outweigh any temporary reduction in the quantity received by each claimant, and that moral depression tending to physical deterioration, which it is most important to avoid, may not improbably be produced by relief given to a large population kept in idleness. Of the reality of this last-named danger, strong opinions have been expressed by trustworthy observers of the people relieved under such conditions. It may be added that the case which is here supposed has hardly ever existed in the past, except as a consequence of want of due precaution at the outset; and that when the internal communications of the country are further improved, as we may reasonably expect them to be year by year in the future, even the few districts which are now so isolated as to be liable to a temporary inability to obtain food will cease to be exposed to that danger.

III.—*Gratuitous Relief.*

Gratuitous relief the duty of the State,

137. The duty of relieving persons other than the able-bodied was till recently considered to rest during famines, as well as in ordinary times, with the charitable public. It is only in the course of the seasons of famine which have occurred in the last eight or ten years that this duty has been accepted by the Government. It is now fully recognized that there is as great an obligation on the State to give relief to those classes that are unable to earn their livelihood by work as to give it to those that can work, when both are alike left helpless at such a time. However great be the importance of maintaining in the community at large the sense of its responsibility for supporting its poorer members, it is obvious that this duty cannot be enforced when the stress of scarcity deprives very large numbers of their usual means of subsistence, and, as a necessary consequence, of the means which they before had of supporting the infirm and helpless members of their families or their villages. But though this principle be fully accepted, the test of experience cannot be said to have removed many serious doubts as to the best mode of procedure in administering this form of relief, or to have led as yet to any such complete uniformity of opinion among the persons to whose judgment on these matters most weight attaches, as to enable us to state our conclusions without some reserve.

to be carried out by the officers of Government.

138. So long as this obligation was not recognized by the State, and voluntary relief committees, being representatives of private charity, had the distribution of food in their hands, there could be no uniformity of procedure, and no specific responsibility was placed on anyone for seeing that the arrangements were sufficient. But when the State undertook that relief should be offered to all who need it, it became incumbent on the Government to control the administration of all forms of relief, and to secure an uniform and efficient system. The voluntary aid of independent persons may be utilised, but where the State is responsible for the result it must look mainly to its own officers for carrying out its policy.

Two systems of gratuitous relief.

139. Two systems have been followed in different places and at different times with regard to gratuitous relief. Under one it has been distributed in the shape of raw grain or money at the homes or in the villages of the recipients, their necessities being vouched for by responsible village officials, and tested by suitable supervision. Under the other the people have been compelled to come to relief-centres to receive it. In this case it has generally been given them in the shape of a meal of cooked food, and has often been accompanied by the condition of residence within a temporarily arranged relief-camp or poor-house.

Preferability of relief in villages.

140. The difference in these two systems of gratuitous relief may, no doubt, be traced to the different circumstances under which they were adopted. The more stringent system, requiring residence in a poor-house, was a somewhat natural development of the efforts of private charity with limited means at its command; and the village system was an equally natural outcome of the view which regulated the relief in 1873–74, that it was requisite for the State not only to supply employment and means of subsistence to the whole population, but to import and distribute the food itself. The poor-house system has generally been followed since 1861 in the North-Western Provinces, and has been highly recommended by many authorities for adoption elsewhere. It was believed that the objection felt to residence in a poor-house might keep away those not really in want, but would not deter any who suffered from real distress. There is, however, a great accumulation of evidence to the effect that the

feeling of the people towards relief administered in this form is in most parts of India one of extreme repulsion; and that even in the North-Western Provinces in 1877–78 that repulsion was strong enough to cause many to lose their lives rather than to accept help on these terms. It was in Bengal in 1873–74 that the system of village relief first became prominent, and that indications were seen that it was preferable to the poor-house system, notwithstanding certain difficulties which attended it. Under any such system the difficulty of discriminating the worthy from the unworthy will be great; the village officials, where such persons exist, can seldom be thoroughly trusted to select the proper persons for the receipt of State help, and in the absence of some really trustworthy residents in the villages who can be employed by Government as agents in relief-distribution, there is great risk that the money or grain will not reach those for whom it is intended. Both systems might no doubt be better administered than they have ever yet been. If it is probable on the one hand that amelierations of the poor-house system could be effected, under which its stringency would be less likely to repel real sufferers, on the other it is clear that much of the heavy cost which attended the operations in Bengal in 1873–74 is in no degree a necessary element of the village system. On the whole there is no doubt left in our minds that the village system should, in the present condition of India, be preferred for general adoption, inasmuch as, while this system may involve the risk of a too free grant of relief, the poor-house system involves the more serious risk of insufficient relief.

Safeguards with which village relief should be worked.

141. If gratuitous relief is never given to those who are able to do a reasonable amount of labour, but only to the children, infirm, and old, to cripples and housc-ridden people, and to those necessarily required to attend to them; and if there is an efficient system of village inspection to see that the persons on the relief list are, as far as outward signs go, deserving of it, and that they do receive it; the result will be that relief will reach the majority in the most effective way, though there may be a certain small number of people who get it improperly. With these two safeguards, the danger of the misuse of the State funds will be minimized, and the danger of imposing a test so repugnant to the people as to prevent their accepting relief will be avoided. But there will still be room for relief-houses, the proper sphere of which will be to receive such persons as have separated themselves from their homes and villages,—aimless wanderers, habitual beggars, or debilitated people who have fallen out of the ranks of the labourers and require to be fed up or receive medical attendance in order to regain strength and return to work.

Utilization of village officers.

142. In most parts of India some village organization exists which offers a ready and natural, though still imperfect, machinery for coping with famine, and it is of special importance that whatever is possible should be done towards improving and strengthening this machinery where it is present, so that it may become more thoroughly efficient for the purposes of village relief. For the future progress of the country the encouragement of the principle of local self-government, by which business of all kinds should be more and more left to local direction, is of much moment, and nowhere more so than in dealing with the relief of local distress; and, however great be the difficulties in the way of its early practical realization, it will be well never to lose the opportunity of taking any step that may lead towards it.

Details of the village-relief system.

143. The first step towards organizing the system of village relief would be to convey instructions to the head men of villages as to the classes who are entitled to this relief, and as to the manner of giving it, and to direct them, with the help of the village accountants, to draw up lists showing what persons resident in the village belong to these classes. In order to enforce this duty it will probably be necessary to provide legislative sanction in each province, under which it shall be lawful for the local Government to define who shall for the purposes of famine relief be considered the head man of each village, and to impose penalties for the failure to discharge the prescribed duty, or for any fraudulent act committed while discharging it. The lists thus drawn up should be scrutinized by the officer of the circle, who should inspect all persons on the list (except women of respectable position, regarding whom he must take other means for obtaining the necessary information), visit their houses, ascertain whether and from what cause the means of support on which they have hitherto lived have failed them, and what their actual circumstances are. He should then, if satisfied that they deserve it, place them on the village relief list, giving to each person a certificate to that effect and a copy of the list to the head village official, which should be produced before every inspecting officer. The relief should consist of a dole of grain sufficient for the subsistence of the recipient,

whether man, woman, or child, and arrangements should be made, suited to the local circumstances, to secure the receipt of this dole without fail at specified intervals of time. In return for this dole any persons who are capable of doing a little labour, though not fit to be sent to a relief-work, might be required to perform any light tasks in the village or its neighbourhood, such as aiding in the distribution of grain, cleaning out ditches, or deepening tanks, which may be useful for sanitary or other purposes, under the direction of the village head man. On the occasion of each visit from an inspecting officer the persons on the village relief-list should be examined to see if any have become fit for labour on relief-works, and those who have become fit should be struck off the list and instructed where employment will be given them. At the same time any new person who may be found qualified for relief should be added to the list, and careful inquiry should be made whether those who are on the list do actually receive the sanctioned quantity of food.

Parda-nashin women.

144. In the case of those respectable women, who by national custom are unable to appear in public, and who are generally of the Mahommedan religion, personal inspection by the relieving officer is impossible, and it is necessary to employ some other check. Committees of native gentlemen who have personal knowledge of the circumstances of the families concerned can generally be utilised for this object, and the circle officers should further test applications by all other information which they can collect. The relief given to women of this class, and to their children, should consist of doles of grain, and in return such labour as they can perform should be required of them, which may ordinarily be done by delivering to them a specified quantity of cotton to be spun into thread.

Relief-houses.

145. Relief-houses are intended for the reception of persons who have no homes, or have cut themselves off from their homes, and are unfit for employment on relief-works, and for professional beggars who cannot be made to work. A system of patrol should be organised to visit the lanes and byeways of towns, and the roads principally traversed by travellers, in order to bring such persons in, and prevent their dying out of sight; and authority should be given by legislation to enable Government officers to compel them to accept relief, even against their will. There may also be a few persons in the villages respecting whose necessities the circle officer cannot satisfy himself, and whom he may require to go to the relief-house as a test that they are really in need. These relief-houses should be established on the outskirts of the principal towns, in localities convenient for constant supervision by responsible civil officers. The greatest care should be taken in their management to avoid offending against popular prejudices, and this will be best assured by associating with the civil officers a body of native gentlemen who should be consulted on all matters connected with caste or social observances, and who would make it publicly known that nothing is done against which any reasonable objection can be raised. Subject to these conditions, relief should ordinarily be given in these places in the shape of cooked food, and residence within the enclosure should be enforced. The utmost vigilance should be exercised to see that the store of grain does not fall short, that the food is properly cooked and distributed, and that no fraud or mistake is allowed by which the ration can be reduced below the authorised quantity. The inmates should ordinarily be employed as far as possible in doing all work required for the service of the institution, and those not thus employed should be set to spin, weave, make rope, or to other light and profitable labour. Those who improve in health and strength should be removed, when fit, to relief works. A hospital should be attached to every large relief-house, and the ordinary residents, as well as the sick in hospital, should be the subjects of regular and careful medical supervision.

Efficient village relief will prevent wandering.

146. An efficient system of village relief will, we trust, in co-operation with the other measures which we recommend, have the effect of preventing that wandering of the poor, which leads to the dissolution of the village communities, and is one of the principal causes of famine mortality. Most of those who have an interest in the land will remain in their homes without the need of other assistance than advances and the suspension of land revenue for the less substantial members of the class. The able-bodied of the labouring class with their families, so far as they are healthy and capable, should be settled on works at a moderate distance from their villages. The remaining class, the incapable poor who can offer neither security for advances nor labour in return for relief, and whom we therefore propose to supply with food in their homes, will not form a large per-centage of the population, and the timely preparation of a framework of village relief, to be administered by responsible supervisors, ranging from the European superintendent to the recognised head men and

village officers, will provide for them. Thus would be secured a scheme of relief which would give to all classes assurance of ample assistance in their own neighbourhood, and leave them without inducement to wander.

IV.—*Village Inspection.*

Establishment of a system of village inspection.

147. The opinion of all persons of experience is unanimous as to the importance of establishing a system under which there should be a constant and careful inspection of all villages in the distressed tracts by a special staff of officers; and it is generally agreed that no better example can be found of the organisation required for this purpose than was afforded in Behar in 1874. The method then adopted was to divide the country into circles of convenient size, each of which was placed under its proper officers with a regular gradation of authority, and with a clear definition of duties. These posts were filled by utilising the existing staff of district officials to the utmost, by borrowing both European and Native civil and military officers from other departments, and by making use of volunteers of ability and character, and especially such of the local landed and moneyed gentry or pensioners of the Government as were willing to contribute their influence and knowledge to the aid of the State.

Object of the system.

148. Such a special organisation should be created whenever the prospect of famine becomes imminent. Its object would be to obtain specific information as to the degree and locality of the distress and the classes and persons in need of relief; and to convey to the people a knowledge of the measures taken for their relief, and to encourage those who really need aid to apply for it. The inspecting officers would examine into the condition of all persons in every village, and especially of the poorest classes; they would ascertain if any are in want and have not applied for assistance, and would see that they receive it; they would also ascertain if any who have applied for relief are not in want, and ought to be struck off the list. To those who are able-bodied they would make known the places where employment is offered; and if any fail to seek work, they would, through the influence of the village head, or otherwise, encourage them to avail themselves of the offer. For those who are in want, and incapable of work, they would see that the arrangements for giving gratuitous relief are efficient, and that no unnecessary delay, or mistake, or fraud intervenes to prevent their getting it. The circles should be so constituted that the inspecting officers attached to each may be able to visit every village within a certain fixed period of time, which would be greater or less according to the degree of the distress. While making these visits the inspector would, in addition to the special duties already described, supervise the arrangements made for the supply of funds or food to meet the requirements of the people receiving relief, and would, if so directed by superior authority, carry on the necessary inquiries preliminary to the suspension of the land revenue, the loan of money to the landed classes, or other matters. Efforts might also be made to induce the agriculturists to apply themselves to the raising of quick-growing and profitable crops, and seed might be procured and distributed for this purpose where necessary.

Nature of the organisation.

149. The extent to which this system should be carried, and the time at which it should be brought into operation, will depend greatly on the stage and on the severity of the famine. At the earliest stage, and so long as it is still uncertain whether scarcity will end in famine or not, it will not be necessary, as a rule, to create special circles or to organise a large establishment. But on the occasion of any considerable failure of crops, such as to require the opening of relief-works, the Government should draw out a scheme for the division of the country into circles, for purposes of inspection, and should make the arrangements necessary in order to be ready to post the special staff to those circles. The first duty of the inspecting officers when appointed would be to collect all available information as to the condition of the people, to satisfy themselves as to the out-turn of the crops on the ground or those just harvested, and, after revising and verifying all previous reports, to assist the Government by their opinions as to the prospects of the country. For this purpose officials strange to the work and to the country or its language will be of little use, and it will generally be the best plan to set free the district officers from other duties, and to engage them actively in this occupation. As distress deepens the staff should be strengthened, and the areas of inspection subdivided. When famine has unmistakeably set in, and the various measures of relief are fully at work, the inspecting staff in all its grades should be constantly in motion, and the areas of the circles should then be laid out on such a scale, with regard both to the distances to be travelled and the population, that every village may be visited by a subordinate officer if possible once a week, and by a superior officer at least once a fortnight.

V.—*Food Supply.*

Intervention of Government.

150. The question whether the direct intervention of Government to control or aid the action of private trade in the supply of food in time of scarcity is likely to be beneficial or otherwise, is one which has been so frequently and completely discussed that it hardly seems necessary for us to treat it at any length. Opinion has more and more steadily settled down, as economical knowledge has advanced, to the conclusion that as a rule such intervention should be avoided, but that exceptional circumstances may justify or even require it.

Government prohibition of export.

151. The prohibition of exportation was in the beginning of the century looked on as the first weapon in the Government armoury, and it was suggested in 1867 in the Orissa famine, and again in 1873, in the case of Bengal; but the arguments brought against it by Lord Northbrook on the last occasion are, we think, unanswerable, and such suggestions will, it may be hoped, never be repeated, or if repeated, never entertained. These arguments were concisely summed up by the Secretary of State, who said that nothing could justify such a measure except reasonable certainty that the exports would so exhaust the resources of India as a whole as to render them insufficient to supply the wants of the distressed districts, and that no such result was even probable.

Government importation of food.

152. Importation of food by Government into a distressed tract may take several forms. In its broadest form—that of buying and importing food to supply the general wants of the whole population—it is improbable that it will ever be found necessary again. It was adopted in Orissa in 1866 at a time when no other resource was available, because the discovery of the exhaustion of food stocks was made just when the setting in of the south-west monsoon rendered communication by sea too dangerous for private trade to embark in the business of importation; but had there been either earlier knowledge of the coming calamity, or better means of communication with the distressed province, the step could hardly have been thought necessary. Reasons similar to those which were held to justify the proceedings of 1866 were also appealed to in support of similar action in Ajmir in 1868, and of the much larger operations of the Bengal Government in 1874. With reference to these last, there appears to be an unanimous opinion that, in consequence of the extension of the railway system, no such measures can ever again be required in Northern Bengal. Measures which involve any large supersession of the operations of private trade must almost unavoidably be in some important respects productive of inconvenience and loss, and should not be resorted to without the most complete proof of their necessity.

Activity of private trade in India.

153. We have no doubt that the true principle for the Government to adopt as its general rule of conduct in this matter is to leave the business of the supply and distribution of food to private trade, taking care that every possible facility is given for its free action, and that all obstacles material or fiscal are, as far as practicable, removed. The manner in which the demand for grain in Southern India in 1877 was met by supplies sent from the North showed the promptitude with which Indian trade will operate when the facilities for transport and the profit expected are adequate. The imports by sea into the distressed districts amounted, in the two years 1876–77 and 1877–78, to about 2 millions of tons.* The total quantity of grain carried on the railways in all parts of India was double this amount,† and the actual weight conveyed by them into the famine area may have been about 1 or 1½ millions of tons, in addition to the quantity brought by sea. If, as is hence probable, the total import in the year 1877 was 2 million tons, it would at the rate of 1 ton to 6 persons for a year have been sufficient for 12 million people, or one third of the whole population affected. These results were produced by the help of a system of railways, mostly single lines, and of which only one branch traversed the worst famine tract. It is only reasonable to anticipate that with every year's additional experience of the use to be made of the railways and telegraphs the activity and sensitiveness of Indian trade will continue to grow, and that with the new stimulus thus imparted to it, and the gradual extension of railways into districts where they do not yet exist, the power of meeting the wants of the population in time of local

	Tons.
* 1876–77 - - - -	750,000
1877–78 - - - -	1,200,000
† 1877 - - - -	3,574,000
Half 1878 - - -	1,192,000

Y 492.

scarcity will be still further developed. Every interference by the Government with the operations of trade must be adverse to this tendency, and prejudicial to the growth of those habits of self-reliance which it is so essential for Government to encourage.

Extension of railways.

154. It is to the future extension of railways that we look as the most complete justification of our belief that the trade of the country may be confidently left to provide for the supply of food in times of scarcity. Such an extension has been going on for some years past, and it will, we trust, henceforth receive an additional impetus, as by the help of these works alone can the whole resources of the country be brought to bear in time of difficulty on any distressed area. The charge for transport between the most distant parts of India connected by rail does not now exceed one anna per seer, or $\frac{3}{4}d.$ per pound, and there is reason to hope that it may be reduced to a considerably smaller sum. At the present rate grain costing 24 seers per rupee or $\frac{1}{2}d.$ per pound could have been taken from Northern India to the famine districts in the south, and sold at 8 seers per rupee or $1\frac{1}{2}d.$ per pound, with a fair margin of profit. Such being the case we cannot doubt that with the growth of these means of communication and their continued use, all the requirements of every part of the country will be met by the natural operations of trade, without the necessity of any interference on the part of Government.

Ability of the country to feed itself.

155. A resolution to rely entirely on the ordinary operations of trade to meet the wants of the country in time of famine must unquestionably rest, not only on the expected activity of the traders, but also on the probability of the requisite supplies of food being forthcoming at the critical time. The question should therefore be answered, whether there is sufficient ground for believing that the quantity of grain likely to be needed to meet the wants of such large areas as may be stricken with famine in a single year will be certainly forthcoming. We believe that there need be no apprehension as to such a provision being forthcoming in time of famine from the parts of the country not affected, though no doubt considerable pressure would be entailed on their inhabitants in proportion to the magnitude of the export. The quantity, though large in itself, bears but a moderate ratio to the whole produce of the districts in which it may be presumed, in accordance with prolonged experience, there will be no scarcity.

Estimate of maximum famine demand and available supply.

156. The following figures (though they are but approximate and rough estimates made from data which we hope soon to see more accurately established) indicate that the ordinary out-turn of food in British India exceeds 50 million tons, and the ordinary surplus available for storage, for export, or for the luxurious consumption of the richer classes is more than 5 million tons.

Province.	Population.	Food Crop Area.	Out-turn of Food.	Area under Non-food Crop.	Ordinary Consumption.					Surplus.
					Food.	Seed.	Cattle Food.	Wastage.	Total.	
		Acres.	Tons.	Acres.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Punjab -	17,600,000	18,500,000	5,330,000	2,500,000	3,800,000	390,000	250,000	270,000	4,710,000	620,000
N. W. Provinces and Oudh.	41,000,000	31,450,000	11,230,000	5,200,000	8,420,000	820,000	830,000	500,000	10,570,000	660,000
Bengal - -	60,000,000	48,000,000	17,100,000	?	13,000,000	1,000,000	1,000,000	900,000	15,900,000	1,200,000
Central Provinces	8,200,000	12,000,000	2,750,000	2,500,000	1,660,000	460,000	180,000	150,000	2,450,000	300,000
Berar - -	2,250,000	5,700,000	620,000	2,800,000	400,000	50,000	80,000	30,000	540,000	80,000
Bombay -	16,000,000	21,500,000	4,500,000	5,500,000	3,300,000	290,000	260,000	210,000	4,150,000	350,000
Madras - -	31,000,000	26,000,000	8,500,000	2,500,000	6,300,000	400,000	440,000	420,000	7,560,000	940,000
Mysore - -	5,000,000	5,100,000	1,300,000	500,000	1,100,000	60,000	50,000	75,000	1,285,000	215,000
Burmah -	—	—	—	—	—	—	—	—	—	800,000
Total -	181,350,000	166,250,000	51,330,000	21,500,000	37,980,000	3,450,000	3,090,000	2,555,000	47,165,000	5,165,000

The figures in the last column show the estimated annual surplus from which the several provinces, if free from drought, could supply the deficiency in provinces suffering from famine. Experience indicates that the largest area with which we may have to deal in a single year is not likely to exceed the tract affected in 1876–77, the total population of which was about 36 millions. It is estimated that in that year the crop in Bombay was short of the average by $1\frac{1}{2}$ million tons, in Madras by $3\frac{1}{2}$ millions, and in Mysore by 1 million tons; and the difference between this estimate of the out-turn in these provinces and the quantity required for a year's

consumption at the ordinary rate is $4\frac{3}{4}$ million tons. But the deficit actually to be met will be sensibly less than this amount. For a calamity of this kind immediately leads the population to reduce its ordinary rate of consumption both for men and cattle, and to guard more carefully against the waste that usually occurs. So far, too, as land remains unsown during the drought, something is saved in seed grain. From these causes the above-stated deficit of $4\frac{3}{4}$ million tons might be reduced to 3 millions. To meet this the local stocks, which there is reason to believe may commonly suffice for not less than three months consumption of the local population, are first drawn upon, and as they begin to be depleted prices rise high enough to attract supplies from distant parts of the country. When the imports from without into a famine area are very large, as in the case of 1876–77, there is a corresponding rise of price and check of local consumption established in the exporting districts also; and thus, partly by enforced economy in these districts also, and partly by the contribution of their local surplus stocks, the pressure is spread over a wide extent of country in a greater or less degree. There would thus be available to meet the estimated deficit of 3 million tons, first, the local stocks of the distressed area, which, taken at three months' supply of the people's food, amount to $2\frac{3}{4}$ millions; second, the year's surplus of the districts not affected, which, by the figures in the above table would be $3\frac{1}{2}$ million tons, but which might be expected to be larger in consequence of the diminished consumption; and third, the local stocks in those districts; and these three sources of supply, taken together, would appear to be quite sufficient to provide what was required. The yield per acre, on which the foregoing estimate is based, is derived from the local detailed reports, and is so moderate that we have no doubt that it can be maintained, or may be readily increased; and it is important to observe that the surplus which we believe to be sufficient to meet the deficiency of food consequent on the severest drought on record, or likely to occur, does not exceed 6 per cent. of the total present produce of the country.

Exports and possible imports.

157. The smallness of the export of food grain other than rice has been adduced as an evidence of the danger of trusting to the surplus produce of India for the food supply of the people. But this fact merely signifies that other countries do not consume the millets of India. The exports are consequent on the demand of foreign countries, and no country grows more food than it can either consume at home or sell to foreigners. Nor in relation to this matter should we overlook the fact that though India as a whole now produces, and is likely to produce, sufficient food for its population, in any season of drought, and that imports are not likely to be needed, supplies from other countries are certainly obtainable. The prices at which grain is bought and sold in seasons of scarcity in India, viz., from 50*s.* to 60*s.* per quarter, will generally admit of imports being made with commercial profit from Egypt and Southern Europe, as well as from the rice-producing countries east of Singapore, and might probably draw supplies from a much larger area.

Probabilities of the future.

158. Judging from these considerations we can have no doubt that the surplus produce of India, taken as a whole, at present furnishes the means of meeting the demands of any part of the country likely to suffer from famine at any one time. It must, however, be observed that the present estimated yearly surplus would soon be all consumed by the increase of population which it is reasonable to anticipate in the future, unless the production should keep pace with that increase. The agricultural and trade statistics of the past 20 years justify the conclusion that the increased production of all sorts has up to the present time more than kept pace with the requirements of an increasing population, and the known large area of land which may still be brought under profitable cultivation, and the possibilities of securing increased production by means of improved agriculture and extended irrigation, afford reasonable grounds of confidence for the future. Fears, however, have been expressed that the grazing lands have already in many parts of the country been injuriously curtailed by being turned into arable land. If this be the case there will be no means of adding to the food supply otherwise than by introducing an improved agriculture which should yield a moderate increase on each acre already cultivated, and by bringing under the plough some of those vast tracts of uncultivated land which are fortunately still available; and eventually there must be pressing need for such measures of improvement. The gradual movement of the surplus population, where excessive, to these virgin tracts, would further assure the prospects of the future. We strongly urge on the Government the great importance of these considerations.

Cases in which interference is admissible:

159. At the same time that we recommend the general principle of abstention from interference with private trade in the supply of food to any tract suffering from scarcity, we admit that there are exceptional cases in which the Government may

(1.) Provision of food required for relief works and gratuitous distribution;

find it necessary to intervene. The success of relief measures essentially depends on there always being grain to be bought by those who receive money wages, and grain to be distributed to those who receive food; and it is an important duty of the Government officials who superintend the relief to see that this assumption is verified, to make all necessary arrangements with local or with distant merchants for the supply of grain, or in the last resort to lay in a stock to be drawn upon in the event of failure. This is particularly necessary in the case of relief-works, which must often be situated in localities where no arrangements for the sale of food exist. By settling down a large population of labourers in such places an abnormal demand is created which, unless local trade is very active, the Government is bound to meet by providing a special machinery for the purpose of supplying food. In districts in which communications or the means of transport are defective, or to which access by railways or by water cannot be secured at all seasons, or generally in the event of well ascertained slackness on the part of the local traders to prepare for an emergency, Government might give assistance in improving the transport or in the supply of fodder for cattle, and might encourage and stimulate trade, by guaranteeing a price for grain laid down at the more distant and inaccessible towns, or by advancing money to merchants to lay out in the trade. In purely agricultural tracts, where wages are paid in grain and not in money, and the local demand of the small towns is supplied not by imports from distant marts, but by small purchases from the stores of the agriculturists, it may happen that the agriculturists refuse to sell for fear of not having enough for their own consumption, and the local traders may be afraid to import through inexperience and the want of correspondents in the large marts. In such a case the Government would rightly intervene, and its action in importing grain from a distance might have a beneficial effect, both by proving to the local traders that such an undertaking is practicable and profitable, and by removing the panic which has led the landowners to close their grain pits. It might even become necessary for Government to import grain for sale to the public in such an event as a combination of local dealers to refuse to sell, or only to sell at prices unduly raised above the rates of neighbouring markets. In all cases in which Government intervention in the supply of food becomes necessary, the purchase, under suitable arrangements, of surplus stocks in parts of the country where they are available would secure those objects which it has been supposed could be attained by the prohibition of export. But much caution will be required in every case lest interference should aggravate the evil which it is designed to avert, and have the effect of preventing traders from entering the market while it is being operated upon by the Government.

(2.) Stimulus to trade where it is sluggish;

(3.) Intervention by Government where trade fails to act,

(4.) Or refuses to sell.

Proposal for Government storage.

160. There is another form of Government action in relation to the food supply which we have had occasion to consider with attention, and to which it is desirable to refer. It is that the Government should store grain in the periods which intervene between famines, and should thus be prepared in time of distress with a supply sufficient for the wants of that portion of the people which is likely to be affected. The probable cost appears to us to offer a most serious primâ facie objection to such a proposal. For it is obvious that any system of State storage to be effectual must be continuous, and that the quantity stored must be the maximum supply that can be required on any one occasion. It implies not merely the intention to dispense with the assistance of trade in the food supply of a large mass of the people when prices are very high, but the adoption of a policy which may place such assistance wholly out of reach. The calculation of cost must, therefore, provide for the storing of the largest supply that can be needed in a season of extreme distress, and for keeping up this supply permanently. It has been estimated (*see* paras. 73–75 of the Report) that 7½ per cent. of the population may at any time require relief for a year in an extreme famine, and that the whole population, on the average, may be reckoned to suffer from famine once in 54 years. If it be assumed (hypothetically) that the storing is to be applied to a tract having a population of 40 millions, which is about one-fifth of the total population of India, the permanent supply stored must be sufficient for 7½ per cent. of this number, or three millions, which, at six persons to the ton, gives a total quantity of 500,000 tons. This, it may also be reckoned, will have to be replaced once in the course of 54 years, as in this period the whole population will have suffered famine, and 7½ per cent. of it will have received relief.

Its probable great cost.

161. It thus appears that the actual quantity of grain required for relief for the specified population, whether it is stored or bought as occasion requires, will, on the scale adopted in the Report, be 500,000 tons for each 54 years. If it is stored, its original cost will be enhanced by interest for 54 years on the capital invested in the

purchase, which will be 2¾ times its first price, and by the cost of storing, renewal to meet waste, and management, which should certainly be taken at not less than the interest, so that the ultimate cost will be 6½ times the first cost. On the other hand, the probable cost, if the grain be purchased when it is required, that is, in a season of very high prices, could hardly exceed three times the price in a season of low prices, and on the average it would probably be cheaper than this. Consequently, so far from there being a financial advantage in the storing, it would almost certainly be more than double as costly as the purchase at the time the grain was wanted.

If we were to assume that the supply should be sufficient for the whole landless class of the same tract, or say one-fifth of the population, instead of 7½ per cent. as before reckoned, the quantity to be stored will be 1,333,000 tons of grain instead of 500,000 tons. Therefore the true ultimate cost of the stock, at the assumed price of 5*l.* per ton, with 10 per cent. per annum added for 54 years, to cover interest and charges, would amount to about 42,000,000*l.*, or nearly 800,000*l.* yearly for the area that has been hypothetically assumed, containing one-fifth of the population of India, and therefore would represent an expenditure of nearly 4 millions yearly for the whole country. Nor should it be lost sight of that the necessity for relief may extend beyond the period of one year, for which alone these calculations provide; and to meet such a contingency a proportional increase of the quantity of grain stored, and of the sum locked up by its purchase would be required, which, if the period found necessary in Madras in 1877–78 were accepted as a guide, might add five-sixths to the amounts above named. This estimate, it must be remembered, refers to the mere cost of the food, to which would have to be added a large sum for the administrative charges connected with famine relief. Any hope of reducing the cost by laying in the stock by degrees in the course of years of plenty is obviously incompatible with the essential conditions that famine may occur in any year, and that the store must always be ready and always sufficient. Moreover, the expectation that by selling portions of the stock in years of high prices, but not of famine, a profit might be obtained, and the ultimate cost of the transaction might be thus reduced, is wholly inconsistent with the intention of keeping a reserve of food sufficient for all possible contingencies, and such a proceeding would be entirely beyond the proper scope of Government action.

Economical difficulties and dangers.

162. On the whole, any argument based on supposed economy seems to us quite untenable. If we saw reason to think that there was any probability of a failure of the food supply of the country as a whole, or of the means of its conveyance from the places where it was abundant to those where it was deficient, we might feel bound to discuss the proposed storing by Government more carefully as a possible remedy and to point out in detail the very serious practical difficulties that in our judgment would attend the attempt to carry it out. But we are satisfied that there is no such probability, and that there is no justification, either on these grounds or on the score of economy, for adopting a course which we consider to be opposed to the prolonged teachings of the past, as conveyed in the history of the progress of civilization, and of the steps by which the various States of Europe have passed from a condition of frequently-recurring famine, such as that which now characterizes India, to one in which, though high prices are at times inevitable, actual famine due to the absence of food may be said to be unknown. No Government has ever succeeded in such a measure as that which is here proposed. The repeated and continued attempts to alleviate the difficulty of securing the food supply of the people by direct State interference, which have been made in our own country and elsewhere, have always ended in failure, and the safety of the population and their freedom from extreme fluctuations of the price of bread were only assured from the time when all such efforts were finally abandoned.

Though for these reasons we do not think it necessary to discuss the matter in any detail, we may indicate that the dangers and difficulties consequent on the storage of grain by the Government would be very great, especially in respect to the manner in which the stores of grain should be utilized, and in which the Government should regulate its action in opening or closing the stores. The result, upon the dealers in grain, of the Government suddenly opening the stores when prices rose beyond a certain fixed amount, and upon the people when the stores were closed, the local trade having meanwhile been destroyed or its action paralyzed, must, we think, be disastrous.

Bad effects on the people,

163. We greatly fear that any system of Government storing, if once brought home to the people, would produce most fatal effects on their prudential habits, and that the existence of a public granary in every village, ready to be thrown open whenever distress passed beyond a certain point, would be a standing encouragement to impro-

and on trade.

vidence and recklessness, and to that most dangerous of popular vices, the disposition to force the Government to grant public charity. The plan would strike a death-blow at that healthy development of the internal trade of the country, now in an early stage, but steadily thriving under the encouragement given by the extension of railways and complete free trade, and it would raise a fatal barrier to the growth of those qualities of self-reliance in the community without which the country can never raise itself in the scale of civilization. Chronic famine is, we are satisfied, one of the diseases of the infancy of nations, and its remedy will never be found in prolonging the tutelage of the State, and least of all, in measures which would render escape from such tutelage almost impossible.

Sufficiency of private storage.

164. We have fully recognized the necessity for private storage of the surplus grain of years of plenty, and we have complete confidence that this is already done on a large scale. What is requisite is to encourage the practice within the limits that true economy requires, not by the intervention of the State, but by the growing intelligence of the people; and to do what is necessary to ensure the surplus thus stored being rendered available, whenever and wherever it is needed, by extended railway communication, through the agency of the natural trade of the country.

Difficulties best met by improved communications and extended trade.

165. On the whole it is highly improbable that Government will ever be required in the future to supply food to meet the wants of the entire population of any large area in time of distress, either by way of purchase and local distribution, or by storing on a large scale. Until, however, the whole country is more completely supplied with railways or canals, by which food can be transported rapidly, cheaply, and in large quantities, to every part where severe want may exist, the possibility of some unusual demand for Government interference in particular localities or for special classes of people cannot be shut out, nor the danger of the occurrence of a great calamity altogether removed. It is therefore to the improvement of the internal communications and the removal of all obstructions to the free course of trade, accompanied by the extension of irrigation in suitable localities and an improved agriculture, that we look for obtaining security in the future against disastrous failures of the food supply in tracts visited by drought. It is not so much any actual deficiency of the requisite food in the country at large which is to be feared as the absence of the means of transporting and distributing the supply available, and the inability of the distressed population to pay for it. The failure of the stocks of food of those who habitually depend on their own harvests, and the want of employment for those who live on wages, can only be met by the offer of employment and wages wherewith to buy food, or by gratuitous relief, and the difficulties in the way of accomplishing this with a population of millions are the really serious obstacles that have to be surmounted.

VI.—*Suspension of Revenue and Loans to the Landed Classes.*

Duties of Government to the landed classes.

166. The duties devolving on Government in relation to the class of landholders are for the most part of a different character from those that attach to it in its relation to the landless classes, which, whenever their ordinary means of employment fail, become in danger of starvation. Those who possess beneficial interests in the land do not in time of famine, as a rule, suffer the extremity of want, or go in danger of their lives; but a large number of them are often severely pinched and obliged to borrow money for their support, and those who borrow at such a time do it on terms which make repayment difficult and may embarrass them for life. It becomes therefore the part of Government to assist such persons, who are in the position of tenants or co-proprietors of the land, and this may best be done in two ways: (1) by abstaining from collecting the ordinary instalments of the land revenue, the payment of which would add to the difficulties of all who are hard pressed; (2) by lending at low interest the sums they require for their sustenance and the cultivation of their land, or for the employment and employment of their dependants.

Suspension of the land revenue.

167. With regard to the land revenue, it has been generally accepted that where settlements are made for a long period of years, an average moderate demand should be fixed which should not vary with the ordinary fluctuations of the seasons, but can be paid in bad and good years alike. But this applies to moderate and should be paid in bad and not to years of extraordinary drought, or to cases of the total or fluctuations only, and not to years of extraordinary drought, or to cases of the total or almost total destruction of the crops which ensues from that or other calamities. Even on such occasions there are among the landowners many wealthy persons who are well able to pay, but the great majority will not have sufficient means both to pay the revenue and to provide for their own support; and to force them to meet the

58

Government demand could not be justified. We consider that the true principle on which leniency should be shown is this: that nobody should be forced in such seasons as these to borrow in order to pay the land revenue, but that all who can pay it without borrowing should do so. It has to be borne in mind, on the one side, that the landholder will benefit by the great rise of prices consequent on a great scarcity, so far as he still obtains a surplus of produce for sale in excess of his own wants; but on the other, when the drought is extreme no such surplus may be left, and he may even be obliged to buy food at ruinous rates for his own consumption. When the outturn is such that the landowners have any surplus to sell they can probably pay the land revenue. But when information is received from the Agricultural Department that the failure of the main crop, or one of the main crops, of the year has been so great that no surplus produce is left to the landowners above their own necessary consumption and that of their dependants, instructions should be issued to the collectors that they may at their discretion suspend till further notice the demand for land revenue due on account of the crop which has been lost, subject to such conditions as are requisite to pass on the relief to all tenants or subordinate holders. It should be understood that such suspensions ought to be liberally given to all but the wealthier individuals, and those who from exceptional advantages have escaped the general failure of the crops; and great care must be taken that the granting of this relief is not unduly delayed while inquiries are being carried on into the claims and circumstances of individuals.

Suspension of rent.

168. In granting relief by suspending the land revenue, it should manifestly be an essential condition that it is accompanied by a corresponding relaxation of the demand on subordinate holders for rent. The relief to the tenants might be secured in one of two ways; either by passing a law similar to the provision in the present rent-law in the North-Western Provinces, under which the Government might declare, in any given case, that the payment of the whole or a part of the rent shall be suspended, a corresponding suspension of the land revenue being at the same time granted to the lawful recipient of the rent; or, if such a law were thought inexpedient, by making the suspension of the land revenue contingent on the corresponding voluntary suspension of the rent. We are not in a position to say how far the extension of the principle of the law of the North-Western Provinces to all parts of India might be found practicable, but we are of opinion that the principle is equitable, and should if possible be so extended. Such an extension should provide for the relief of the tenants of all persons who, whether as grantees, inamdars, or under any other name, are entitled to receive all or any part of the land revenue, whenever similar relief is given to the tenants on neighbouring estates which pay land revenue to the Government. With regard to the question whether interest should be charged on revenue so suspended the practice varies in different provinces, and we do not think that it is needful for us to give an opinion on this subject further than by saying that if any interest is charged it should not exceed one anna in the rupee, or 6¼ per cent., and whatever rate of interest is charged by Government on arrears of revenue, the same and no more should be chargeable by landowners on arrears of rent due from their tenants.

Remission of revenue.

169. It is not expedient to remit any part of the land revenue till it becomes certain that it cannot be collected without undue pressure on the persons liable for it. The demand suspended should stand over, in the expectation of an early return of prosperity, till the Government by a special order directs its collection, or, if the circumstances are unfavourable, its final remission. The same general considerations will apply to remissions of rent as to remissions of revenue, and in no case should a tenant be relieved from his liability to pay his ordinary rent, unless his inability to do so is fully established. With regard to the realisation both of any portion of the demand which is not suspended during the time of famine, as well as of that which is so suspended and eventually has to be collected, the utmost discretion should be used; the arrears should not be exacted too promptly after the close of distress, when they can only be recovered by sale of the defaulter's agricultural cattle and implements, or of his rights in the land; and the Government should prescribe the extent to which the ordinary process of collection should be followed, or whether any special procedure should be substituted for it.

Loans to the landed classes.

170. The suspension of revenue may be an adequate relief to the more substantial landowner, who, when this drain on his resources is removed, has enough left to struggle through the time of hardship; but it does not entirely provide for the case of the small agriculturist who finds himself without the necessary means either of subsistence or of preparing his lands for tillage, and who, if he is obliged to have

recourse to the money-lender, can only obtain a loan on ruinous terms. It is moreover desirable that in times of famine reasonable help should be given to landholders to enable them to undertake works on their estates by which employment may be offered to the poorer tenants or labourers. It should, therefore, be the policy of the Government to advance money freely and on easy terms on the security of the land, whenever it can be done without serious risk of ultimate loss. The experience of the Bengal famine of 1874, and other less conspicuous instances, have shown how faithful the landed classes are, as a rule, in repaying such advances, and how inappreciable is the risk attending them when they are judiciously made. The rules under which such advances are given should admit of their being devoted to the purchase of seed grain and bullocks, and to the employment of agricultural labour. They should be made under the general supervision of the Agricultural Department, and when famine has set in, through the inspecting officer in charge of the relief circle. The grant of such loans should be regarded as of primary importance among the measures adopted for meeting distress, and should receive early and sedulous attention on the part of the local Government. No undue pressure should be used to induce the people to accept such loans, nor should they be given unless the applicant is able to show that he is in serious need of such assistance. On the other hand, after these advances have been made, care must be taken not to check the recovery of the country by a too prompt demand for their repayment.

VII.—*Local Financial Responsibility*

Localization of the cost of famine relief.

171. There are obvious advantages in so localizing the cost of relief as to bring home to its administrators a sense of personal responsibility for its amount and the burden it creates. The guarantees for economy must be incomplete so long as the incidence of the charge is spread over an area so wide that its presence becomes virtually imperceptible, and so long as those who bear it have no power to keep it within proper limits.

Advantages of this principle.

172. It was observed by the Secretary of State, and we think with perfect justice,* that, "however plain may be the primary obligation of the State to do all that is "possible towards preserving the lives of the people, it would be most unwise to "overlook the great danger of tacitly accepting, if not the doctrine, at least the "practice of making the general revenues bear the whole burden of meeting all "local difficulties, or of relieving all local distress, and of supplying the needful funds "by borrowing in a shape that establishes a permanent charge for all future time." * * * * "The question which is thus raised of how to make local resources aid in "meeting local wants is no doubt one of great difficulty and complexity, especially in a "country like India. But the difficulty of providing any satisfactory solution of it "should not be allowed to obscure the perception of its vital importance to the "future well-being of the country, as well as of the troubles to the Government and "the demoralization of the people which must necessarily result from postponing too "long the introduction of some system under which shall be suitably recognised the "undoubted responsibility which rests on the people themselves to provide for their "own support and well-being. The duty of the State does not extend further than "to see that the needful means are supplied for giving effect to this principle, and "for distributing the local burdens arising from its practical application in the "manner which shall be most equitable and least onerous to those who have to bear "them." This sense of responsibility would of course be most effectually quickened by meeting famine expenditure out of the proceeds of local taxation, and by administering the relief through representative members of the tax-paying body, themselves responsible for providing all needful funds.

* Despatch to Government of India, 25 Nov. 1875.

Difficulty of working this principle in respect to different provinces.

173. There are, however, insurmountable difficulties in the way of any but a very partial development of such a system in India at the present time. In the first place it involves the assumption that the various provinces are, on the whole, equally well qualified to bear the burden that would thus be imposed upon them. But this is far from being the case; not only are some parts of the country much more exposed to drought than others, but from the nature of the case the richest and most resourceful populations are those which are least exposed to this visitation; so that, supposing the cost of relief to be localized, the heaviest load would be imposed on those portions of the community least able to bear it. There are some localities whose physical conditions preclude the possibility of famine, and which, when famines devastate less fortunate districts, reap direct advantage from the rise in prices. Moreover, the various provinces differ much in the benefits they severally have derived from the

59

expenditure of the general revenues, some tracts having been secured and enriched by a large outlay of the public money, while for others little or nothing has been done; and if at the present time a strict system of localization were introduced it would have the result of still further enhancing these inequalities by freeing the more advanced and prosperous districts from a contribution which they could easily spare, and leaving the people of the localities least favoured by nature, and worst supplied with the means of resistance to meet their trials, without that support which they could fairly claim, and which their fellows have received, from the resources of the Empire as a whole. On all these grounds we are led to the conclusion that no system could be effectually and justly carried out which should impose on each province the duty of making good to the central Government the sums expended in excess of the provincial revenues on the relief of its population in time of famine.

And to the character of the men concerned in working it.

174. A danger incidental to any system of localizing the cost of famine relief in the present state of Indian society is that it would be likely to exercise a prejudicial effect on the feelings, still very partially developed, which should prompt the landowners to acknowledge their responsibility for helping the poorer agricultural classes. The general testimony is that, with but rare exceptions, the large landed proprietors have not satisfactorily realised the hopes which were formed when their position was recognised by the Government, and experience indicates the small degree of assistance given by them in alleviating the sufferings of the people. This state of things would be rendered still worse if local proprietors were made to feel that the relief of famine was exclusively entrusted to them, and that it immediately entailed additional taxation on themselves; for the Government, instead of being able to depend more fully on the co-operation of the wealthier classes in meeting distress, might find their influence directed rather to conceal it.

Modified application of the principle.

175. The Government has accordingly, and we think with good reason, proceeded very cautiously in its arrangements for localizing the expenditure which famines must involve. It was declared* that the local Governments should henceforth be regarded as responsible, "to the full extent of what was possible," for providing the means of protecting the people of their own provinces against famine, and of meeting the cost of relief when famine actually occurred. As to the first of these objects, arrangements were made under which a guarantee might be given by each province for the interest on the capital expended on its own railways and canals, the sources of income necessary for the discharge of this liability being at the same time entrusted to it. As to the second, it was expected that by economical and judicious control of the expenditure on the numerous branches of the administration which have been transferred to provincial Governments, a balance would be secured which would be available for purposes of relief, and that such balances standing to the credit of provincial revenues should be exhausted before the Imperial treasury could be drawn upon. But it was recognised that there was a limit beyond which the provincial revenues could not supply relief, and that resources must be created from which the central authority could supplement provincial funds on occasions of widespread and severe famine; and it was to this end that arrangements were made to secure a surplus of 1½ millions of income over ordinary expenditure, in addition to the annual surplus of half a million otherwise regarded as proper. It was determined that this surplus should not take the form of a fund specially allocated to meet the cost of famine relief, because such an arrangement would be financially inconvenient and objectionable. The intention was simply that a source of revenue should be provided which would enable the Government to carry out the principle on which it had for some years insisted—that the relief of famine distress must be regarded as a charge constantly liable to recur, which must be met like all other obligatory items of State expenditure. The money obtained, or so much of the 1½ millions as remained after meeting charges for famine during the current year, was to be applied to the discharge of debt, or the prosecution of remunerative public works of a character likely to give protection to the country against the effects of drought. Such works might be expected to produce an income equal to the interest on the capital spent on them, and thus lead to a result financially identical with the discharge of debt, but otherwise more beneficial from the protection given by the works. As the Government was engaged in carrying out productive public works, the expenditure on which involved annual loans to the extent of 3 or 4 millions, the plan practically operated in reducing, to the extent of the surplus, the sum to be thus borrowed.

* 27th December 1877.

Sufficiency of this system.

176. We see no reason to doubt that the general arrangements thus made were in the actual circumstances well suited to meet the difficult problem that had to

be solved, nor is it easy to see how such heavy and irregularly recurring charges as those that arise from the relief of famine on a great scale of severity and extent could otherwise be met than by borrowing when the calamity occurs, and by discharging the debt in times of prosperity, or securing such an increase of revenue from productive works as shall cover the interest on the debt.

How far provincial revenues can meet expenditure.

177. The extent to which the provincial revenues at the disposal of the local Governments will enable them to meet famine expenditure is a subject on which we need not enter at length. In a time of exceptional financial pressure, such as every period of famine must be, there can be no question that any outlay which is not obligatory should be postponed, and so far as the ordinary and necessary expenditure on public works can be directed to the relief of persons in distress, this also will be advisable. The extent to which aid from the resources of the central Government should be given, will have to be determined as each case arises, and there can be no doubt that in all cases of severe drought this liability will occur.

Or be used to guarantee interest on protective works.

178. There is, however, one direction in which the responsibility and power of usefulness of the local Governments could be enlarged in respect to famine relief. The surplus created for famine purposes may, under existing arrangements, be applied to the prosecution of public works likely to mitigate the consequences of famine, whenever the income of those works can be reasonably expected to cover the interest on their cost, and thus to secure the Government from charge on their account. In extension of this policy, we think that all reasonable facilities should be given to the local Governments to undertake works likely to protect their provinces against the results of famine, even if not of a character to be immediately remunerative, in every case in which they can secure the Government of India against eventual loss by the specific allocation of some part of their provincial revenues. Nor does it appear to us in any way objectionable in principle to levy special local rates or cesses either on a whole province or some smaller area, in order to provide a fund from which such guarantee may be obtained.

Employment of local funds to extend communications.

179. The future power of the country to resist the pressure that arises from drought is so immediately dependent on the improvement of the means of internal communication that it is in our opinion impossible to exaggerate the importance of striving to accomplish this in every practicable way, and the arrangements above indicated afford an obvious and easy method of extending the application of local responsibility to this paramount object. During the resources under local financial late years of famine India was saved by its railways from disasters, the bare possibility of which should serve as a warning not to postpone the extension of works of this class to which the country must mainly look for alleviating the horrors of famine.

Application of this suggestion to Madras and Bombay.

180. In Madras and Bombay, the natural features of which provinces add much to the difficulties of transport, such works are more especially necessary. The additional rates on land, which were imposed in Northern India in 1878, and in Bengal in the previous year, and which constitute one of the chief sources of the famine surplus of 1½ millions, were not extended to Madras and Bombay, partly for reasons which had reference to the position of those territories at the moment. The question now presents itself whether there still are grounds for considering that these provinces should be exempt from the burdens which have been imposed on the land elsewhere to aid in meeting the liabilities caused by famine expenditure, though, as the effects of the recent scarcity had not passed off in 1878, and as the equalization of the salt duties then effected led to their increase in Madras and Bombay, it was naturally thought inexpedient at that time to extend the additional rates on land to these provinces. If the Government should be of opinion that the time has come when these considerations may be regarded as no longer operative, and that the additional rates could be imposed without placing undue pressure on the landholders, we think that the early adoption of such a measure would be expedient, and that its efficacy would be secured and the objections to it diminished by providing that the income obtained should form an addition to the provincial revenues, to be specially and exclusively devoted to the prosecution of such works of a protective though not financially remunerative character as may be approved by the local Governments in those provinces, and to be applied either in the form of direct grants, or of a guarantee to the Government of India of the interest on the capital provided by it for these undertakings.

Financial responsibility cannot be

181. If the difficulty of extending financial responsibility for famine expenditure to the provincial Governments is extreme, it becomes insurmountable, in the present

condition of India, when we descend to the smaller local divisions of the country, such as districts, local fund circles, or municipalities. To admit of any steps being taken to impose on the tax-payers within such areas the duty of paying for the cost of famine relief locally incurred there must manifestly first be introduced into India a law of settlement, under which no applicant should be entitled to relief except in the district or other area to which he is properly chargeable. This would be peculiarly necessary in the case of municipalities, which are liable to be crowded in times of distress by an influx of strangers, the cost of supporting whom could not justly be imposed on municipal funds. We are unable to suggest any system under which so artificial and necessarily complicated an arrangement could be carried out. Nor are there wanting other grave causes of doubt as to the expediency of attempting anything like the framing of a poor law for India. The doctrine that in time of famine the poor are entitled to demand relief from the funds of any definite area would probably lead to the doctrine that they are entitled to such relief at all times, and thus the foundation would be laid of a system of general poor relief, which we cannot contemplate without serious apprehension, and the adoption of which could hardly be advocated unless on proof of its absolute necessity. It would be in a high degree impolitic to introduce the idea that relief of the poor in ordinary times is a regular part of the duties of the State in any of its departments or branches, or to depart from the broad principle that it is only in exceptional seasons of difficulty that State relief should be given.

extended to areas smaller than a province;

But executive responsibility can and should be extended.

182. But without going so far as to enforce financial responsibility, we think it highly desirable to impose executive responsibility on municipal committees and local district organizations, and so to enlist their administrative aid in the actual management of relief under Government supervision. We consequently advise that where these institutions exist it should be made a recognised part of their duties to co-operate in famine relief, and that so far as practicable the public works which they are in the habit of carrying out should in time of distress be made the means of adding to the employment of the part of the population requiring help. The municipal authorities should be responsible for carrying out all relief measures necessary within their limits, receiving from the Government such pecuniary aid as may be requisite for the proper fulfilment of the duty. From the completeness of their organization, their local knowledge, the comparatively small area within which they act, and the strength of the available staff, it should follow that relief measures ought to be conducted in municipalities with great efficiency.

VIII.—*Miscellaneous.*

183. A few points remain which cannot well be brought under any of the foregoing heads, but which we consider of sufficient importance to be mentioned here among the main rules of action which should be followed in times of famine.

Amount of food required.

184. One of these is the amount of food required by workers and non-workers. The conclusion we draw from a careful examination of the evidence of authorities in all parts of India is, that on an average a ration of about 1½ lbs. per diem of the meal or flour of the common coarser grain of the country suffices for an ordinary working adult male. In the rice-eating countries an equal weight of rice may be accepted in lieu of flour, and in any case the ration should include a suitable proportion of pulse. A man doing light work would require about 1¼ lbs.; and the ration which consists of 1 lb. of flour with a little pulse has been found sufficient to support life in numerous relief-houses, where no work is exacted, all over the country. On these bases the diet scale should be built up, it being understood that a female requires a little less than a male, a child below twelve years of age about half the allowance of an adult male, and a non-working child below six or seven about half as much as a working child. On relief-works, however, where a money wage is given, the rate of pay should be such as to leave a slight margin above the actual cost of the flour, so as to allow for the purchase of salt, pepper, and other condiments and firewood, and to avoid the risk of the wage being insufficient to purchase the full ration of food. Whenever it is necessary to supply people with a kind of food to which they are unaccustomed, the result should be carefully watched, and endeavour should be made to counteract, by some adjustment of the dietary, the unfavourable results which will probably arise from the change.

Employment of artizans.

185. As to that class of applicants for relief which consists of small artizans, who in a time of famine can get no employment and find no market for their productions, the question arises whether and how far it is possible to give them employment in

their own walk of life. This is certainly desirable, if it can be done conveniently; but if the number in these classes is small, and the time and labour necessary for making arrangements for their employment in special trades would be better spent on matters affecting large masses of people, then the interests of the majority must prevail. Blacksmiths and carpenters and to a less extent bricklayers and masons and other crafts would find employment on public works. Weavers are the most numerous class among artizans who habitually require relief, and much employment has in many instances been given to them in their own trade. The thread which is spun by impoverished females in respectable families can be given to weavers to turn into cloth at rates corresponding to those of the market, and the cloth thus woven can generally be disposed of in the relief-houses and hospitals. If there is any surplus at the end of the famine it should be sent for sale to some distant market, so as not to interfere with the local sales and deprive the weavers of work when times begin to improve. The other artizans who require help, such as potters, tanners, &c., are generally too few to be employed in their trades without putting more urgent work aside; and in such cases all that can be done is to offer them employment on the relief-works, and in very few cases will such work be inappropriate to their ordinary habits.

Orphans.

186. In all great famines large numbers of orphaned or deserted children have been left in the hands of Government. Till lately the practice has been to make over them to orphanages established by Missionary Societies, in which the children are brought up as Christians. Objections have of late years been urged to this practice; and an alternative plan has been followed of making them over to Hindus or Muhammadans who have applied to receive charge of them. We conceive that, as matters now stand, both these systems must be adopted, but the latter one should have the preference as far as it is possible to carry it out. The State should not take advantage of the helpless position of such orphans to encourage proselytism, but it is bound to make due provision for their moral and physical welfare. Supposing there are rival applicants for the care of a Hindu or a Muhammadan child, the person most entitled to receive the child would be a co-religionist, provided he is of such respectability and character as will give security for the proper bringing up of the child. But there have been so many cases of such children being brought up to a life of prostitution or of semi-domestic slavery that an officer would not be justified in making over a child, especially a female child, without inquiry, to any applicant who may appear. Muhammadan families, among whom there is no question of caste, will generally be found ready to receive Muhammadan children, but for low-caste Hindu children suitable applicants will rarely come forward, and such children will generally remain on the hands of the State. Efforts should be made to induce respectable and charitable persons to adopt the orphan children, in preference to any other course; but when these have been exhausted the children may properly be entrusted to any well-conducted orphanage under due supervision, and with the proviso that they should always be reclaimable by their parents or by near relations who may have a right to demand the care of them.

Private charity.

187. Native society in India is justly famous for its charity. It is owing to the profound sense which is felt by all classes of the religious duty of succouring, according to their means, the indigent and helpless who have claims on them as members of the family, the caste, or the town or village, that in ordinary times no State measures of relief are needed. Native charity, however, does not work according to the English pattern. It does not tend to organization or co-operation among those who bestow it; it consists too much in giving a small dole to numerous applicants rather than in providing completely for the wants of a few applicants. When scarcity increases and deepens into famine, this liberality naturally decreases with the diminishing ability of the well-to-do classes to give, and at last it almost comes to an end; while the number and the wants of the applicants rapidly increase. Such charity is to be encouraged at the beginning of distress; and in a slight scarcity which does not grow to a famine it is often sufficient to meet all local requirements; but when famine has once set in with severity it may become a serious evil unless it can be brought under some systematic control. The rumour that doles of food or money are liberally given in any town penetrates into the country, unsettles men's minds, and makes them disinclined to honest exertion. When they flock to the town the want of organization results in the stronger paupers getting more than the weak who need help most, and sometimes to the latter being deprived altogether of their food. The element of chance which this system contains, under which more than is necessary for subsistence may be

61

obtained one day, even though less may be obtained another day, is more attractive to many paupers than the regular distribution of the bare means of subsistence; and this uncertain and unequal provision of food often leads to disease and death. When once Government has taken the matter thoroughly in hand and provided relief in one shape or another for all who need it, and a proper inclosed place of residence for all casuals and beggars, street-begging and public distribution of alms to unknown applicants should be discouraged, and if possible entirely stopped.

Utilization of public subscriptions at the close of a famine.

188. Under the system of Government relief which recognises the responsibility of the State to provide for all who really require relief, there does not appear to be any reason for making an appeal to the public to aid the Government by their contributions. This is a relic surviving from a past state of things, and is unsuitable where efficient relief measures are carried out on a uniform plan designed to give security to the whole population, at the public cost, and on the responsibility of the Government. Such full responsibility having been accepted, the spontaneous contributions of private persons, given for the purpose of supporting the lives of the famine-stricken, are as much out of place as they would be in meeting any other public charge; though something may still be done towards supplementing the subsistence ration of Government with small comforts, especially in the case of hospital patients, of orphans, and of the aged and infirm, and any charitable assistance of this kind should be welcomed and encouraged, provided it is so administered as to work in with the Government organization and system. But when the famine is coming to an end there is a wide and useful sphere for private charity in restoring the sufferers as far as possible to their original position, or in giving them a little capital with which to start again in their old modes of life. This was done with excellent results, by the aid of the munificent charity of England, in Madras and Mysore at the close of the famine in 1877–78. The State cannot properly expend the money raised by taxation on such objects, though it may certainly lend its officers to assist in the work of distributing charitable contributions in the most useful way. Subscriptions raised at the end of a famine for the purpose of restoring his bullocks to the cultivator, his implements to the artizan, or of giving a little money to a petty shopkeeper to get together the articles necessary for his stock-in-trade, if disbursed by competent and judicious persons, would be of the greatest benefit in assisting the population to recover from the blow they have received.

Treatment of subjects of Native States.

189. With regard to the treatment of the subjects of Native States who may apply for relief in British districts, three courses have at times been followed. The usual one has been to make no distinction as to origin, but to treat all comers alike without inquiry. In the late famine in the south, in some cases such immigrants were separated from the local poor and sent back to their own country, or the State to which they were believed to belong was requested to send an officer to identify and take back its subjects. A third course was advocated by the Government of Madras in 1877, that a list should be kept of such immigrants and the bill for their support should be sent in to the State from which they came. We consider that the first of these three courses, that of treating all applicants for relief alike, whatever their nationality, is the right one. The attempt to discriminate cannot be successful, for as soon as the people learn its object they deny their true origin; and the attempt to relegate them to a country from which they fled because they dreaded starving in it, may be both futile and cruel, and will probably only lead to increased habits of wandering. The British Government might with propriety endeavour to induce the Native States to take proper measures for the relief of their own poor, as far as possible on the general system adopted in British territories, and the records of successive famines show that Native Rulers are becoming more and more alive to this duty, and ready to perform it. It will be for the Government of India to consider what degree of responsibility, pecuniary or otherwise, may attach to any State which neglects this important duty, but beyond this no further question should arise as to whether applicants for relief are emigrants from Native to British districts, or from British to Native districts, or from one part of the British territory to another.

Migration—(1st) to preserve the cattle;

190. The history of Indian famines shows what a large part local and temporary migration plays in the measures which the population of India take to protect themselves in time of famine; and it is necessary to consider what the policy of Government should be as regards controlling it or working it into the general relief system. There are two main kinds of migration to be dealt with. One is migration for the sake of cattle, to find pasture; the other for the sake of the emigrant's own safety, to find food or employment; and there is a third or spurious kind, viz., aimless wandering. Of the first kind of migration we have

examples in the famine of 1868, when herds of cattle were driven from Western Rajputana to Malwa, Central India, and the Sub-Himalayan pastures; and in 1876–77, when the cattle of the Deccan, Mysore, and Madras, were driven to the forests on the Western Ghâts. Such migration is purely beneficial to those who start early enough on the quest; and though it often entails great losses on those who start late and arrive when all the best pastures have been occupied, the loss would probably have been as great had they remained at home. All that Government can do here is to aim at some control over the distribution of the incoming cattle, to open one tract after another as the first becomes filled, and to disseminate information as to the best roads to be taken. It may be useful also to adopt the course taken by the Bombay Government in 1877 to facilitate the transport by rail of cattle travelling towards the pastures, and to place fodder for sale along the most frequented roads, though the latter measure proved to be unnecessary.

(2nd) to preserve human life;

191. The second kind of migration is meant to be either permanent or temporary. As to permanent emigration, there is always in famine years a considerable increase to the normal number of voluntary emigrants to the colonies and elsewhere; but the efforts made by Government to stimulate this (as in Behar in 1874, and Madras in 1877) have been extremely unsuccessful. The class of people with whom Government has to deal in its relief measures are not the class most suitable for permanent emigration to a distance, or most likely to undertake it. The true emigrant class, should be, and as a rule is, composed of the stoutest and most self-reliant; while the class most requiring relief are the weakest and least self-supporting of the population, and peculiarly open to panic and to suspicion of the motives by which the Government is influenced. It is difficult, therefore, for Government to include permanent emigration among its relief measures in time of famine. The question how far emigration may be looked on as a safeguard in the future against over-population will be considered in the second part of our Report. As to temporary migration, there is commonly a great readiness to flock to any place where there are hopes of employment and food. Thus in 1877 the numbers who travelled to the coffee plantations of the Nilgiris, the Wynad, and Coorg, and to Ceylon, in the hope of getting employment were very large; and in all famines the tendency of beggars to collect in towns has been remarked. It has frequently happened that the numbers thus migrating have far exceeded the powers of the country or town into which they penetrate to afford them employment or food, and great misery and mortality have ensued. Attempts have been made to prevent such migration, either by stopping the people on the roads or drawing a cordon round the town, or by relegating them to the country from which they came. These measures have generally been unsuccessful, and have often caused as great misery as that which they were meant to prevent. It is to be hoped that the arrangements we have suggested for village inspection and relief will obviate to a great extent this tendency to migrate, but should it still arise, efforts should be made to discourage it by spreading information as to the condition of the tract to which the tide is setting, and to arrest the movement at its outset. The only steps that can usefully be taken beyond this are to provide the usual measures of relief, such as relief-works and relief-houses, in the most suitable places where such immigrants collect in large numbers.

(3rd) Aimless wandering.

192. The evils of the third kind of migration—aimless wandering—have been keenly felt in the recent famine in the south of India; and the Bombay Government has sought for legislative power to enable its officers in such cases to make the acceptance of relief compulsory. It is evident that such power, if given, should be carefully limited, as it might be used so as to cause a panic, and to make the State relief unpopular; but we believe that if used with discretion, and confined within narrow limits, it would be useful. The power, indeed, has been assumed as a matter of necessity by many discreet and humane officers; and if in doing so they have gone beyond the law, the law should be amended so as to cover such acts. No such power, however, should extend to people who persist in remaining in their houses, even though they may appear to have no means of subsistence there; it should be confined to those who have cut themselves off from home, and who are either wandering along roads or begging in towns. Such persons may with propriety be conducted, even against their will, to relief-houses or relief-works, according as they are unable or able to work.

How to meet cost of improved administration.

193. In concluding this portion of our Report we desire to explain that we have intentionally avoided any attempt to make a particular estimate of the probable cost of the administrative measures suggested for the permanent improvement of the

statistical records and the creation of a more effective Agricultural Department, and it will suffice for our present object if we state that we think it unlikely that the additional yearly charge caused—if these suggestions are adopted—would materially exceed one hundred thousand pounds. No useful purpose would be gained by our offering an opinion as to how far any additional charge for such objects might properly be regarded as merely involved in the necessary improvement of the ordinary administration, or how far it should be held to be a measure connected with famine relief, and so fairly chargeable against the special famine surplus. Even if the latter view be adopted in respect to the whole charge, the practical efficacy of the financial measures of insurance adopted in 1878 will not be impaired. Should the net surplus, after meeting these extra charges, be no more than 1¼ millions, there would still be provided the means of discharging 12½ millions of debt in 10 years, and thus of reducing the net yearly charge for interest by more than 500,000*l.*, an amount which, according to our calculations, will be amply sufficient for the prevention of any increase of the permanent debt by reason of the expenditure on famine relief.

Conclusion.

194. We consequently have no hesitation in commending to the favourable consideration of the Government the measures which have been detailed in our Report, in the confident belief that the necessary charge they may involve, so far from leading to any financial inconvenience, will be followed at an early period by material improvements in the country, which will not only add directly to its present resources, but increase its permanent power of contending successfully with the terrible scourges of drought and famine to which it must ever be liable.

RICHARD STRACHEY.
JAMES CAIRD.
H. S. CUNNINGHAM.
H. E. SULLIVAN.
J. B. PEILE.

July 7, 1880.

Dissent on certain Points from the Report of the Indian Famine Commission.

We think that a more simple principle of treatment for a famine-stricken region than that set forth under heads II. and III. in this Report would better secure the saving of life and the maintenance of order, without an undue pressure on the resources of the State, with less dislocation of official duties, and no disruption of the mutually helpful bond of village society. The people of England can hardly realize the loss by death in the last Indian famine. Upwards of five millions of human beings, more in number than the population of Ireland, perished in that miserable time. If the people of this vast metropolis, with the millions in its neighbourhood, were all melted away by a lingering death, even this would not exceed in numbers the loss of India. A result so fearful in extent, and so heartrending in its details, was brought about by want of timely preparation to meet a calamity which, though irregular in its arrival, is periodical and inevitable.

Famine Administration.

Timely preparation indispensable for the successful treatment of famine.

1. The great difficulty hitherto felt in famine administration in India has been in the disorganization arising among multitudes of people, landless labourers and their families, suddenly deprived of their usual employment, without stores of food, who, when the last measure of grain is reached, break away from their villages in despair, and "wander" in search of food or employment. The attempt to cope with this, in dealing with millions of people, without due preparation, overtaxes the working power of the State and has led to frightful confusion, waste, and expenditure, and to untold misery and death.

The cost of relief so moderate as to admit of no financial excuse for famine deaths.

2. The estimate made in Section 75, page 26 of this Report, shows, from past experience, that the largest population likely to be severely affected by famine at one time may be taken at 30 millions, 10 per cent. of whom we may reckon it may be necessary for the State to relieve for an average of a year. The cost of this for 3 millions of people, at 3*l.* a head, at famine prices, would be 9 millions, and this would provide relief on a scale double that given in Madras and Bombay in 1876—78. As famines of this magnitude have not occurred at an interval of less than 12 years, it would appear that the annual reserve fund of 1,500,000*l.* now made by the Government, if so applied, should amply suffice to meet this calamity. On the Indian population this would be an extremely small expenditure on poor relief, not one fortieth part per head of that of the United Kingdom. The amount is so moderate that if acute distress, and its consequent terrible mortality, can be prevented by such an insurance fund, no financial excuse can be admitted to justify famine deaths. Nor should any practice be adopted which needlessly aggravates the distress, or is likely to lead to increased mortality.

The first object of famine administration should be the saving of life, and the mode by which that has been most successfully accomplished.

3. We will assume that the first object of famine administration by the British Government in India will be to save life. In all the famines on record which have occurred in India, that of Behar in 1874 is the only instance in which this object, though at an excessive cost, appears to have been satisfactorily accomplished. There was early and active intervention by the Government in securing an assured supply of food. No distance or other tests were used to repel the needy applicant for work or aid. The village system was as much as possible left undisturbed. Useful work was found for the capable workers of the population, and the infirm and really necessitous, who could not work, had food distributed to them in their villages by the local authorities, under proper supervision. The small landholders, to the number of several hundred thousands, received advances from their superior landlord, the Government, to tide them over the worst of the time, and nearly the whole of these were recovered. The collection of revenue was promptly suspended, and some proportion of it afterwards altogether remitted.

63

Mode of treatment suggested.—

4. If an adequate and timely supply of food has been arranged for, either by importation from other parts of India or private storage in localities difficult of access, we should divide the people needing relief into two classes, those capable of doing remunerative labour, and those who are not. The general testimony of the officers of the Public Works Department shows that remunerative work can only be got from persons in bodily condition capable of labour. The class who suffer most from famine are those who have no land, field labourers, weavers, and village artisans. When employment fails them they have no margin to fall back upon. It is essential to their safety, therefore, that when ordinary sources fail Government should have employment prepared for them. In those districts of the country which are periodically subject to famine permanently useful works of public utility should be prepared, to be then ready for execution. On the approach of famine, these should be thrown open to all capable workers, under the superintendence of the Public Works Department. No test would be required, as a full return in work would be given to the Government for wages paid by the "piece" system, the ordinary rates being paid, on a scale adjusted in accordance with the market price of food. The works would thus cost, to the extent of such variation, more than if carried out during times of average prices, but otherwise the cost of supporting this class through the famine would be repaid to the State by the value of the works of utility executed. This class, as it would include also the blacksmiths, carpenters, bricklayers, and masons, who could exercise their calling on the public works, would probably comprise two thirds of the people requiring the help of the State, if measures are taken at an early period before the people have become emaciated.

1. For those capable of labour of a remunerative kind, under superintendence of the Public Works Officers.

5. To the remaining third, the persons who from age or infirmity, or being unfitted by their normal occupation, or other sufficient reason, for doing remunerative field work, food should be gratuitously supplied in their villages, on the lowest scale sufficient to maintain health, without exacting other labour than such sanitary or other light work as could be advantageously done near their homes. The administration of this, under official supervision, should be laid upon the village headmen and owners of property; and, in order to enlist their careful management, a proportion of the cost of the gratuitously supplied food might, where the ordinary circumstances of the people would admit of such a course, be repayable, by instalments, to the Government, by a rateable charge on the property of the village. By distributing the responsibility in this way the relief work would be comparatively easy, as in each village the number to be thus relieved would not exceed three to four persons in each hundred of the population.

2. For those not capable under village headmen, officially supervised.

Orderly manner in which each class would thus be treated.

6. The labouring class would thus be dealt with promptly, in an orderly manner, free from confusion and panic,—the capable workers passing at once under the charge of the professional superintendence of the Public Works officers,—and the weakly class remaining at home under the charge of the village officials, to whom they are individually known. By thus employing the capable workers, and maintaining the village organization, the distance and other tests, which proved fatal to hundreds of thousands of starving people in the last famine, would be rendered unnecessary.

3. The landholders to be under the care of the Revenue Officers, who should have power to make advances, and suspend collection of revenue.

7. The small landholders, and all of the landed class who stood in need of temporary aid, would naturally be under the care of the Civil officers of the Government, who should be authorized to make advances in money or food as they might deem necessary and judicious, and on the same principle to suspend for a time the collection of the revenue. If some portion of this

class desire to earn wages, they should be received on remunerative works without hesitation.

8. It is to meet the case of the incapable workers that it is recommended in the Report to retain the unsatisfactory "task-work" system, by which strong labourers are restricted to a limited amount of work, and the weak are compelled to fulfil their task under penalties sometimes dangerous to their lives to enforce —and also to employ the requisite accompaniment of "task-work," the complex machinery necessary for the prevention of fraud; a system which assimilates the unfortunate recipients of relief to gangs of convicts sentenced to hard labour, and the engineers in charge to jail warders. This "task work" system must not be confounded with "piece work," from which in India it has a quite different signification. If the distress consequent on famine is grappled with at an early period, before the people have become emaciated, the number of these incapables will be comparatively small, and the method of dealing with this fraction of the community, at once the most economical and the most humane, will be to admit them to almost gratuitous relief, administered on a scale sufficient to maintain life, but insufficient to attract wilful idlers.

Grain Storage.

9. Although the principles laid down under head V., pp. 49—54 of the Report, in regard to the action of Government in relation to the food supply, have our general concurrence, we are unable to adopt the views which find expression at paras. 160—164, inasmuch as the evidence which we collected has led us to form the opinion that, under present conditions, it might be not only expedient, but absolutely necessary, for the State to make provision in the manner condemned by our colleagues. There are certain localities in Southern, Western, and Central India which are now, and may continue to be for some time, distant from the lines of railway communication, and which are in an especial degree liable to visitations of famine. For these comparatively inaccessible tracts, which we may reckon at one fifth part of India, with a population of 40 millions, we suggest a plan of storage to show that the measure is not the financial impossibility indicated in the Report, and if our views as to its necessity be accepted, we recommend its being adopted tentatively on a limited scale, leaving the extension of the operation to be decided by the success or otherwise of the experiment. We are unable to place confidence in the Table at page 50, which shows an estimated annual surplus yield of five million tons of food grain. The average annual export of rice and grain from all India is one million tons, which should thus leave four million tons to be laid by, a quantity sufficient to feed 24 millions of people. As famines come but once in 12 years, there should in that period be an accumulated surplus sufficient to feed nearly 300 millions. And yet when famine does come, and then affecting at its worst not more than a tenth of that number, it is only by immense pressure on other parts of India, and at a quadrupled price, that the barest sufficiency of supplies can be obtained. This seems a clear proof that the alleged surplus must be greatly over-estimated. Considering, also, the admittedly "approximate and rough estimates" on which the belief in this surplus is based, and the exhausting practice of agriculture so generally followed in the cultivation of dry grain in India, we are unable to concur in the statement that "India as a whole now produces, and is likely long to produce, sufficient food for its population in any season of drought." The "prolonged teachings of the past" referred to in the Report are, as far as that country is concerned, wholly against such a conclusion. Population is increasing, the price of food is rising, the production of it as shown by exports scarcely advances, whilst, as the number of the landless class who depend on wages is constantly growing, the supply of labour in the absence of industries other than agriculture must soon exceed the demand. Already their wages bear a less proportion to the price of food than in any country of which we have knowledge. The common price of grain in the Southern States of America on which the free black labourer is fed, is the same as that of the Indian labourer, viz., 50 to 60 lbs. per rupee. But his wages are eight times that of

64

the Indian, 2*s.* to 2*s.* 3*d.*, against 3*d.* a day, whilst the climate is much the same in its demands for clothing and shelter. This is a fact of extreme gravity as illustrative of the poverty of the Indian coolie or field labourer, not to be met by resting satisfied that "chronic famine is one of the diseases "of the infancy of nations." For India as a nation has long passed its "infancy," and the task of the British Government is, by fostering diversity of occupation, to guard it against decline.

Proportion of grain and rice used as food by natives of India.

10. The food of two thirds of the people of India is grain, and of one third rice. The annual surplus of rice, as shown by the export, is so great that a sufficient supply from the current crop can always be relied on to meet a partial rice famine. But the export of food grain, other than rice, from India, during each of the last ten years, has been less than one day's consumption of the grain-eating population. There would thus appear to be no sufficient annual surplus within the country to meet the demand of a severe grain famine, without drawing part of their ordinary food from the unaffected districts, thereby diminishing their supply, raising the price, and thus extending the area and general pressure of the famine. This has been the uniform effect of drawing supplies suddenly to the famine districts from other parts of India. Supplies from foreign countries are practically impossible. The densely peopled countries of other parts of Asia do not appear to export grain. And in a country where the annual surplus of grain is so small, and where it cannot be increased by foreign importation, the absolute need of reserves in seasons of scarcity, for the supply of places difficult of access, becomes almost imperative. The most effectual remedy for this would be to encourage the storage of grain in such localities in seasons of plenty.

No sufficient annual surplus of grain to meet the sudden demand of famine, and foreign supplies not procurable.

Storage in seasons of plenty therefore required in localities difficult of access.

Grain food easy to handle and to store.

11. No treatment of famine has yet been successful in the preservation of life that has not been ready to be commenced at the earliest period of actual want. The food of the people is of the simplest kind, grain and salt, and a few condiments for a relish. The grain is easy to handle, bears storage in pits for many years, and the people themselves grind it as they require it. The pits are made in the ground, in a manner with which the natives are familiar, and cost nothing beyond the encircling ring of baked clay, and labour, in construction. We propose no new practice, but recommend that, in outlying places, the Government should, through their resident officials, do for the safety of the poorer class what the wealthier now do for themselves. The people live on different varieties of dry grain grown in their several districts, which is the specific food they are accustomed to. As this common grain is rarely an article of export, its storage would in no way interfere with the operation of foreign trade, and as the storage would be subdivided in every village it could be done without disturbance to the usual operations of husbandry. In seasons of abundance stores may very conveniently be made. A village of 400 inhabitants, cultivating 400 acres of grain, may be reckoned to have 40 of the class for whom storage is here proposed. A store of seven tons would suffice for this number during a year of famine, and as severe famines on an average come as yet but once in 11 or 12 years, the quantity so required might be secured out of two years of good crops during that interval, at the rate of 3½ tons for each time, without any pressure on the rest of the people, while the storage of that quantity of grain would be a simple and inexpensive operation.

Mode of storage simple and inexpensive, and would not interfere injuriously with trade.

12. Where the administration of relief in time of famine has broken down, it has generally been due to an attempt having been made to combat an extraordinary emergency with ordinary means. But arrangements that answer their purpose fairly well in the ordinary conditions of society fall to pieces when those conditions are shaken to their base by an abnormal visitation such as famine. As a general principle it is manifestly inexpedient for the Government to undertake any functions which experience has shown can be adequately performed by private enterprise. In ordinary times, wherever a demand arises, trade will in due course furnish the supply; but we know from sad experience that in a sudden emergency, such as famine, trade has often been found wanting. Instances are on record of starving people, with money in their hands, being unable to purchase food which trade had either failed to bring to the locality, or which, under the influence of panic or greed, the traders refused to put into the market; and the reason

Ordinary appliances not adequate to cope with unusual emergencies.

is obvious. Trade as a rule acts cautiously, and is not influenced by sentiment. Its object is profit, and unless that is clearly discerned it is slow to move. There is much risk also in a speculation which might be altogether marred by a few falls of rain, which would convert imminent famine into moderate sufficiency. And thus, as a matter of fact, trade remains inactive until the uncertainty has become reality, when the task of replenishing the exhausted stocks, over an enormous area, is one of such vast proportions that, without railway advantages, it cannot be accomplished before famine becomes master of the situation, and trade supplies arrive too late to save the lives of tens of thousands.

There will doubtless be difficulties attendant on the practical working of the scheme, but they will not, we think, be found insuperable. On the other hand, it is certain that the stored provision of an adequate supply of food for the poorest class in every village would give time for trade to operate, and, by inspiring confidence among the people, would prevent wandering and the disruption of local and family ties, causes which have hitherto so much impeded the effectual administration of relief, and so greatly enhanced its cost.

13. The main difficulty arises in making a beginning, inasmuch as it is impossible to predict the locality on which famine will fall, and, if the scheme were to be carried out in its integrity at the outset, it would be necessary to make provision for the whole period of 54 years, though only one fifth of the store would be required in each 11 or 12 years of the famine cycle. As the value of our suggestion is to be tested by experiment we would propose to proceed gradually, making one locality after another safe, after careful trials had proved that the plan was likely to succeed. If success should be assured, the plan might then be systematically entered upon, on the basis of securing 666,000 tons in the first period of 11 years, which would be the whole quantity necessary to feed, for 54 years, 10 per cent. of the population of one fifth part of India, the proportion here assumed to be difficult of access. The grain would be bought in years of plenty, on the spot where grown, at 4*l.* a ton, delivered at the pits, and the cost of storage may be taken at 10*s.*, making together 4*l.* 10*s.* The quantity annually stored would be 60,000 tons, at the cost of about 270,000*l.* This, when all was got into working order, would be the annual cost during the first 11 years, making a total of 2,950,000*l.* for securing, for 54 years, one tenth of the poorest of the population of one fifth part of India, against the effects of drought. In the eleventh year we may reckon that one fifth of the stores will be required to meet a famine, and this quantity, at a cost of 594,000*l.*, should be replenished in the first two good seasons afterwards. This would carry the country on till the famine period recurred 11 years subsequently. The whole cost at the end of 22 years would be 3,564,000*l.*, or an annual average of 162,000*l.* A second fifth would then again be consumed, and again replaced at a cost of 594,000*l.*, raising the total expenditure from the beginning to 4,158,000*l.*, which again carries the country on to the third famine, in the 33rd year, at an annual cost now falling to an average of 126,000*l.* The third fifth will then be consumed and again replaced, raising the total cost to 4,752,000*l.*, but lowering the average annual cost for 44 years to 108,000*l.* And in like manner the fourth famine will then have eaten up the fourth fifth, to be again replenished before the 55th year, raising the total cost to 5,346,000*l.*; the average annual cost for the whole period having fallen to 97,000*l.* The last fifth will then be consumed by the fifth famine, leaving in store a fresh stock of four fifths to commence a new famine cycle. The whole expenditure to the end of the first cycle of 54 years would thus be 5,346,000*l.*, but this will leave stocks in hand sufficient to carry on for 44 years more.

We have put forward this proposal for partial storage more as a means of saving life than of saving money, but the certainty of the latter would appear to be quite as great as the former. The annual famine insurance fund of 1,500,000*l.* would in 55 years amount to 82,500,000*l.* One fifth of this, taken for the one fifth part of the country with which we have been dealing, would be 16,500,000*l.*, whilst the actual expenditure under our plan would be something less than one third of that sum; moreover, there would

remain in hand stocks to the value of 2,360,000*l.* as a provision against future famine for the poorer class, in four fifths of the country to which the system of storage had been applied. The argument in para. 61 of the Report by which it is attempted to be shown that, by the multiplication of interest at 10 per cent., the ultimate cost will be extravagant is quite fallacious. The Government of India can raise money at 4 per cent., and, if any charge of interest for this object be legitimate, that should be the limit. But the necessary expenditure in making provision against famine comes out of the current revenue, and is no more chargeable with interest than the annual cost of any other branch of the public service.

14. Without desiring in any way to depreciate the efforts of the many able officials who during the last century have given their attention to the question of famine relief, we think that the terrible fact of five million people having been allowed to perish in the last famine is sufficient proof that past experience must serve more as a warning than a guide. The complete break down that then occurred was but a repetition, on a larger scale, of the failure which has characterized the administration of every Indian famine in this century, with the single exception of that of 1874, which was met by the principle that, before all other considerations, the saving of life must be the first object of a British Government, armed with absolute power, and therefore the more responsible for the lives of its helpless subjects. Whilst we thus unable to draw any comfort from the past, we do not differ from and [illegible] agues in desiring to have labour in return for State relief, though we so far as it is at once capable and useful; nor do we at present counsel [illegible]erence with trade, except in localities with which it has as yet impe[illegible]s of communication.

JAM
H. F

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STEAM-TRAMWAYS

FOR

INDIA.

AN INTRODUCTORY PAMPHLET

BY

CLAUDE VINCENT, A.M.I.C.E.,
UNDER SECRETARY TO GOVERNMENT,
P. W. D. IRRIGATION BRANCH.

Published under Official Sanction.

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CONTENTS.

CHAPTER I.—INTRODUCTION . . . . . Page. 1
II.—STEAM-TRAMWAYS—HISTORICAL AND DESCRIPTIVE 7
III.—STEAM-TRAMWAYS FOR INDIA 23
IV.—CONCLUSION 47

69

70

ERRATA.

Page 23,	4th line from bottom,	*for* "engenders"	read "engender."
" 34,	11th " "	" "former"	" "railway"
" 37,	in Table II.	" £2,640	" £2,940
" "	"	" £25,000	" £25,300
" "	"	" £2,500	" £2,630
" 38,	in Table III.	" £3,520	" £3,920
" "	"	" 3 closed vans	" 2 closed vans.
" "	"	" £6,846	" £6,696
" "	"	" £472	" £222
" 41,	9th line from bottom,	" "34·96"	" —"34·96"

NOTES.

1.—Page 27—The Bengal name for a jutka is "ekka."

2.—Page 29—In Northern India and Bombay octroi duties are universally levied by Municipalities in the place of toll-fees; the difficulty therefore would not apply there. The case of these towns would also form a precedent for the adoption of the necessary change of system in Madras, where required by the introduction of Steam Tramways.

STEAM-TRAMWAYS FOR INDIA.

CHAPTER I.

INTRODUCTION.

The great famine in Bombay and Madras of 1876 to 1878 took every one somewhat by surprise and attracted very serious and very general attention. The loss of life was so great that pity opened widely the purse-strings of private benevolence; and the cost to the State was so enormous, that politicians eagerly inquired whether it might not have been materially diminished by the exercise of a little previous foresight. It was felt that the frequent repetition of such expenditure—and there is no particular reason why it should not have to be repeated somewhere at any moment—would precipitate the phesied ultimate collapse of the Indian finances. So suggestions were freely offered as to the causes of famines, the proper way of meeting them, and their possible prevention in the future. An influential Royal Commission was also appointed who have issued a most exhaustive report on all the bearings of the question.

Speaking generally, remedial measures that have been proposed are divided into two classes: (1)

Measures that contemplate the extensive creation of irrigation works; (2) Measures that contemplate a considerable development of the system of inland communication.

Advocates of the first system have a good deal of solid argument on their side, for they say, and very justly, that irrigation works confer permanent benefit on the country, and enable the individual cultivator to lay up a store of food against a dry day; whereas improved communications confer but little real benefit to the individual, and seldom pay a reasonable interest on the outlay upon them. Unfortunately, irrigation works fail most conspicuously when their assistance is needed most urgently. In a dry year, and still more in a succession of dry years, even the largest irrigation systems produce a reduced supply, and, moreover, the area protected by them can, at the best, bear but a ridiculously small proportion to the total area affected by an extensive famine. Only great rivers have any supply in dry years—small rivers, and of course all tanks, being perfectly innocent of water at such times—and the great rivers of India are limited in number. Moreover, even though food-grain may be stored in favoured regions in good years, and though it may be also produced in excess of the local demand in bad years, yet it is quite one thing to have the grain at the place of production, and quite another to get it, in the middle of a crisis, to outlying famine-stricken localities. A recommendation of some members of the Famine Commission is that large store-houses should be built for grain in important centres, so that a reserve may exist in times of scarcity. But it is unlikely that this idea will be carried into execution for it presents difficulties that need not be discussed here, and, in any case, the reserve would not constitute a sufficient supply dur-

ing the recurrence of a period such as that of 1876-78.

Any one who had practical experience of famine-work during that time will know that one of the chief difficulties arose, not from the scarcity of grain, but from the impossibility of sending it forward with sufficient rapidity or in sufficient quantity from the ports, or stations of delivery, to the interior of the country. The block at the Madras port, or at Raichoor Railway Station where Bombay territory ends and that of Madras begins, in 1877, must have been seen to be believed. The grain was there and in abundance; it came from Burmah, from Calcutta, from the Central Provinces, from the Punjab, but it lay there for days owing to the hopeless block on the lines of rail. Merchants up-country had plenty of demand for grain, but they could only obtain it with great difficulty and at enormous expense, so the price when it reached the consumer was raised very much beyond what it would have been, had the ready demand met with an equally ready supply. And the lines of price and the lines of mortality rise and fall with unerring synchronism in famine tables. Neither when the grain reached the up-country railway station were the difficulties ended. Bullocks had died in thousands, and the means of transport were thus rendered scanty,* so that it may be said that people died of hunger with the food at their very doors. The remedy for this state of things, say the advocates of the second of the abovementioned systems, lies in the development of

*In time of drought and famine the substitution of mechanical for animal power for purposes of transport is another very important advantage which it is not possible to reckon by any money standard. (Chapter V, Section 4, para. 3 of Part II of Famine Commission Report.)

The cost of transport by cart is estimated at five times that by rail in ordinary times, but it will increase to ten times as much during famine. (para. 4 of same.)

internal communication. The battle between the two systems has been hotly contested enough, but victory may be said to rest finally now with the latter, the expenditure on large irrigation works having been strictly limited by the Secretary of State, while the railways of the country are about to be largely developed. For example, in the current year, out of the £2,500,000 to which the total yearly expenditure on Productive Public Works is now limited, £1,780,000 are to be spent on railways and only £758,000 on Irrigation Works. Moreover, it is believed that by far the larger share of the £750,000 which are to be yearly devoted to Protective Works will also go to the further development of internal communications.

Great encouragement has also been held out to private capitalists to embark in Indian ventures, which are understood to mean principally, railways. Para. 179 of Part I of the Report of the Famine Commission runs:—

"The future power of the country to resist"
"the pressure that arises from drought is so"
"immediately dependent on the improvement of the"
"means of internal communication, that it is, in our"
"opinion, impossible to exaggerate the importance"
"of striving to accomplish this in every practicable"
"way."

The railway-system of India is fairly complete so far as the great trunk-lines are concerned, but this is about all that can be said. The real function of railways is to bring about the closest possible alliance between the producer and the consumer, and this can never really be attained until all the principal tracts of country are within easy reach of a line of rail. There are still many important pro-

ducing centres in India, which are situated miles and miles from any ready means of communication with the outer world; and the food-produce, which is there in excess, does not really benefit the consumer, the expense of carriage making any reduction in price to him impossible.*

Remedy this state of affairs, it is said; run light and inexpensive lines of rail from the trunk-lines into these districts, their surplus produce will then be rendered available, one of the great famine difficulties will be solved, and the resulting development of trade will increase incalculably the wealth of the country in ordinary years. But the fatal objection is at once raised. "Where is the money to come from?" The Government of India have not got it at their disposal; private enterprise will not step in unless a substantial guarantee is promised; and Government have almost renounced the principle of guarantees. Why? Because it has been shown by experience that but few of the trunk-lines will ever work up to their guarantee, and that it is quite certain that feeder lines, as they are called, will never do better, if so well, as the trunk-lines. It is scarcely probable that even a light line of railway in India will ever be constructed for much less than from £6,000 to £7,000 a mile; and, at this rate, and with the expenses of working and management as high as they must necessarily be, it is impossible, on any reasonable estimate of traffic, to show any satisfactory percentage on the expenditure. India is a poor country; so much is at last happily acknowledged; and the inhabitants of India have their travelling idiosyncracies, which ought to be recognised, but often are not. So that in the first place travelling, for people as well as for goods, must be cheap, and in the second place its methods must coincide with the wishes of the people.

Nothing makes travelling so popular as making it easy. A man living 10 miles from a railway remains contentedly at home. Bring the railway to his door and he will think that a journey is the one thing he has always needed to complete his happiness. So also with goods. A producer has a surplus stock, but carriage being difficult, he sells it to the nearest middleman at the local rate. The latter, who does things largely, sends it off to a trade-centre and makes a handsome profit. Improve the means of carriage, the producer then sends his stock direct to the trade-centre, and he benefits, even though prices there fall to the advantage of the consumer.

We thus come to this—that improved communications, or, let me say once for all, railway feeders, are highly desirable, but that even light lines of rail are, in most cases, too expensive to be practicable. Is there any alternative? I think there is, and that it is to be found in steam-tramways. The reasons for this opinion will be indicated in the next chapter.

CHAPTER II.

HISTORICAL AND DESCRIPTIVE.

Tramways generally are of quite modern origin, and steam-tramways in particular may be said to be still in the earliest stage of development.

To America belongs the credit of being the pioneer of this new mode of locomotion. They were adopted there long before they became popularised in Europe, and in large American cities tramways have now replaced almost all other means of conveyance. For instance, in some streets of New-York there are four lines of rail, along each of which cars pass at intervals of two minutes. But in England, vested interests and the dislike to novelties long prevented the introduction of the system, and it was not till 1860 that the first tramway was established at Birkenhead. It was not till 1869 that the vestries of the suburban parishes of London were forced, by the pressure of public opinion, to grant concessions to Tramway Companies, and even now their operations are confined to the suburbs, no tramway running into the heart of London. In Paris the first important tramway was not established till 1875, but a start having been once made the after-growth has been very rapid. This indeed is true generally. At first the public were suspicious, and Municipalities and Corporations imposed hopeless conditions on would-be concessionaires. But the system was too good not to be successful. A few examples sufficed to show that a method of quick, pleasant, and cheap travelling had been secured,

and one town after another became so eager to obtain these advantages for itself, that now there is scarcely a place of importance that has not got its tramways completed, in progress, or projected.

Horses were at first solely used for traction on tramways, but their prime cost is so great, and their employment involves such difficulties of upkeep and management, that numerous attempts have been made to replace them by some method of steam traction. These attempts have not been very successful hitherto, as the use of steam-power on public roads is subject to such stringent regulations, that it has not been found possible to comply with their conditions. The smoke, the noise of the engines, and the difficulty of controlling them, are all exaggerated, and are supposed to present so many annoyances to the general road-traffic, that a form of locomotive power which will successfully meet all these objections has hitherto been considered a *sine quâ non*. Compressed air engines have been tried on numerous occasions, but with only a moderate measure of success, and there can be little doubt that eventually public opinion will change, the objectors will have to yield to the force of example, and that steam will triumph.

As a matter of fact, the anticipated dangers resulting from the use of steam are purely chimerical. Steam-cars are in use now in many cities of Europe and America, and not the slightest difficulty or danger is found to result from their employment. Any Anglo-Indian may verify the truth of this assertion for himself without much trouble. He probably knows Turin. The next time that he halts there on his way to or from England, he may see steam tram-cars running up the Via di Po, the principal street in the town, and into the Piazza

di Castello. In this case scarcely any precautions are used to lessen the noise or the smoke of the locomotive. The train of passenger cars is drawn by a separate locomotive, which would certainly look a strange object to a horse the first time he saw it, but which, in Turin, all horses now pass with the utmost indifference. Horses in towns but rarely shy at objects; so many things are strange that they merge all into a general indifference. Noises they do mind, but the noise made by a steam-tramway going at a slow speed is almost inaudible.

So far reference has been made only to tramways in towns, but with the example of steam traction engines before them, and with the principle of steam-tramways admittedly successful, it was evident that the pioneers of the new enterprise would soon turn their attention to the possibility of successfully serving country districts. It was the logical sequence of suburban tramways—first to bring the outlying portions of a city into easy communication with its centre, and then to bring the means of locomotion to the environs and outlying villages. They were obvious difficulties in this extension, for tramways to be successful must be cheaply constructed, *i.e.*, they must be able to utilise the existing roads, which, in turn, involves the absence of any steep gradients on the latter. Also, being at first designed solely for passenger traffic, it was necessary that the flow of passengers should be fairly continuous and their numbers constant.

The first country tramways that have been introduced into Europe on a large scale are accordingly in a country where all these conditions are fulfilled, —the north of Italy.

The plain of Lombardy, with Milan as its centre,

formed the place of all others for such an experiment. The country for miles around Milan is almost perfectly level; the roads are numerous and good; there are many surrounding villages all filled with a large and busy population; and lastly, and this is a point of no small importance, the country is very little intersected by railways. The first Milanese tramway was only laid down, to the best of my knowledge, about 4 or 5 years ago, but, at the present moment, there are 200 miles of rail branching out from Milan on every side along fifteen of the principal roads, and running in some cases as far as 30 miles into the country. Steam-tramways exist of course in considerable numbers in other countries, especially in America, Germany, and France, but they have no where reached as yet the same stage of development as in Lombardy. I recently had a very advantageous opportunity of studying the working of the Italian system. I made Milan my head-quarters for several days while I was making an official inspection of the important Irrigation works in the neighbourhood, and every day I went to the head-works, or to some point of interest on the various canals, by means of one or other of these lines of tramway. I also had what may perhaps be called exceptional advantages for studying the details of the working of one of the Companies; and, as any system of steam-tramways in India would certainly be based to a considerable extent on the results of these Milanese lines, I will proceed to indicate some of their more important features.

The line that I will take as typical was opened in June 1878, has a length of main line of 18·64* miles, and runs along a fine straight road about 20 feet broad with a slight and steady ascent out of Milan. There is only one difficult point in the whole line, where the road ascends sharply over an arched bridge across a navigation canal. The use of the portion of the road required by the tramway was granted gratis by the Provincial authorities to whom the road belongs. In some other cases however an indemnity has been claimed by the proprietors of the road. The Company is only obliged to keep in order that portion of the road which is occupied by the tram, and as the gauge is 4′, 8″½, which is the same as that of the Government railroads, about 7 feet is about the width for which the Company is responsible, allowing a small margin outside the rails on each side.

*It has in addition a branch of 2·3 miles opened last year.

Government sanction has nominally to be obtained before a tramway concession can be taken up, and Government surveillance is exercised when the line is working, but neither of these points are very strictly enforced up to the present. The Italian Government has shown itself to be very unselfish and very discriminating in the matter. Unselfish, because as proprietor of the railroads, the tramways enter into direct and, I may add, successful competition with it; and discriminating, because it has recognised the importance of securing to the province the utmost possible development of the system, and has therefore declined to strangle its birth by any vexatious regulations or stringent control. As a matter of fact, the rails of some of the new trams have been laid down before the sanction of Government to the concession has even been asked for, and the Bye-Laws framed by the Companies are not interfered with, except so far as to see that the public safety is duly considered. This latter point is secured principally by limiting the maximum speed of the steam-trams to 11 miles an hour. This point brings out well the perfunctory nature of the Government control, as, on every line, the trains run to a speed

of certainly 15 miles an hour and probably more. In fact their printed time-tables are boldly based on a higher rate of speed than is allowed by regulation. It is known however that it is the intention of Government, as soon as the trams are as fully developed as is reasonably required by the needs of the province, to bring in a law strictly defining the right of tramways, which will be rigidly enforced. The Companies at present are therefore only in the state of "making hay while the sun shines."

As a matter of convenience the Company does the repairs to the whole breadth of the road, receiving an annual subsidy from the Provincial authorities for the up-keep of their portion of it.

The capital of the Company to which I am more particularly referring, consists of £40,000 worth of fully paid up shares, and of £10,000 worth of debentures. There are 4,000 shares of £10 each, and the market value of each is now £16, which sufficiently indicates the prosperity of the Company. A large amount of foreign capital is invested in the Milanese lines.

The cost of the main line was about £2,300 per mile including rolling stock and all incidental expenses, divided as follows:—

	£	£
Preliminary Expenses.		
Inauguration	219	
Indemnity to Concessionaires	880	1,740
Sundries	641	
Buildings, &c.		
Station at Milan	5,517	
Terminal Station	616	
Other buildings	60	7,886
Legal expenses	1,693	
Permanent way		21,121
Carriages and Trucks		5,901
Locomotives		5,897
Office Expenses		282
Tools, &c.		266
Sundries...		208
Total...		£43,301

The buildings at Milan comprise workshops for the repair of the rolling-stock, and sheds in which it can be housed; also a small station, but regular station-buildings are not required, tickets being taken *en route*. At the other end there is a housing shed; but at other places, the train simply draws up in the principal street of the village, opposite the "Albergo di Tramway," which suffices as a rallying point for passengers.

The permanent way is supposed to be laid down flush with the road, and is so through towns and villages, but in the country there is a drop of nearly an inch between the rails, from the top of the rail to the roadway, which makes it very unpleasant, if not impossible, to utilize the between-rail portion for ordinary traffic. No doubt the Companies have made their permanent way like this intentionally,

so as to keep road-traffic off their lines and so to save wear and tear, but when the Government Regulations are framed, this omission will have to be rectified. The rails are of Vignoles section, made of Bessemer steel weighing 36·28lbs. per yard, clamped on to cross-sleepers of wood. In towns and villages there is a longitudinal sleeper above the cross-sleeper, and the rail is then clamped on to that, a guard rail being also employed. There is also a guard rail round all curves, the minimum radius of which is 131 ft. The steel rails cost £9 16*s.* a ton. The cost of up-keep of the permanent way varies from £16 to £19½ per mile per annum, but the details of receipts and expenditure during one year will be shown in a copy of the balance-sheet later on. The line is only single—there is no double line of steam-tram yet established anywhere in Italy—but there are shunting stations at the principal villages, where trains can pass each other.

There are three classes of passenger carriages, besides goods-trucks and goods-vans. The passenger carriages are divided into;

1st class, which weigh 51·18 cwt., are 19·7 ft. long, 8·86 ft. high, and carry 16 inside passengers, besides from 12 to 16 passengers on the platforms at each end;

2nd class, which weigh 49 cwt. are of about the same dimensions as the 1st class, and carry 22 inside passengers and about the same number of platform passengers;

open-side carriages for summer use, which weigh 43 cwt. are 22·3 ft. long, and carry 32 seated passengers.

The carriages cost on an average £200 each, and there are altogether 40 at work on the line at

the present moment, some having been purchased since the Company was first started, on the construction of the branch line abovementioned. One or two American carriages were imported and were much liked, but the Belgian make is well spoken of, and Grondona of Milan also turns out good ones.

There are altogether 8 luggage trucks and vans on the line, but the goods-traffic is small at present, consisting chiefly of milk and garden produce for the markets of Milan.

The locomotives are mostly of Swiss or German manufacture coming from Zurich or Cassel. They have very much the appearance of a high box on wheels, being covered in as much as possible so as not to frighten horses. They are of the ordinary direct-acting outside-cylinder type, weigh from 6 to 10 tons, develop from 20 to 30 H. P., and work at a nominal maximum pressure of 118 lbs. on the square inch. As a matter of fact this is exceeded, and I saw several working up to 10 atmospheres, or 147 lbs. on the square inch. They cost from £640 to £800 each, and there are 12 now at work on the line. They all burn coke, patent-fuel being said to give out too much smoke. Coke costs about 36*s.* a ton at Milan.

The total number of miles run in 1880 was 128,889, and the total cost of running was £4,283, or nearly 7·9*d.* per train-mile, which includes the lighting of carriages, wages of servants, &c.

As regards the locomotives alone, the average consumption of fuel in each for each mile run, is 10 lbs. of coke, 1·1 lb. of wood, and ·18 lbs. of oil. The fares are 1·13*d.* per mile 1st class, and ·64*d.* per mile 2nd class. The goods rates are fixed so as to be between the express and slow-train rates on the neighbouring lines of rail. There are 6 trains each way every day, extra trains being run on Sun-

days and holidays. There are 7 stopping stations between Milan and the Terminus, and, at intervals between these stopping stations, poles are placed, at which people who wish to be taken up may take their stand. The tram will stop for them there, but not at other places, as it is well known that frequent stoppages cause a great loss of power, equal, it is estimated, to half a mile of running for each stoppage. These intermediate stopping-places appear, however, to be very rarely used. The engines can stop the trains dead in about 25 yards.

The trains consist of the locomotive, which has an engine-driver and a boy to look after it, and generally of one 1st class, one 2nd class, and one open carriage, with perhaps a goods-van. One conductor and one check-taker look after these. There are in all 33 subordinate employés on the line. The ticket-system is as follows; all tickets are given in the cars, the conductor being provided with two rolls of narrow paper which are marked off into divisions, each representing $2\frac{1}{2}d.$ for the 1st class, and $1\frac{1}{2}d.$ for the 2nd class. All fares are in multiples of these, and he gives each passenger the number of divisions his fare represents. The check-taker follows the conductor, and to him each passenger gives his slips which he tears in half and throws away. At the end of each trip, the number of divisions issued by the conductor is counted by the cashier, and he hands over the equivalent sum. Season tickets are given, but there were no return tickets on the line in question till September last. The above system is said to answer well and there is but little fraud. I may mention, by the way, that the most successful means of checking fraud get discovered is on the Bombay horse tramways, that are the property, I believe, of an American firm. There is a monthly drawing of prizes, in which each ticket taken has a

chance of several very handsome sums of money, so that naturally every passenger insists on having a ticket.

The principal traffic on the Milanese lines is between October and May, and there is steady influx of country people into Milan on market-days, (3 a week), and many also come in to see their friends in the famous free hospital at Milan which contains 2,500 beds.

The maximum gradient on the line is 1 in 20, which is about as steep as an ordinary locomotive can manage with an average train. On the Tivoli tramway at Rome there is a steady continuous ascent of about 1 in 33 with a reversing station. It is supposed by the Milanese authorities that a tramway would not be likely to pay for a short distance, say under 10 miles, unless there was a very large passenger traffic, such as that to some pleasure resort. This is well exemplified by the Turin tramways, which do not run far out into the country, but only through and round the town, and out to a country resort 7 miles from Turin. They only run about 7 miles an hour, but do not differ materially in other respects from those of Milan. They use the ordinary horse-tram rails in Turin.

The country tramways are said to draw all the traffic to them for a distance of at least 2 miles on either side of the line. This distance sounds small, but the richness of the country and the multiplicity of its roads must be carefully borne in mind. It has already been said that where they run parallel to, or near the railways, the latter suffer much from the competition. An instance was given me of a horse-tram that was established 10 years ago to a place called Moriza, 12 miles from Milan, which has caused a total loss to the railway running to the same place of £24,000.

The following is an abstract of the balance-sheet of the Tramway Company I have been describing. It will be observed that the taxes from an exceptionally heavy charge, there being an income tax of 13 per cent., besides taxes on carriages, sheds (house-tax), and Railway Traffic tax. The total taxation is about 20 per cent. on the net income. No one who knows Italy needs to be told of how heavily the burden of taxation weighs there, many landed proprietors having to pay in all nearly 50 per cent. of their income in taxes. However it is the penalty a poor country has to pay for being great, but, in spite of it all, there are plenty of Italians who raise the cry of "Italia Irredenta," and who wish to go to war with France about Tunis.

BALANCE SHEET OF A MILANSE STEAM-TRAMWAY COMPANY FOR 1880.

Receipts.	£.	£.
Passengers	12,369	
Goods	364	
		12,733
Interest		81
Contribution from three hamlets		194
Compensation for damage to Cars		14
Postal Service		81
Discount and Rebate		115
Sundry Receipts		126
Gross Receipts	£13,344	
Gross expenditure	£10,784	
Net Receipts	£2,560	

That is the gross expenditure is equal to 80·8 per cent. of the gross receipts.
Total length of tramway, 27·94 miles.
Train mileage, 128,889.
Receipts per train mile, 25·6d.
Expenses do. 20d.

Expenses.		£	£
Rolling-Stock Depreciation.	Locomotives	603	
	Carriages	578	
	Buildings	48	
Consumption.	Coke	1,138	
	Wood	102	
	Oil and grease	510	
	Leathers	26	
	Varnish, &c	53	
	Tools	46	
			3,104
Maintenance and Repair of Locomotives, Carriages, and Roads		790	
Depreciation of Permanent Way Workshops, &c.		1,786	
Cost of inauguration, &c.		16	
Assurances.	Fire	131	
	Accidents	9	
		28	
			2,760
Cost of Administration.	Direction	729	
	Office	18	
	Stamps	7	
	Publishing	98	
			852
Taxes		586	
Lighting		28	
Rents		12	
Interest on Debentures		250	
Salaries		2,708	
Legal, &c., expenses		45	
Rewards		33	
Sundry losses		17	
Sundry expenses		389	
			4,068
Gross expenditure			£10,784

It will be observed that a fixed sum is paid to an Insurance Office which takes all risks as regards compensation to passengers for accidents on the line. The accidents have been but few and un-

important hitherto, being confined to cars running off the rails round curves, &c. There are no night trains, by which much risk is avoided. The net profit is equivalent to a dividend of about 6 per cent., which is considered small in Italy. A certain amount has been put on one side to constitute a Reserve Fund. Analysing the figures given in the above balance-sheet, we find that the passenger receipts were made up as follows:

	No.	Receipts. £.	s.	d.
1st Class Passengers ...	299,490	3,031	7	1
2nd do. ...	1,453,052	9,004	3	4
Return Tickets ...	...	162	9	7
Season do. ...	...	81		
Special Trains ...	...	64		
Reserved Carriages ...	...	26		
		£12,369	0	0

This gives the result that each 1st class passenger pays on an average 2½*d.*, which is equivalent to a journey of 2·21 miles; and that each 2nd class passenger pays on an average 1·55*d.*, equivalent to a journey of 2·44 miles.

The mean daily receipts, from passengers and goods combined, is £40 8*s.* 8·6*d.* Moreover, the train mileage during the year having been as above stated 128,889, it follows that the passenger receipts per train-mile were 23·03*d.* and the goods receipts, ·677*d.*, or a total receipt of 23·707*d.* for each mile run; sundry receipts of 1·893*d.* bringing up the total to 25·6*d.*, as stated in the balance-sheet. Such are the principal details of the Italian steam-tramway system. It will be seen that they are virtually light railways running along the high-roads, and, in fact, an Engineer said as much to

me, "For all practical purposes we consider them as railways." But whether they are called rail or tramways does not much matter; they confer an enormous benefit on the district they traverse, and there can be no doubt that the system is capable of very large and profitable development in European countries, where the conditions are similar to those obtaining in the neighbourhood of Milan. The principal opposition to them arises from popular prejudice, but any one who has seen them at work in Italy must confess, that 6 or 7 feet of the road-way may very well be given up to a tramway at the side of most important roads, and that the tramway traffic, and the ordinary road-traffic of the country, are perfectly capable of being carried on side by side, without the very slightest difficulty or danger.

The following are some particulars of a steam-tramway between Cassel and Wilhelmshöhe in Germany, extracted from volume 52 of the Minutes of Proceedings of the Institution of Civil Engineers.

The line is 3½ miles long, on an incline of 1 in 16·6, and on a curve of 164 ft. radius. The rails are of steel weighing 36 lbs. to the yard.

There are two locomotives on the line of 20 H. P. each, weighing, with 2 tons of water, 9 tons. They burn 88 lbs. of coke for a double journey of 6·6 miles, running 7½ miles an hour. Each engine can draw two fully loaded cars up the incline, and in twenty-two days the two made 302 trips carrying 34,000 passengers. There had been, at the time the paper was written, no stoppages or accidents, and no cases of alarm to horses. The author considers that—"experience enough has been gained to "allow not only the relaxation of the legal restric-"tions to the use of steam-power on tramways, and "to sweep away horse traction altogether, but also

"of a large extension of the system for light connecting lines of railway to be laid at a small cost on common roads; the speed of these lines not to exceed 12 miles an hour, and the engines to be such as will require only a single attendant. The track should be of the best description with steel rails and iron sleepers; such a track can be laid complete at a cost per mile of £1,200 for material, and £300 for laying. Rolling-stock, such as used at Cassel, can be bought at the following prices; Locomotive, £500; covered car, £200; open car £125; and open goods waggon £75."

Let us now consider how far and with what modifications the system is applicable to India.

CHAPTER III.

STEAM-TRAMWAYS FOR INDIA.

Tramways in Europe have hitherto been designed almost solely for passenger-traffic, the goods traffic even on those that were treated of in the last chapter being very inconsiderable, though capable of development. In India, on the other hand, it is fairly certain that if a country tramway is to be successful, it must traverse a line where the goods traffic is considerable, and succeed in drawing to itself the major share of the carrying trade.

The native of India is not a great traveller, and for short journeys between village and village he has his own means of conveyance, and prefers to make his journey at his own time, so that a tramway might not attract a very large proportion of passenger traffic. Even in Indian cities, tramways have not always proved successful, as we in Madras know to our cost. True, the Madras Company failed chiefly on account of faulty management, and there is the example of the Bombay Company to prove that town tramways, if well managed, may yield handsome profits even in India, but a country tramway here would never return a profit from passenger traffic alone. It has already been said that travelling facilities engenders travelling desire, and so no doubt the passenger traffic on a country tramway would go on increasing, if the line was judiciously chosen.

And there would not be much ground for hesitation as regards the choice of the best lines. There are many towns lying at a moderate distance from the lines of rail, between which and the nearest station a very large traffic exists, which is urgently in need of some more expeditious mode of conveyance than that provided by the cumbrous bullock cart. In the Madras Presidency, every one can call to mind numerous such instances. The South-West line of the Madras Railway took expressly, as is well known, a line running some distance from the principal towns of the districts it traverses, and consequently Arcot, Vellore, Salem, &c., which are all centres of a considerable trade, are quite disconnected from the railway. Nellore and Kurnool on the Bombay line are also far distant from railway facilities, though each is the centre of a large producing region. Again, in connection with the South Indian Railway, the road between Madura and Ramnad has already been subject to the proposal of a light railway line, though the project has been temporarily shelved on account of the cost. The connection of Tranquebar with Mayaveram is another instance. In Lower Bengal too, where the country is so thickly populated, a very great need is felt for some better method of carriage than at present exists. It is not unlike Lombardy in its flatness, its richness, and in the large proportion of its inhabitants to its area, so that if steam-tramways ever become successfully established in India, it will probably be here, as in Lombardy in Europe, that they will be most largely utilized and most profitably worked.

However, it is too early yet to discuss the question as to where tramways might be established, for we have first to show that they are capable of being established at all with a reasonable prospect of success. I shall have to deal with figures to a certain

extent, when discussing the movement of passengers and merchandise in the country, and I shall take for my purpose the published returns of traffic on some of the principal Indian railways. This will be disadvantageous to the tramways in some measure, for it is very generally admitted that, most Indian railways have not yet succeeded in drawing to themselves so large a proportion of the general traffic of the country, as had been anticipated. Perhaps the native has not quite realised yet the advantages offered by a railway, or perhaps the Railway Companies have not, in some cases, consulted sufficiently the peculiarities of the native character. Anyhow the fact remains. In tramway management, on the other hand, the system would be on such a very much smaller scale, that fares, time-tables, &c., might be altered constantly without much difficulty, till the convenience of the majority of the travelling public had been satisfied, with the result of a better chance of relative success than has as yet fallen to the fortune of railways.

The first question to be considered is the position that Government would assume towards the new enterprise, should any proposals for its trial be brought forward. The principal points are;

(1.) Would permission be given to the local authorities to grant the use of their roads?

(2.) Would a reasonable rate of speed be authorized?

(3.) Would interbooking between tramway and Railway Companies for passengers and goods be adopted on State, and encouraged on guaranteed railways?

(4.) Would Local Fund Boards and Municipalities be encouraged to guarantee a moderate rate of interest to the undertakings?

Let us briefly consider each of these points.

(1.) Would the use of the roads be granted?

It would be scarcely worth while to consider the feasibility of making a tramway a paying concern, if this concession were not made; for it would burden the Company hopelessly at the outset, if it had to purchase land and to make all its own embankments, cuttings, and bridges. I will therefore assume that the use of the roads would be granted under certain conditions, and turn to,

(2.) The rate of speed allowed.

The conditions here would necessarily be somewhat different to those existing in Europe. There, foot-passengers are comparatively rare on the roads, nor is there anything approaching the same amount of cart-traffic as in India. Also the existing cart-traffic is better organised, and you do not, for instance, come across the long interminable lines of carts, often hopelessly intermingled, that are so common here. In Europe the road-traffic looks out for the tramway; in India the tramway would have to look out for the road-traffic. That is about the difference. The best way to conduct the traffic safely at a moderate rate of speed would be to allow the Company to fence off that portion of the road occupied by its line, but it is highly improbable that this concession would be granted in many instances, or, indeed, that the existing width of road would render it possible to grant it. On the other hand, a fair rate of speed is an essential condition of success, for to secure the passenger-traffic, the tramway

would have, at any rate in Southern India, to compare favourably as regards fares and speed with the little two-wheeled vehicles, locally called "jutkas." These run at about 8 miles an hour, so that a speed of at least 10 miles an hour would have to be maintained. No doubt at first the running would have to be conducted with much caution, but as, at this rate of speed, the cars could be stopped dead in a distance of 70 feet, there should be no danger about it. Moreover, when the hours of passing of the tramway became known, the native bullock-drivers would soon learn to be on the look-out for it. The Italian locomotives are provided, some with a powerful steam-whistle, and others with a horn blown by the driver, to warn carts of the approach of the tram. I may also add that the driver sits at the front of the locomotive, where are placed the brake-handle, and that for shutting off steam, so that he has his train absolutely under control.

(3.) Would interbooking between tramway and Railway Companies be adopted?

This again I consider as an essential feature of success. It has been said that in most cases—at first certainly in all cases—tramway lines would serve as railway feeders, and unless they were really treated as such, the commercial and travelling public would never take to them. If at the railway station, rebooking, reweighing, and all the other formalities had to be gone through a second time; the trouble, the delay, and the general friction, would be so many impossible barriers to success. It may even be said that to be really successful it ought to be possible to pass railway waggons in case of need over the tramway lines. This involves however the difficult question of gauge which will be referred to presently, and, in the meantime, I will only assume

that the above-mentioned facilities would be readily accorded, as being of as much advantage to the railway as to the tramway.

(4.) Would a moderate guarantee be authorized?

This is really the kernel of the whole affair. Naturally, in writing of tramways, I am not putting a purely hypothetical case of possibly successful enterprise. There are capitalists in Europe who have already been profitably connected with Tramway Companies, and who would be willing, if a favourable opening could be shown to them, to put themselves at the head of similar enterprises in India. "But," they will certainly say, "India is an uncer-" "tain country at the best, and in the case of a new" "class of undertaking it is quite an unreliable" "country. Tramways may prove a success, or they" "may not. We are willing to make a trial, if we" "are guaranteed against total loss."

The present policy of the Government of India, as announced in the Hon'ble Evelyn Baring's Financial Statement of March 25th last, is opposed to guarantees in principle, but still admitting them to a limited extent in practice, should it be found that private enterprise, which is to be encouraged by every legitimate means, is so timid as not to venture forwards without this helping hand. And private enterprise is timid; justly timid, I may add. But without a guarantee it is improbable that there will be any tramways. The position is certainly a difficult one, for there are very few Municipalities that will be in condition to offer any guarantee to a Tramway Company, which will affect their incomes enormously by largely reducing their toll-fees. I may safely take half of the total income as being the proportion which many Municipalities derive from tolls; and, if the effect of a tramway is to reduce the tolls by half, each

Municipality will look to the Company for an equivalent compensation, and will not hear of a guarantee, much as they may desire to see their communications improved. The only plan would be to introduce octroi duties, which are levied in almost every continental city, but to which the Indian Governments have always been steadily opposed. But suppose octroi duties were sanctioned, and the Municipal finances balanced in this way, the difficulties of a guarantee would almost disappear.

Take the case of a line 5 miles long connecting a Municipal town of 20,000 inhabitants with a railway station, and suppose the income of the Municipality to be Rs. 20,000, and that of the Local Fund Board of the circle to be Rs. 50,000. The line of tramway might require a capital of £20,000, to put an extreme case, on which interest at 3 per cent. would amount to £600 a year, which might be jointly guaranteed by the two Boards.

It will be seen that the introduction of tramways is not by any means a simple affair, and would involve many concessions on the part of Government. Let me also add, that they would require very judicious treatment. Capitalists are frightened, not only at the uncertainty of enterprise in India, but at the vexatious control to which it is subject. No doubt zeal for the public interests and for the public safety are admirable qualities in a Government Officer; but they may be carried too far. Men, who have dealt with important concerns in western countries, come here, and sometimes find that they are treated with a suspicion that they resent, or are hampered by a control which they find unendurable. If a tramway concession is given, let the official regulations for it be drawn up most carefully, though in a liberal spirit, in the first

instance; and let them then be left unchanged, as far as possible, so that concessionaries may know exactly the conditions they are bound to conform to, and not have to depend on the continuity of purpose of successive supervising officers.

I cannot do better than quote here the remarks on the subject of encouragement of private enterprise made by the Hon'ble Evelyn Baring in paras. 84 to 91 of his Financial Statement.

84. It is, however, manifest that a capital expenditure of £2,500,000 a year is inadequate to meet the present wants of India. Are we therefore to abandon all hope of constructing canals and railways with the rapidity which the exigencies of the country demand? I hope not. It has always appeared to me a remarkable fact that India,—with all its magnificent and, as yet, only half-developed resources, and with all the security to life and property resulting from a Government, which, whatever be its defects, is at all events strong, honest, and well-intentioned,—should up to the present time have been obliged to pledge the full security of the State in order to attract any considerable portion of the surplus capital of England. I hope that some railways afford sufficient attraction to induce private individuals to undertake their construction without the aid of Government, or, at all events, with a minimum amount of such aid. I do not question the wisdom of the policy which would permit private capitalists to embark in this field. It was therefore with pleasure that I read the following instructions which have been received from the Secretary of State:—

"In the case of railways, I do not doubt that Your Excellency will bear constantly in mind the importance, whenever possible, of ensuring their construction by private capital, either local or European. It is true that up to the present time no Companies have been found willing to undertake the construction of railways without a Government guarantee; but I would, nevertheless strongly urge upon Your Excellency that, when any reasonable prospect of success presents itself, an endeavour should be made to encourage the raising of capital through private agency, on the exclusive security of the success of the undertaking. Any step in this direction will meet with my most cordial support and co-operation. In the event of its becoming apparent that the due execution of this policy is impracticable, it may become

desirable to consider whether a modified system of guarantee might not advantageously be adopted. By a modified system I mean one so restricted in respect to time and to the rate of interest guaranteed as to give the subscribers a real interest in the efficient and economical adminstration of the railway."

85. It is sometimes urged that a railway is a monopoly, and, for that reason, should be in the hands of the State, and not of any private interests. Further, that to concede the right of building a railway is to part with one of our most productive resources.

86. It is true that a railway is generally a practical monopoly. The State, therefore should exercise so much supervision over its working as will prevent the monopoly being exercised in a manner detrimental to the public interests. Thus the State should possess a right of inspection, in order that the line may be certified by competent authority to be safe for the transport of goods and passengers. It should regulate the maximum tariff and fix the gauge on which the line is to be constructed. It is especially necessary that a conditional right of purchase after the lapse of a certain period should be reserved. But when provision has been made for these and some other points, which I will not now enumerate, the necessity for State interference ceases. The interests of the public do not necessarily demand that the State should create an artificial monopoly in its own favour in respect to the construction of all railways.

87. As regards the loss of revenue, it may be urged that if the profits of the railway be left to fructify in the pockets of the people they will be more advantageously employed than would be the case were they paid to the State, with a great chance of their being employed on unproductive expenditure. Moreover it is to be observed that the indirect benefits to the State and to the country resulting from the extension of railway communication are obtained equally well whether the railways are constructed by Government or by private agency. The value of land is enhanced; new markets are opened; an impetus is given to the export trade, and the greater power of transport and concentration affords a hope that military expenditure may be reduced.

88. Even if the general arguments in favour of constructing railways solely through the agency of the State were more valid than I conceive them to be, I should still hold that those arguments did not apply in India. The first economic requirement of India is that her resources should be developed without delay,

and that means of communication should be so improved as to facilitate emigration from districts which or over-populated to those in which labour is scarce. I doubt whether Government agency alone can adequately perform this task, and I hold that in any case it is not desirable that it should do so if private agency can be found to undertake the work. I am not without hope that, if an impulse can be given to railway construction by British enterprise, Native capitalists will enter the field, either alone or in conjunction with Englishmen. I should regard such a movement as an important factor in the practical education of the people, inasmuch as it would tend to wean the Natives of India from that dependence upon Government which is intensified by concentrating in the hands of the State all the organised skill which the construction and management of a railway requires. If ever the Natives of this country are to be schooled in the first rudiments of self-government, it is desirable that they should be encouraged to act for themselves in such matters, rather than that they should rely always upon that coercive philanthropy which insists upon doing everything for them.

.....

91. I am unable as yet to say anything definite as to the conditions under which concessions may be made to private capitalists. Possibly those conditions may vary according to the exigencies of each particular case. It appears to me, however, that the Government may legitimately help in a variety of ways short of giving a guarantee. Government officers may make surveys and estimates, and supply all necessary information with a view to enabling private individuals to judge for themselves whether they care to invest their money in any particular scheme. The land on which the line is constructed may sometimes be given free of cost. Possibly, in some cases, grants of waste land in the vicinity of a new line may be given. On the other hand, certain conditions, to some of which I have already alluded, must be imposed, and it will be important only to give concessions to such persons as can afford good security that they have at their command a sufficient amount of capital to carry out the undertaking to a successful issue.

It will be observed that the Finance Minister refers almost solely to railways, but, as has been previously mentioned, steam-tramways are still quite in their infancy, and possibly he had not thought of them as being a method of inter-communication in India, more suitable perhaps than even light rail-

ways. The views of the Government of India thus authoritatively enunciated give every possible encouragement to private enterprise, and, as has been already implied, I have not contemplated a Government guarantee to the undertakings, at any rate at the commencement. I would rather let the enterprise depend on the support of local authorities, who have the best means of judging, and who are the most interested in judging rightly.

This brings us to the construction of tramways.

They might either be laid down by the local authorities themselves, or else a concession might be given to independent capitalists for their construction and maintenance. The latter case is the only one worthy of consideration, but the position of the local authorities in the matter has so far to be considered, that they will certainly have to invite the attention of the capitalist to the opportunity that may exist for a profitable undertaking within their jurisdiction, and they will also have to decide on the terms they are prepared to offer him, and the reservations they may determine to make in their own favour.

The possibility of making a tramway a paying concern will depend:

(1) on the original cost of its construction.

(2) on the traffic returns.

The estimated cost of construction must be based on the cost of similar concerns in Europe, with such additions as the freight, &c., of the plant will entail. This additional cost may be calculated with sufficient exactness from the corresponding figures for the Indian railways. The use of the roads is as-

sumed, subject to such conditions as are specified hereafter, and it is also assumed that the road is bridged throughout, and that the bridges will be capable of carrying the tram as they are, or with but such additions as may be made at a moderate cost. Finally there is the question of gauge.

I have said above that there would be certain obvious advantages could the railway trucks be run, in case of necessity, over the tramway lines. Conversely there would be many advantages could the tramway rolling-stock pass over the railway lines. The locomotives, carriages, and waggons could then be set up at a moderate rate in the railway workshops at the sea-port, and could be run directly on to the tramway; repairs could, on occasion, be done in the same way; and the tramway trucks could load and unload in the railway sheds and sidings.

A special form of rail, and perhaps also a wheel flange differing somewhat from that usually employed for tramway-cars, might have to be adopted to render these desiderata possible, as experiments made in Glasgow have shown that, to allow railway waggons to pass easily over ordinary tramway lines, the gauge of the latter should be ·787 inches less than that of the former.

On the other hand there would be many disadvantages attendant on the adoption of the standard gauge of Indian railways for tramway lines.

The gauge of almost all European lines is $4'\cdot8\frac{1}{2}''$, the same as that of the railways, and scarcely any lines have been constructed of a broader gauge, with the one exception of the Dublin tramways which are of the Irish railway gauge of 5′ 3″. If one had to select the gauge the most suitable for India on the grounds of efficiency and economy, it is probable

that one would choose the metre gauge, which would, I may remark, be adopted in any case for all tramways running in connection with narrow gauge railways. The 5′ 6″ gauge would entail a large additional cost of up-keep, on account of the additional width of roadway to be maintained; the prime cost of the rolling-stock would be enhanced, as designs and patterns would have to be specially prepared for it; and, lastly, it is probable that on many roads the necessary breadths of road and bridges could with difficulty be spared. On *primâ-facie* grounds therefore, it would appear that the disadvantages of the 5′ 6″ gauge exceed its advantages, and that Tramway Companies would decline to adopt it. On the grounds of general convenience however, and on those of public policy, no other gauge could be admitted on the lines running in connection with broad-gauge railways, and it is likely therefore to be one of the principal conditions of the proposed guarantee, that the standard gauge shall be adopted.

The last chapter gave with sufficient detail the approximate initial cost of Steam-tramway Lines in Europe, and, in the following table, I have made out approximate estimates based on those details for lines of 5, 10, and 15 miles in length, for India. It is improbable that any line would be established shorter than the first, or, at the commencement, much longer than the last of these. All calculations have been made in £. *s.* *d.* for convenience of comparison with European and Indian Railway returns.

I.—*Approximate Cost of 5 miles of Tramway, 5′. 6″ gauge.*

		£	£	£
	Permanent Way.			
1	Cost of re-formation of road, including strengthening of bridges where necessary, at £300 per mile (5 miles) ...		1,500	
	Bessemer-steel rails, weighing 35lbs. a yard, 55 tons per mile, at £7 per ton ...	385		
	Iron sleepers, 70 tons per mile at £3 per ton ...	210		
	Add 40 p/c for freight, &c. ...	238		
	Laying Permanent Way at 2*s.* per yard, per mile ...	176		
	per mile £	1,009		
	For 6 miles, to include sidings, and circular sweep for reversing locomotives at each end, and extra curves ...		6,054	7,554
	Locomotives.			
2	Three locomotives, each of 30 H.P., weighing 10 tons each, at £700 ...		2,100	
	Add 40 p/c for freight and fitting up ...		840	2,940
	Carriages and Trucks.			
3	One combined 1st and 2nd class car ...		240	
	Four open cars at £150 ...		600	
	Two closed vans at £120 ...		240	
	Twelve open trucks at £100 ...		1,200	
			2,280	
	Add 40 p/c for freight, &c. ...		912	3,192
	Carry forward ...	...	...	13,686

I.—*Approximate Cost of 5 miles of Tramway, 5′. 6″ gauge.*

		£	£	£
	Brought Forward. ...			13,686
4	Sheds for rolling stock at one end, repairing shop, necessary offices, &c. ...			750
5	Payment to Concessionaires ...		250	
	Compensation ...		500	
	Legal, &c. expenses ...		250	
				1,000
6	Fitting up offices ...			100
7	Tools, &c. ...			100
8	Sundry expenses ...			364
	Total £...			16,000
	or £ 3,200 per mile.			

II.—*Do—for 10 miles.*

		£	£	£
1	Formation of Road ...		3,000	
	Rails, sleepers, &c., for 11½ miles ...		11,099	
				14,099
2	Three locomotives ...			2,640
	Carriages.			
3	Two composites, six open cars, two vans, and 18 goods-trucks.			4,788
4	Sheds, &c. ...			1,250
5	Compensation, &c. ...			1,500
6	Fitting up offices ...			150
7	Tools, &c. ...			200
8	Sundry expenses ...			373
	Total £...			25,000
	or £ 2,500 per mile.			

III.—*Do—for 15 miles.*

		£	£	£
1	Formation of Road ...		4,500	
	Rails, sleepers, &c., for 18 miles.		18,162	
				22,662
2	Four locomotives ...			3,520
	Carriages.			
3	Two composites, 9 open cars. 3 closed vans, and 24 trucks ...			6,846
4	Sheds, &c. ...			1,750
5	Compensation, &c. ...			1,750
6	Fitting up offices ...			200
7	Tools, &c. ...			300
8	Sundry expenses ...			472
			Total	£37,500
				or
				£ 2,500 per mile.

N.B. No special form of sleeper is referred to, but it is believed that a suitable one can be obtained not weighing more than 70 tons per mile.

The prices of rolling stock have been taken higher than European prices on account of the increased width, and 40 per cent. has been added throughout for freight, insurance, &c., which it is considered is ample, the corresponding increase on Indian Railways not exceeding 25 per cent.

The rolling-stock allowed would be amply sufficient for the commencement of working. The same number of locomotives will be required for the 5 mile as for the 10 mile line. The prices of iron and steel are taken slightly in excess of current English prices.

A portion of the cost of laying is included in the £300 per mile estimate for the re-formation of the road.

IV.—*Approximate cost of 5 miles of tramway, metre (3'. 3⅜") gauge.*

		£	£	£
	Permanent Way.			
1	Formation of Road.		1,500	
	Bessemer-steel rails, weighing 30 lbs. a yard...	330		
	Iron sleepers, 65 tons per mile.	195		
	Add 40 p/c for freight ...	210		
	Laying Permanent Way ...	176		
	per mile	911		
	for 6 miles		5,466	
				6,966
	Locomotives.			
2	Three at £500 each		1,500	
	Freight, &c...		600	
				2,100
	Carriages and Trucks.			
3	One composite car		200	
	Four open cars at £125 ...		500	
	Two closed vans at £100 ...		200	
	Twelve open trucks at £75 ...		900	
			1,800	
	Freight, &c...		720	
				2,520
4	Sheds, &c.			750
5	Compensation, &c.			1,000
6	Fitting up offices			100
7	Tools, &c.			100
8	Sundry expenses			464
			Total £...	14,000
				or
				£ 2,800 per mile.

V.—*Do—for* 10 *miles.*

		£	£
1	Formation of road	3,000	
	Rail and sleepers (11½ miles)...	10,477	13,477
2	Three locomotives		2,100
3	Carriages as in II		3,780
4	Sheds, &c.		1,000
5	Compensation		1,500
6	Offices		150
7	Tools		200
8	Sundries		793
	Total £...		23,000
	or		
	£ 2,300 per mile.		

VI.—*Do—for* 15 *miles.*

		£	£
1	Formation of road	4,500	
	Rails and sleepers, (18 miles)...	16,398	
			20,898
2	Four locomotives		2,800
3	Carriages as in III		5,075
4	Sheds, &c.		1,500
5	Compensation		1,750
6	Offices		200
7	Tools, &c.		300
8	Sundries		372
	Total £...		33,000
	or		
	£ 2,200 per mile.		

N.B.—The cost per mile is sensibly less than on the standard gauge. Continental prices have been taken for rolling-stock.

The above tables give what is considered a fair estimate of the cost of construction of a line of steam-tramway, and I will now turn to the second of the propositions I have already laid down as requiring to be determined before a line can be undertaken, *i.e.*, the traffic returns. On English railways the gross expenditure and the net receipts are about equal; *i.e.*, taking a rough average, they are each about 50 per cent. of the gross receipts. On Indian railways however the figures for different lines show such enormous variation that any general average must be received with caution. For instance, for 1879 the following extremes are observable:—

Lines.	Proportion of expenditure to Gross Receipts.	Net Receipts.
Guaranteed Lines.		
East-Indian Main Line ...	31·85 p/c.	68·15 p/c.
Madras	68·68 „	31·32 „
Average for all Lines ...	48·16 „	51·84 „
State Railways.		
Sindia	134·96 p/c.	—34·96 p/c.
Muttra-Hathras	54·96 „	55·04 „
Average	78·82 „	21·18 „
General average	52·16 p/c.	47·84 p/c.

As regards tramway lines we have seen that on those round Milan the expenditure has been 80 per cent. of the receipts, (but a very much better average is expected), and in England, and on the continent generally, the expenses on horse tramways amount

to from 90 to 75 per cent. of the receipts. There are no reliable figures from which a general average for steam-tramways can be obtained, but it is admitted that they will be much cheaper to work than the former, so that if I take from 70 to 75 per cent. as the proportion that the expenditure will bear to the gross receipts, I shall probably be on the safe side.

To attract capital to a line the probable net percentage on the outlay should not be less than 5 per cent. with a reasonable prospect of increase.

Taking now line No. I, which is the most unfavourable in the above tables, we find that 5 per cent. on the capital of £16,000 involves a net receipt of £800 per annum, which, as above stated, is probably about 25 per cent. of the gross receipts. These should therefore amount to £3,200 which gives £2,400 as the gross expenditure. The length of the line is 5 miles; so supposing 10 trains to run each way every day we get a daily mileage of 100 miles, and a yearly mileage of 36,500 miles. From these figures again we get 26·3*d*. as the gross receipts, and 19·37*d*. as the gross expenditure, per train-mile.

On Indian Railways in 1879 the corresponding figures are as follows, the extremes being given in each case as before.

Lines.	Gross Receipts per train-mile (goods and passenger.)	Gross Expenditure per train-mile.
Guaranteed Lines.		
Eastern Bengal	133·68*d*.	
South Indian	66·6*d*.	46·32*d*.
Average	96·96*d*.	

Lines.	Gross Receipts per train-mile (goods and passengers.)	Gross Expenditure per train-mile.
*State Lines.**		
Punjab, northern	113·16*d*.	
Sindia	43·56*d*.	
Average	70·44*d*.	55·44*d*.
General average	92·64*d*.	48·44*d*.

On English railways, the receipts per train-mile average 69·3*d*. and the expenses 33·78*d*. On English horse-tramways, the receipts per mile run average 16*d*. and the expenses 12*d*. On the Italian tramway, the receipts per train-mile were 25·6*d*. and the expenses 20*d*. but it must be remembered that it carried next to no goods traffic, which in India would, it is expected, form a large portion of the receipts.

This expectation is based on the receipts of Indian railways where the goods traffic brings in about twice as much as the passenger traffic. The figures for 1879 are

	Passengers £	Goods £
All railways		
Gross receipts...	3,413,910	7,274,403

The receipts on the 5-mile line of tramway may be taken in a somewhat smaller proportion, and I will allow a higher ratio of passengers, say 14·3*d*. per train-mile from passengers and 12*d*. per train-mile

* Excluding coal-lines and Khamgaon Railway.

from goods. On Indian railways the corresponding receipts average 72·36*d.* and 102·96*d.* The proportion of 3rd and 4th class passengers on Indian railways is 97·432 per cent. of the whole number carried, and it is stated also that 97 per cent. of the goods traffic belongs to the cheapest category. I will therefore, to be on the right side, take the whole of the above-mentioned tramway receipts at the lowest rates in each case. The lowest railway rates are ¼*d.* (2 pies), per mile for passenger, and 1*d.* (8 pies) per ton per mile for goods. Adopting these figures, we get an average of 57·2 passengers and 12 tons of goods per train-mile, which would be about a maximum train-load; or, assuming all the passengers and goods to go through from the town to the railway station, and *vice versa*, we have a yearly total of 337,562 passengers and 87,600 tons of goods, or a daily average of 1,144 of the former and of 240 of the latter, or 572 passengers and 120 tons of goods passing each way every day.

Would this high rate of traffic be obtainable? It would certainly seem doubtful to any one acquainted with the movement to and from Indian Mofussil towns, but with a smaller traffic the line could not be made to pay on account of its high capital cost. In fact, even with the returns quoted, the interest would soon fall into arrears, unless a development of traffic took place, and unless 150 or 200 train-miles a day could be run with full loads. The cost of running cannot be taken safely at less than 12*d.* a mile, though in Italy, with coke at almost its Indian price, the cost is only 7·9*d.* This would absorb £1,825 per annum leaving only £575 for depreciation, renewals, and sundries. As a matter of fact, at least £1,000 a year would be required for depreciation alone, which makes the deficiency very apparent.

Taking on the other hand the 15-mile line, the capital of which is £37,500, the interest charges at 5 per cent. would be £1,875 making £6,250 the gross receipts, assuming on the larger concern that the expenditure is 70, and the profit 30 per cent. of the total. Supposing 6 trains to run each way every day we get a daily mileage of 180 and a yearly mileage of 65,700 miles, so that the gross receipts per train-mile are 22·83*d.* and the expenditure 15·981*d.* This would be provided by 10 tons of goods and 49·32 passengers per train-mile, in other words by 60 tons of goods and by 296 passenger passing each way every day.

The total yearly expenditure would be £4,375, and the running expenses, at 12*d.* a mile, £3,285, leaving £1,090 for renewals, &c. Or if the running expenses could be brought down to 10*d.* a mile, as they ought to be, we should have £2,738 to provide under this head, leaving £1,637 for other items. As a beginning, this would be fair enough, for it would only be rational to suppose that the traffic would largely develop, and that the country cart would be soon beaten in the competition for the carrying trade. If the town situated 15 miles from the railway, could double the assumed traffic in a year or two, all the figures given above would be also doubled, and the Company would obtain a 10 per cent. dividend, and be able to put by a very handsome surplus to form a sinking fund.

But it is time to bring this long chapter to a conclusion. The calculations for any of other line may be worked out in the same way, but enough has been said to show the relative advantages and feasibility of the undertakings. It will be seen that it would be difficult to make a short line a paying concern, unless there was an exceptionally heavy

traffic, and any town so situated, that wished to possess the luxury of a tramway, would probably have to pay for it, by contributing a fixed yearly sum to the Company's receipts. A yearly contribution of £1,000 would probably enable the 5-mile tramway to pay its way, including renewals, &c., if the traffic were only as heavy as has been assumed.

For longer lines than those that have been taken, the cost of construction per mile might be a trifle less, and a proportionately smaller through traffic would leave a margin for profit.

94

CHAPTER IV.

CONCLUSION.

may be objected to the principle of reasoning dopted in the calculations of the last chapter that have argued from results to premises, that I have rst assumed the interest, deduced therefrom the net eceipts, and thence the traffic. But in treating of he question generally no other alternative is posible, for it would not do to assume a traffic which ight perhaps be higher than would be applicable o an actual case, and be therefore valueless. The ethod adopted too has this advantage, that it preents the question in the form the most adverse to he tramways. I have said that the receipts cannot e assumed less than a certain amount, and that the raffic must therefore amount to at least a certain otal, if any line is to be thought of as a paying oncern. It is within the compass of every one's owers to ascertain the total amount of passing raffic, and the only other requirement, before comaring it with the figures I have given, is to calculate he proportion of it that the tramway would attract. t is not an easy question and scarcely any data xist on which to frame an answer. But if the rincipal merchants of a busy town could be induced o become part proprietors in the Company, they would have a direct interest in sending their goods by its agency, and in promoting, by their example, he development of the passenger traffic. This, and ixing low rates, would furnish the best chances of

success, and naturally no line would be undertaken except under reasonable prospect of support from those whom it was intended to serve.

The advantage of assuming the most adverse conditions is that, if the gross receipts may be taken higher than those obtained by the method of calculation adopted, so much the better for the chances of the tramway, but I would urge on every one who may be tempted to bring forward a scheme not to be over-sanguine. As has been already said, the distinguishing feature of enterprises in India is their timidity, and nothing encourages this timidity so much as failure in their beginnings. If the first lines are carefully chosen, cheaply constructed, and well worked, there is no reason why tramway enterprise should not develop, and result in the profitable employment of a good deal of capital, in a very rapid development of the internal trade of the country, and of a partial solution of one of the great Indian problems,—a successful famine campaign. But if blasted in its beginnings it will have a short life, and a poor one.

But, it may be urged by some into whose hands this pamphlet may fall, who is going to undertake these enterprises for which such a magnificent future is predicted? Even granting that we have, or that we can point to, a line which fulfils in some measure the stated conditions, we know of no expert to whom we can turn to seek for a reliable opinion on the prospects of our scheme. There is, at any rate in this part of India, no independent Engineering enterprise, and none but a very large concern could stand the cost of bringing out an Engineer specially from England to undertake the preliminary investigations.

The data necessary to be collected are not however very elaborate, and the following list comprises every information that need be obtained before the actual proposals for the formation of a Company to construct a line are brought forward.

1. A map of the town, and of the country lying between it and the railway station, showing the road on which it is proposed to lay the tramway, other roads, and neighbouring villages.

2. The population of the town and villages.

3. A return of the traffic between the town and railway, and in the neighbourhood generally, detailing what it principally consists of, how carried, the approximate number of passengers and weight of goods, with rates of present conveyances.

4. A longitudinal section of the road, with cross sections at all important points, and a description of the bridges, culverts, &c. Also information as to the price and quality of the material of which the road is formed; distance of gravel and stone-quarries; prices of labour in the neighbourhood; depth and minute description of formation of road.

5. Cost of bringing machinery, or railway material to locality; cost of concrete work in ditto; and, generally, the cost of fuel and of such materials and labour as would be employed on a tramway. (These details for any neighbouring railway should specially be quoted.)

6. Particulars as regards the climate, rainfall, &c.

7. The conditions of the concession in detail;* noticing obligations as regards up-keep of road; liability to tolls, taxes, &c.; probability of guar-

* In Italy, tramway concessions are for a period of 50 years.

antee; estimate of proportion of traffic tramway will secure, with reasons.

A combination of Local Fund and Municipal establishments would generally suffice for the preparation of all this information, and even if it did not, perhaps Government might, in the furtherance of the policy, announced in the Financial Statement (page 30) be induced to assist the Local authorities* by granting to them the services temporarily of one of their own officers.

* Though the steps taken by the Government with a view to offering facilities for the extension of railways where a proportion of the necessary capital have not been effectual, great advantages could be gained by interesting local communities and capitalists in making investments of local public utility, and we trust that the plan may be further considered, and, if possible, brought into practical operation. (Chapter V, Section 4, para. 11 of F. C. R.)

There is one point on which I would remark before I conclude, and that is as regards the management of the tramways. I have said that in all probability a moderate guarantee would be required, but there is this objection to a guarantee, that the irresponsible management of a small concern, (and it must be irresponsible in a great measure if the capital is not locally subscribed), is apt to be lax when there is an assured income.

But all tramways, and especially new tramways in a country new to them, require the best and most careful control, and I would therefore urge as a *sine quâ non* of management, either a stake in the Company, or a payment by results.

And here, I think, I may conclude. I do not pretend to have exhausted the subject, or even to have done more than to treat of it in the most elementary fashion. There are numbers of details,—such as the best form of road, of rail, of sleeper, of locomotive,

of car, of truck, to adopt; the ticket system; the fares, and so on—which all have to be considered. But if the perusal of these pages carries with it the conviction that what has proved successful in Europe, may be as successful in, as it is undoubtedly suitable to, India, their purpose will have been fulfilled, and the above-mentioned details may safely be left for subsequent treatment.

I may add that, so far as the Madras Presidency is concerned, I shall be glad to answer any further questions on the subject that I am able, or to furnish any assistance that is in my power.

STEAM-TRAMWAYS

FOR

INDIA.

A SECOND PAMPHLET

BY

CLAUDE VINCENT, A.M.I.C.E.
MADRAS P.W.D.

Published under official sanction.

MADRAS:
HIGGINBOTHAM AND CO.
By Appointment in India to H.R.H. the Prince of Wales, and to the Madras University.
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CONTENTS.

	PAGE.
INTRODUCTORY NOTE.	1
I.—WHAT IS A TRAMWAY?	8
II.—TRAMWAYS *versus* LIGHT RAILWAYS	9
III.—GAUGE	11
IV.—WEIGHT AND FORM OF RAIL	12
V.—SLEEPER	15
VI.—LOCOMOTIVES	16
VII.—OTHER ROLLING STOCK	18
VIII.—COST OF CONSTRUCTION	19
IX.—COST OF WORKING	22
X.—LEGISLATION	26
XI.—GENERAL	36
PLATE TO FACE PAGE	16

APPENDIX.

DECAUVILLE'S SYSTEM	39

STEAM-TRAMWAYS FOR INDIA.

INTRODUCTORY NOTE.

THE extract from the Proceedings of the Madras Government under date August 17th which immediately follows, will sufficiently explain the circumstances under which the following notes were drawn up. The lines on which the questions in the Proceedings are based are perhaps rather,—to what extent tramways could be laid *during* famine to aid in the distribution of grain,—than that of their construction during ordinary years as part of the general improvement of inland communications. From these lines I have, I fear, somewhat departed, and have considered the latter question more than the former. My reasons for this have been two. Firstly, the general principle that if communications ought to be improved in order to mitigate disaster it is better to undertake their improvement before, rather than during the catastrophe. Secondly, that I know of no system, save that of Decauville, which is suitable for being laid down on an emergency—certainly the ordinary steam-tramway system is not so suited—and of Decauville's system I have no sufficient knowledge to express a confident opinion. Government are moreover more or less committed to the principle of non-construction by its own direct agency and if therefore the steam-tramway system is to be adopted

it must be so by private enterprise and on commercial principles. Will this enterprise be forthcoming? I have endeavoured to explain why it may be, and to answer some of the preliminary questions that would arise with regard to it. In that view I have received permission to publish these notes as a sequel to my introductory pamphlet on Steam-tramways which was circulated with the above-mentioned Proceedings. This will explain the frequent references to it I have made in the following pages.

102

EXTRACT *from Proceedings of the Madras Government, No.* 2,018-*W., dated* 17*th August* 1881.

NOTE BY THE CHIEF ENGINEER, P. W. D.

"The questions now under the consideration of Government with reference to the Famine Code, as also the correspondence as yet incomplete with the Government of India on the subject of "Protective" Works, appear to invite special attention to the applicability of steam-tramways for certain selected lines in the famine zone of this Presidency.

2. The Famine Commission (page 169 to 171, Part I, of their Report) have gone at length into the subject of railways as a means of distributing food in famine, and they have assumed as an ideal system a series of lines, each 300 miles long, serving 25 miles of country on either side.

3. This was much the same as the plan Sir Andrew Clarke had previously in view when, in his speech in the Viceroy's Council on famine works, he observed that, "the railway system must continue to expand and will expand till every inhabitant of India is within 50 or 100 miles of a railway."

4. When applied, however, to the actual circumstances of the famine zone in this Presidency there are two very patent difficulties to be encountered:—

(1.) Neither the Indian nor the metre guage railways can be built with any hope in ordinary years of yielding any adequate return on their prime cost.

(2.) Unless a sufficiently close net-work of lines be established, the means for distributing food-grains

will not meet the requirements of extreme famine, accompanied, as was the case in the last calamity, by the great loss of draught cattle.

5. Sir Andrew Clarke well observed in his speech that, "A grass famine may be said to be as bad as a grain famine," and the Famine Commission remark, "In time of drought and famine the substitution of mechanical for animal power for purposes of transport is another very important advantage which it is not possible to reckon by any money standard."

* * * * *

7. Although it cannot for a moment be supposed that by the adoption of a cheap system of steam-tramways for aiding in the distribution of food-grains during famine, the difficulties above adverted to can by any means be entirely overcome, it is still clear that they can be in great extent minimised.

* * * * *

11. * * * it may therefore apparently be accepted *primâ facie* that steam-tramways on even the broad guage could be built at two-thirds the prime cost of metre guage railways.

12. But as the problem to be solved requires as a *sine quâ non* that all outlay shall be reduced to an absolute minimum compatible with the attainment of the immediate object in view, it does not appear improbable that a very sensible reduction could be effected even on the low estimates above (Rs. 30,000 a mile.)

13. It is, in the first place, well recognised that the metre gauge for State Railways was a compromise of conflicting opinions, and that $2\frac{1}{2}$ feet represented much more nearly the width of a truly narrow gauge. The Port Madoc line is only 1 foot $11\frac{1}{2}$ inches gauge and works up to 30 miles per hour.

14. There may be technical objections to a gauge of 2 feet in reference to the most economical form for the engines, but if these could be overcome, there is no other reason apparently against its adoption.

15. Speeds again of 15 and 20 miles per hour are solely accepted on the demands of the British travelling public, but are by no means applicable to the case under consideration, 6 or 7 miles per hour average speeds with 10 miles as a maximum would, it is thought, amply suffice.

Throughout the famine zone the beds of large streams and rivers are quite dry excepting for a very few days in the year, and they might be crossed by causeways, thus saving the cost of all large bridging.

These principles accepted, a corresponding reduction in the metals to 20lbs. or at most 25lbs. per yard might, it is believed, be effected * * *

On the whole, therefore, it is not too much to assume that lines of steam-tramways might be established along selected routes for Rs. 20,000, or at most Rs. 25,000, per mile, or at little more than double the cost of a metalled and bridged cart road.

* * * * *

It is now sufficiently recognised that in the famine zone of this Presidency navigable canals and new irrigation works of a promising, much less of a paying character are out of the question; there would thus appear to be only a choice of two alternatives if famine is to be effectually combated: (1) the people must move to the food on the one line of railway at present existing, or (2) mechanical means of distribution by steam-tramways or road engines must be adopted.

For an agricultural population, who require to be sufficiently near the fields to take instant advantage of a favourable change in the weather, the first plan could hardly be adopted as a general working policy, though no doubt in some cases applicable.

Mechanical means for distribution seem therefore alone left for choice, * * * *

If the Government are satisfied that an effort should be made in the direction above indicated, the following points might be made subject of early inquiry among selected Revenue and Public Works Officers, viz. :—

(1.) To what tracts tramways as protective works would specially apply.

(2.) The lines in order of importance within the famine zone (which consists of the marginally noted districts) which it might be desirable to carry out.

Bellary.	North Arcot.
Kurnool.	South Arcot.
Cuddapah.	Salem.
Nellore.	Coimbatore.
Chingleput.	Madura.

(3.) The probable cost per mile, the gauge rate of speed, &c.

(4.) A rough estimate of the traffic returns in ordinary years.

(5.) A general idea of the advantages that might result from the lines in famine years.

(6.) Whether, and if so to what extent, applicable outside the famine zone.

(Signed) R. H. SANKEY, Col., R.E.
Chief Engineer, P.W.Dt.

4th August 1881.

No. 67. ORDER THEREON, 17th August 1881, No. 2,018-W.,

The Honorable the Governor in Council fully concurs in the desirability of instituting the inquiries indicated by the Chief Engineer. The questions brought forward will therefore be considered and reported on as follows by Public Works Officers and such officers of the Revenue Department as may be nominated by the Board of Revenue :—

* * * * *

MEMORANDUM.

The following observations are offered with reference to Proceeding of the Madras Government, No. 2,018-W., dated August 17th, 1881, on the subject of steam-tramways.

Of the questions indicated in the last paragraph of the note of the Chief Engineer, P. W. D., printed in the above-mentioned Proceedings all except No. (3) involve points which require local knowledge for their due discussion and may therefore be best left to the care of the officers to whom they are referred for reply in the Proceedings. But question (3) is one which opens out the whole line of argument as to the form steam-tramways for India may best adopt, and on this a few remarks may be found appropriate.

I.—WHAT IS A TRAMWAY?

The first point for consideration is—"What constitutes a tramway?"—and some sort of answer to this question is very necessary for it has been urged by some with whom I have discussed the subject that the proposal to lay lines on the existing roads is not capable of adoption in this country for reasons that will be subsequently noticed, and that, consequently, if tramways are to be introduced they must take new and distinct lines of their own.

Very good. Such may be the case, but the manner of stating it is erroneous; for it becomes then not a question of how tramways shall be laid, but of a choice between tramways and Light Railways.

For the very essence of a tramway is that it shall be laid on the existing roads, and shall so save all the original cost of land, earth-work, and bridges. A tramway may indeed form a Light Railway *along a road*, and so in truth it does, but the fact of its being along the road constitutes it a tramway according to the modern acceptation of that term. I shall refer to this point again under the head of "rails" which are said by some to constitute the distinction, but the only essential regarding them from a tramway point of view is that they shall be so laid as to allow of the free passage of other road traffic. The answer to the question "What is a tramway" therefore becomes,—it consists in a line of rails so laid along an existing road as not to interfere with the ordinary road traffic.

II.—TRAMWAYS *versus* LIGHT RAILWAYS.

The upholders of Light Railways *versus* Tramways may be divided into two classes;—

(1) those who maintain that there will be no practical saving on the above-mentioned items, in that the cost of re-forming the road will more than counter-balance any economy so effected, and that therefore the road traffic will be interfered with to no advantage.

(2) those who deny that the present roads are capable of being utilised, and who maintain therefore that it is not a question of Tramways *versus* Light Railways, but of Light Railways or nothing.

To the first class of objectors I reply that the truth of their contention is one that is easily tested by means of figures, and that such as are available do not bear them out in their assertion.

There are very complete figures showing the cost of construction under various heads for Indian State

Railways, and analysing these I find that the cost of land averages £106 per mile and that of permanent way and construction £4,250 per mile. Even on what is considered almost the cheapest line yet made in India, the Muthra-Hathras (metre gauge), the cost of land was £53 and of permanent way and construction £1,947, or a total of exactly £2,000 a mile. Against this may be put £1,300 a mile as the cost on a very liberal estimate of the same work for a tramway laid on a road (page 36 of introductory pamphlet). Moreover there are other considerations that would affect the relative cost. It is pre-supposed that the line of country for which improved communications are required is one along which a considerable traffic now passes, and it may therefore be fairly assumed that it connects either an important town or a series of large villages with the railway. The land to be taken up for a new line would therefore probably be under wet cultivation and in any case exceptionally valuable; feeder lines from the existing roads would have to be cut to the railway, which would thus have to be fed instead of being a feeder; and, lastly, traffic would have to be diverted from its existing grooves, of which task we all know the hopelessness in this country.

To the second class of objectors who say that the existing roads cannot be utilised, because;—

Their gradients are steep;

They are narrow;

Bridges and Culverts are weak;

Irish bridges are frequent;

Sandy beds of streams have to be crossed with steep ramps on either side;

Materials are bad, and so on;

I reply that I do not deny that all these diverse objections are to be found on various roads. All that I do say is that I doubt their being found combined on any one important road; though if so, they would, I confess, show that such a road was not suitable for a tramway. I may also observe I have distinctly pointed out in my first pamphlet that tramways are only contemplated in certain exceptionally level districts such as the Deltas and the Deccan plateau.

That some re-formation of every road on which a line might be laid would be necessary is certain, and in the rough estimate entered in my pamphlet on the subject I have allowed £300 per mile under that head, for which sum a good deal of work might be done in the way of strengthening bridges, easing off steep gradients and relaying in the firmest and strongest manner the macadam of that portion of the road to be occupied by the tramway.

So thus on every ground the existing roads must be made available or no *tramway* will be possible.

With Light Railways I have no present concern, but it is of the highest importance that the issue should be strictly confined to the proper point, which is—the possibility of improving the present local communications by means of light lines of rail laid along the roads—and that it should not diverge to a point that must be discussed on entirely different grounds—the construction of Light Railways.

III.—GAUGE.

The next point to be considered is that of gauge, and here, I must admit, I am disposed to modify the opinion expressed on page 35 of my first pamphlet that "no other gauge" (than 5.′ 6″) "could be admitted on

the lines running in connection with broad-gauge railways." On many roads the requisite width could with difficulty be spared, and the cost of formation, of rolling-stock, and of upkeep would all be so very much higher in the case of a 5.′ 6″ than in that of, say, a 2′ 6″ line, that I believe the advantages attendant on the adoption of the latter would more than counterbalance the sole, though most serious disadvantage of break of bulk at the railway station. In the case of tramways established in connection with the metre-gauge railways, I would still recommend that gauge for the tramway lines. But in the case of tramways serving as feeders to broad-gauge lines, I am now disposed to advise the adoption of a narrow gauge, and holding that view, it only remains to decide on the most convenient width. The choice probably lies between the metre, the 2.′ 6″, and the 2′ gauges. The latter is, I think a trifle too narrow for it must be remembered that the locomotives will have to be adapted for burning wood, which requires a proportionately larger area of grate than coal and also a larger carrying capacity for the fuel itself. On the other hand the 2.′ 6″ gauge presents for a very light traffic the maximum of carrying capacity combined also with the maximum of convenience and the minimum of space. For a heavier traffic the metre gauge presents precisely the same advantages, and on the whole for a steam-tramway I advocate the 2′ 6″ gauge, when running independently or in connection with broad-gauge railways, much as I regret the involved abandonment of the advantages resulting from the existence of a uniform gauge between a railway and its feeders.

IV.—WEIGHT AND FORM OF RAIL.

I had recently an opportunity of bringing to notice the French system of light tramways introduced by M. Decauville, and the peculiarity of which consists

having very light rails which are sent out in lengths metres (16·4 feet) with fish-plates, and sleepers y 3·28 feet, ready bolted on, so that the line simply be laid down on the prepared road, the gths bolted together, and be then at once ready the passage of traffic. For a temporary line such one that might be laid down during a Famine is to some important outlying tract of country ere food was scarce, and the ordinary means of munication had failed or had been found insuffi- rt, no system could be better. It might also do a line where it had been resolved to make a trial the tramway system, but where the existing ffic was very small, and where it was there- evident that the most rigid economy would have be exercised if the line were to be made to pay il the expected development of traffic occurred, en the light trial line would make way for one of eavier and more permanent description. In the t of these cases Mr. Decauville's system would ubtless be found the best, and having this in view

Appendix, page 39. I give further on a *Table showing approximately its t. But the case I am now supposing is that of a e intended to be of a permanent nature, adapted heavy traffic, and which is to allow of the free sage of ordinary road traffic over its rails, which Decauville's system would not do, because its s are light, weakly fastened, and laid *on* the road, that the first passing cart would break them.

In my pamphlet I have recommended a 30lbs. to yard rail for the metre-guage line, and a somewhat ter, say a 25lbs. rail would probably be found the st suitable for the 2.′ 6″ line. The form depends ncipally on the kind of sleeper adopted which will treated of in the next paragraph, but I am inclin- to recommend either the Vignoles section which

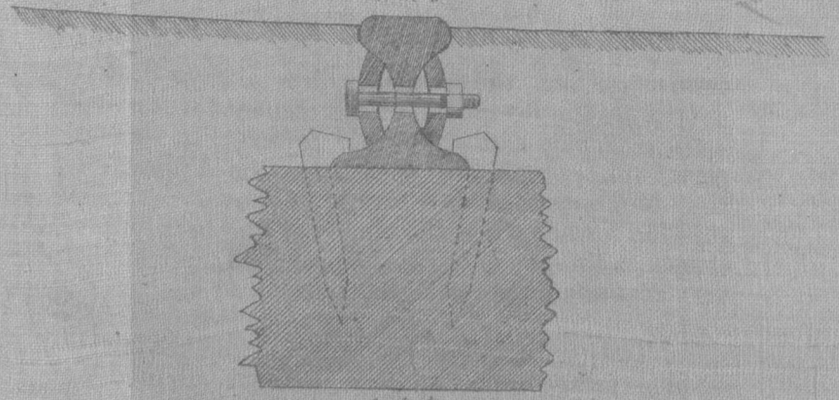
is shown in the Plate, or else the ordinary double headed rail. These are the most convenient forms of rail for country tramways on every ground, though they are not suitable for town tramways over which an incessant and heavy traffic passes and for which the ordinarily adopted tramway-rail proper is found better. Of this latter form of rail there are many varieties.

It has indeed been urged that the form of rail constitutes the sole difference between a light railway running along a road and a tramway. The distinction between a railway and a tramway consists, it is said, in the latter permitting the passage of the ordinary road-traffic across it without obstruction, which the former does not.

But in the first place it may be said that if the only distinction existed in the *form* of rail, then there would be no real distinction at all. I am, as already said, quite prepared to subscribe to this view, except that rightly or wrongly the name of railway frightens people, conjuring up all sorts of ideas of extravagant expenditure, whereas the term tramway seems to carry with it the implied aim of simplicity and economy. What's in a name? Well a good deal, when it affects people's ideas and prejudices, and therefore I prefer to call the lines "Steam-tramways." Moreover, as stated on page 9, the accepted definition of a tramway is a line of rails so laid on a road as not to interfere with the ordinary traffic and has no connection with the mere form of rail, for it is of course assumed that whatever its form it must be so laid as to allow carts to pass freely over it, and there need be no difficulty in so laying the Vignoles rails. I have said in my first pamphlet, page 13, that in Italy the Tramway Companies have not as yet been compelled to bring up the between rail portion of the road

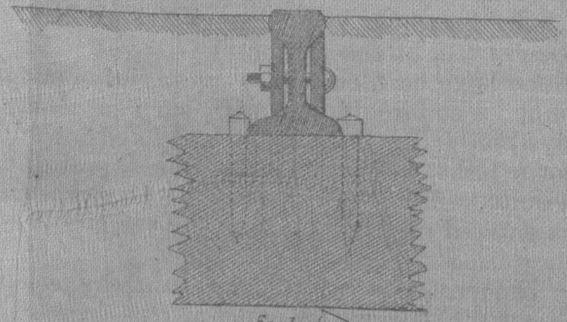
PLATE I.

FIG. Nº 1.



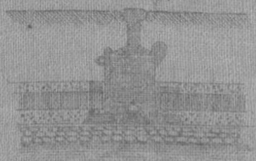
Scale 4

FIG. Nº 2.



Scale 6

FIG. Nº 3.



Scale 8

REFERENCE

Fig 1. Rail and attachment to Sleeper on a French Country Tramway

Fig 2. Another form of Do

Fig 3. Isaacs's method of attaching Vignoles Rail.

flush with the ordinary road-level, but it is not contended that there will be any difficulty in doing this, or that when it is done the working of the line will be in any way interfered with. The depth and thickness of the flange on a tramway wheel is very much less than on a railway wheel, and the object of leaving the drop is simply to keep the traffic off that portion of the road and so effect a saving in maintenance charges. Again, it must be borne in mind that in this country we have not to deal with a rapid carriage traffic, that travels on springs, and that is drawn by valuable horses. Neither have we to contemplate much cross traffic on the line, as is the case in the streets of a European city. Nor has the line to bear the weight of ponderous waggons weighing many tons but only that of country-carts weighing not more than $\frac{3}{4}$ of a ton. To the country-cart a slight obstruction, even did such exist, would not be of the least moment, and the Vignoles rail is so much lighter, cheaper, and easier of attachment than the orthodox tramway rail, that I should recommend it for adoption without the slightest hesitation. There is a further point. We in India being late in the field with tramway enterprise gather at least this fruit—that we obtain the advantage of all previous experience in Europe. And that experience conclusively proves that the Vignoles rail with cross-sleepers is perfectly suitable for country tramways, and it is undeniably far cheaper than any other form. In Italy, as I have said, it is exclusively used, and in France* almost so. There is thus no reason why in India prejudice which is not founded on fact should deny to steam-tramways this economy.

* Vide Plate.

V.—SLEEPER.

On no point does more diversity of opinion exist than on the best form of sleeper to be used for

tramways, but the difficulty has always been to determine the best mode of attachment for the awkward tramway rail. Having, however, in the last paragraph, pointed out that either the Vignoles or the double-headed rail would, in every way, be suitable for adoption, the choice of the best form of sleeper is thereby enormously simplified, and another very real advantage gained.

In Italy, the Vignoles rails are spiked on to wooden cross-sleepers in the manner adopted on railways. The system answers extremely well, but it is perhaps doubtful whether it would be capable of extensive adoption in India, as wooden sleepers would be too apt to rot or to be attacked by white ants. On the whole I am disposed to advocate the adoption of a light description of Greaves' pot-sleepers which have been employed on railways in tropical countries so largely and with such success. As employed on railways each pot weighs about 90lbs., but for a light tramway 40lbs. would probably be found quite sufficient, or about the 65 tons per mile I have entered on page 39 of my first pamphlet.

The cheapest of the ordinary tramway sleepers would cost 3 or 4 times as much as this form.

Three forms of attachment for Vignoles rails are shown in the Plate. Livesey's Patent, fig. 3, is the most expensive of the three.

VI.—LOCOMOTIVES.

The principal points to be observed in designing a locomotive for Indian Tramways are that, as the fuel employed will generally be wood, the grate-area should be somewhat larger than in the ordinary European types, and somewhat more room for reserve

fuel should be provided. These however are very simple points and can be allowed for without any difficulty, and without any appreciable increase in cost.

That the locomotive should be of a type that is propelled by steam and not by compressed air I look upon, however, as a point of considerable importance. Mekarskis' compressed air locomotive, and also perhaps Colonel Beaumont's may have a successful future before them in Europe. But while I am inclined to doubt even this, I feel quite sure that such a type would not be the best for Indian lines. I have before me a drawing of one of Mekarski's latest forms of air locomotives, and have no hesitation in saying that the details of its construction are infinitely more complicated than in the ordinary steam locomotive. Moreover in the case of the latter the method of working and of construction is very generally known, so that such a one would be easily put together or easily repaired, but with a compressed-air machine the putting together might be attended with difficulty, and if a break-down occurred, the tramway might have perforce to cease running from no one being competent to repair its delicate and complicated valves. This is a risk which, obviously, it would not be wise to run. It may be presumed that on the Italian tramways the most efficient means of traction available are employed, and on them nothing but steam is made use of, though coke costs 36s. a ton. The principal advantage claimed for the compressed-air engine is its freedom from noise when working, but this, as I have pointed out in my first pamphlet, is an advantage that can to a certain extent be dispensed with, especially in India. Moreover the steam-engines are practically noiseless when running at moderate speeds.

As regards the cost of locomotives, I believe that

mated the cost of light railways, and that such could be constructed for very little more than I had entered as the probable cost of tramways. On page 5 of my pamphlet I said that I did not believe a light railway would ever be constructed for much less than £6,000 or £7,000 a mile. This opinion, as a general one, I see no reason to modify. Under exceptionally favorable conditions a metre gauge railway might be opened for £5,000, or say even £4,500 a mile, but even the latter figure would be more than double the cost of a first-class line of tramway as given in Table VI, page 40.

The fact must also not be lost sight of that many lines of light railway which appear to have been constructed at an exceptionally low cost, are reported as complete when they are, as a matter of fact, very far from being so, and much expenditure has afterwards to be incurred on them which is either improperly charged to revenue, or is else met by an increase of Capital.

I have now prepared an estimate showing the very least sum for which a steam-tramway could be established on a 2′· 6″ gauge, supposing all the conditions to be extremely favourable. I believe that it would be possible to put down a line in *complete working order* at this cost in most parts of the Madras Presidency, leaving additions to rolling-stock and buildings to be carried out as the traffic developed and profits increased.

CAPITAL ACCOUNT.

Estimate of Minimum Cost for a Line of Steam-tramway 15 miles long on the 2′· 6″ gauge along an average Indian Road.

		£	£	£
1	*Permanent Way.*			
	Cost of re-formation of road, including strengthening of bridges, flattening of curves, &c., wherever necessary, at £300 per mile for 15 miles...		4,500	
	Bessemer-Steel rails, weighing 25lbs. to the yard, say 40 tons per mile, at £7 per ton, per mile ...	280		
	Iron pot-sleepers, 40lbs. each, about 65 tons per mile, at £3 per ton, per mile ...	195		
	Add 40 per cent. to above two items for freight, &c., (which amounts to £1·81 per ton), per mile ...	190		
	Laying Permanent Way at 2*s.* per yard, per mile ...	176		
	Total per mile £	841		
	For 17 miles to include sidings, reversing triangle, double rails at curves, &c.		14,297	
				18,797
2	*Locomotives.*			
	Three locomotives, each of 25 H.P., weighing 8 tons each, at £500 ...		1,500	
	Add 40 per cent. for freight and fitting up ...		800	
	Carry forward ...			2,300
				21,097

		£	£	£
	Brought forward ...			21,0. 97
3	* *Carriages and Trucks.*			
	Two composite (1st and 2nd class) cars at £100 ...		200	
	Nine open cars, at £60 (para. 7).		540	
	Three closed vans, at £40 ...		120	
	Twenty-four trucks, at £30 ...		720	
			1,580	
	Add 40 per cent. for freight, &c.		632	
				2,212
4	Sheds for rolling-stock, repairing shed, offices, &c. ...			750
5	Fitting up offices ...			100
6	Tools, &c. ...			100
7	Sundry expenses ...			241
			Total £...	25,000
				or
				£1,666⅔ per mile.
				= Rs. 20,000, at 1*s.* 8*d.* per Rupee.

I still retain 40 per cent. for freight, &c., on rolling-stock. The allowance is a very high one for rolling stock, but as the actual cost is uncertain I prefer to be on the safe side.

A 30lbs. to the yard rail would increase the total capital cost by about £1,000.

IX.—COST OF WORKING.

The answers to question 4 in Proceedings of the Madras Government No. 2,018-W., will furnish Government with a more or less accurate idea of the traffic that would be attracted to tramways along most of the important lines of communication in the Presidency, and it will only be necessary to compare the figures so obtained with the subjoined calculations of the minimum amount of traffic which would enable the line of which the estimate has just been

* The number might be slightly reduced if necessary.

given to pay a fair dividend, before deciding as to whether a *primâ facie* case for or against the establishment of a tramway along any given road had been made out. The calculation of working expenses has been very carefully made, and I believe that it conveys an accurate idea of what the maintenance cost of an economically managed line would prove to be. But there must be no extravagance, and the Manager of the line would have to take a personal and active interest in its welfare.

It is assumed that 6 trains run each way every day along a 15 mile line.

REVENUE ACCOUNT.

EXPENDITURE.

		£	£	£
1	*Working Expenses.*			
	CONSUMPTION.			
	Wood, at 25lbs. per mile run, at 10*s.* per ton ...		366	
	Oil and grease (·15lbs. per mile, at 3*d.* per lb.) ...		123	
	Leather, Varnish and Tools (lump sum) ...		50	
				539
	MAINTENANCE.			
	Maintenance and Repair of Locomotives, at £15 each...		45	
	Maintenance and Repair of Carriages, at £2 each ...		68	
	Maintenance and Repair of Road 15 miles, at £40 per mile for the whole breadth of road ...		600	
	Carry forward ...			713
				1,252

	Brought forward ...			1,252
2	*Cost of Administration.*	£	£	£
	DIRECTION.			
	Manager ...		300	
	EXECUTION.			
	3 Engine drivers, at £40 ...	120		
	3 Boys £10 ...	30		
	3 Guards £30 ...	90		
	Porters, &c. ...	100		
			340	
	OFFICE.			
	Salaries ...	50		
	Stamps, publishing, &c. ...	50		
	Sundries ...	20		
			120	760
3	*Sundry Expenses.*			
	Lighting ...		15	
	Bonuses ...		50	
	Sundry Losses ...		13	
	Sundry Expenses ...		100	
				178
	Total *working* expenditure £			2,190
	or			
	8*d.* per train-mile on 65,700 miles.			
4	*Depreciation.*			
	Locomotives, at 6 per cent. on prime cost ...		138	
	Carriages and trucks, at do. ...		132	
	Permanent way, do. ...		858	
	Sheds at 5 per cent. ...		35	
	Tools at 10 „ ...		10	
				1,173
5	*Renewals and Additions.*			
	Sundry ...			337
	Gross Expenditure...			3,700

RECEIPTS.

It is assumed as before that 6 trains run each way every day, and that each train consists of 1 passenger and 4 good-trucks, carrying an average of 32 passengers and 10 tons of goods for the whole distance. The train load will be about 21 tons gross. The ruling gradient should not exceed 1 in 100 for any distance though a gradient of 1 in 20 could be overcome for a few yards.

	£.	£.
Passenger, at 1*d.* per mile...	2,190	
Goods, at 1*d.* per ton per mile	2,737	
		4,927
Contribution from Local Fund Board for up-keep of its portion of the road, 15 miles at £15		225
Postal Service		20
Sundry Receipts		28
Gross Receipts ...		5,200
Gross Expenditure...		3,700
Net Receipts ...		1,500

which is equivalent to 6 per cent. on the Capital of £25,000.

The gross expenditure is equal to 71·15 of the gross receipts.

The yearly train mileage is 65,700

„ gross receipts per train-mile are ... ... 19*d.*

„ expenditure is ... ... 13·5*d.*

I hope that the figures given above will be deemed sufficiently encouraging. Everything that is essential for the establishment of the line has been entered in the Capital account, and every possible charge against Revenue has been fully provided for in the Revenue account. The probable traffic has been

taken at what may perhaps be called a ridiculously low limit, and the fares and rates have been reduced to a minimum. Nevertheless the net receipts are equivalent to 6 per cent. on the capital outlay, which though not an extravagant is a very fair return. Nor would the subscribed capital be left long lying idle as is sometimes the case. Fifteen months should suffice from the commencement of operations to the opening of the line for traffic.

Such are the direct results, but neither must the indirect results be lost sight of. It is sometimes urged that India has been impoverished by the large outlay incurred on guaranteed railways which have not been directly remunerative. But the enormous development of trade in recent years and the consequent increase in wealth would have been impossible without the improved lines of communication, and the indirect benefits thus conferred on the empire in general by the railways has been incalculable. And what the railways have done for the Empire on a large scale will also be done by steam-tramways for the districts they serve on a small scale, with the additional benefit of affording a good investment for local capital.

X.—LEGISLATION.

The introduction of steam-tramways into India will necessitate some sort of legislation for their control, and this has indeed been contemplated in the Railway Act, No. IV of 1879, paragraph 54 of which provides for its extension by notification to any tramway worked by steam. To a certain extent it would be applicable, but as, at any rate, the paragraphs marginally* noted would have to be omitted, many of the others revised, and important new paragraphs added, it would, in my opinion,

* 17 to 20, 31 to 33 35, 41 to 43, 45 to 47 and 52.

be preferable to embody the whole of the regulations that Government might consider it necessary to frame in one short Tramway Act. I have pointed out in my pamphlet that tramway enterprise might have to be somewhat liberally treated, and not weighed down at the commencement by onerous conditions, which, though they might not prove very severe in application, would have a sufficiently alarming appearance to frighten away timid speculators. It is worthy of remark that neither in France nor in Italy where steam-tramways have up to the present been most largely adopted has any Tramway Act yet been passed, though in both countries such is in contemplation. I have given in my pamphlet the conditions under which the Italian lines are worked; those in France have special regulations made in each individual case to which reference will presently be made. In England tramway construction is now authorised by a separate Order in Council for each line, the form of which is given as an Appendix to the Report from the Select Committee of the House of Lords on tramways during the Session 1878-79. Certain clauses of this form of Order, suitably modified to suit local conditions, might be embodied in the proposed Indian Tramways Act, which would take a general form. In England any special points that may arise are by the terms of the Order in Council left for the decision of the Board of Trade, for which in this country we may read the Consulting Engineer for Railways. The recommendations arrived at by the above-mentioned Committee are of sufficient importance for some extracts from them to be made, as follow;—

I. It is desirable that, wherever it is possible, tramways should be constructed and maintained, but not worked, by the Local Authority.

II. The preliminary consent of the Local Authority to the construction of tramways by private Pro-

moters should be required as at present, with the exception that where the proposed tramway passes through the districts of more than one Local Authority, and those authorities differ as to whether it should be sanctioned or not, there should be an appeal to the Board of Trade.

III. There should be freedom of contract between the Local Authority and the Promoters as to contribution to local rates, fares, tolls, and general charges, subject to an appeal to the Board of Trade.

IV. The periodical revision of fares and tolls should be provided for.

* * * * *

VI. Notices should be served upon any Railway Company across whose line it is proposed to carry a tramway on the level, and upon any Railway or Canal Company, whose bridges are intended to be used for a tramway; and the attention of the Board of Trade should be called to all cases of level crossing, and they should require a special report from one of their Inspectors in every instance of the kind.

VII. * * * * * it should, however, be left to the Board of Trade to decide, according to the special circumstances of each case, what width of roadway is required to provide adequately for the safety of the public and the convenience of ordinary traffic.

VIII. No preference should be given to one gauge over another, but the width of gauge should be settled freely, according to the circumstances of each case. * * * *

IX. The Board of Trade should instruct their Inspectors to pay particular attention, in their inspection of tramways before they are opened for use, to the solidity of the permanent way, * * * *

* * * * *

XI. A Tramway Company which fails to keep its rails and its own part of the road in good condition and repair, * * * *, should be made liable to a penalty not exceeding £5 a day.

XII. The Board of Trade should have power to make regulations which should be of general application on the following points:—

(*a.*) The general speed to be permitted.

(*b.*) The speed on passing through narrow streets or roads, or approaching facing points or other places where a low speed is desirable.

(*c.*) The pulling up of Cars at the intersection of cross streets or roads, or at other places where such a precaution may be advisable.

(*d.*) The stoppage of cars in case of horses becoming alarmed or of impending danger of any kind.

(*e.*) The provision of efficient self-acting breakmachinery regulated to the satisfaction of the Board of Trade.

(*f.*) The use of bell, whistle, or other warning apparatus.

(*g.*) The provision with every engine of a fender, and also, as far as possible, of an indicator.

* * * * *

(*l.*) The posting of Regulations and Bye-Laws in conspicuous places.

(*m.*) The numbering of engines.

(*n.*) The position of the Engine-driver, who should be placed in front of the engine, so as to command the fullest possible view of the road before him.

XIII. The penalties for breach of these regulations should be of moderate amount.

* * * * *

XVI. The Board of Trade should be at liberty to inspect engines and boilers, whenever necessary, and to prohibit the use of those which may be found to be unsafe.

There are many points in the French regulations that are well deserving of attention, and without burdening this Memorandum with extensive quotations, I will now briefly summarise some of the more important provisions. The system adopted is for towns to make demands for tramway concessions, which are granted to them by the State on certain conditions, and the concessions are then made over by the towns to the Companies that may have been formed to work them. When applying for the concession, general and detailed plans and sections have to be submitted showing full details of the proposed methods of construction, together with a Report containing a complete description of the project. If it is approved a decree is issued the provisions of which are very searching. The principal points are ;—

I.—DESIGN AND CONSTRUCTION.

Art. 3.—Provides for the completion of the line within a stated time.

Art. 4.—Provides for the submission of the designs for approval by the State Engineers.

Art. 6.—Provides for the laying of the line without projection above the road surface or depression below it, and for the necessity of approval being

obtained to the form of rail and the method of attaching it.

Art. 7.—Provides for the re-establishment of the road-surface.

Art. 11.—Provides for the official inspection of the before its opening for traffic.

II.—UPKEEP.

Art. 12.—Provides for the maintenance of the permanent way in good order, and also for the upkeep of the between rail portion of the road, and of a certain distance outside each rail.

Also that when any portion of the road beyond the limit has to be broken up for construction or maintenance, such portion shall be repaired at the cost of the tramway for one year.

Note.—(It is omitted to be stated how the repairs shall be effected, in case of improper maintenance.)

Art. 14.—Provides for the approval of the types of car adopted.

III.—DURATION AND CESSATION OF CONCESSION.

Art. 16.—Fixes the number of years for which the concession shall last.

Art. 17.—Provides that at the expiration of this period, the line shall become absolutely the property of the State, and shall be made over to it in good order and free from any indemnity.

Art. 18.—Provides that if the State does not wish to enter into possession the concessionaire shall be bound to place the road into its original condition.

Art. 19.—Provides that if the works of construction are not completed within the period fixed the concession shall be revoked, and if so, should it be so

decided, the road must be re-formed in its previous condition.

Art. 20.—Provides that in case of interruption of service, urgent measures shall be taken to remove the cause, and if the traffic is not resumed within 6 months the concession will be cancelled.

Art. 21.—Provides that the last rule shall not apply if the causes be exceptional.

IV.—RATES AND FARES.

Art. 22.—Fixes the rates and fares according to a varying tariff.

Art. 23.—Provides that if they are lowered they shall not be raised within a limit of 3 months.

Art. 26.—Prohibits, unless specially authorised, arrangements being made with certain parties which are not applicable to the general public.

V.—SPECIAL STIPULATIONS.

Art. 27.—Provides for Non-Commissioned Officers and Soldiers in uniform being carried at half price.

Art. 28.—Provides for inspecting officers being carried free.

VI.—SUNDRY CLAUSES.

Art. 29.—States that no indemnity can be claimed on account of;

(1.) Damage caused to the rails by the ordinary road-traffic;

(2.) Condition of the road;

(3.) Opening of new lines of communication, or the establishment of new tramways competing with the one under reference.

(4.) Interruption of service on account of other work executed on the road by properly authorized agents.

(5.) Any circumstance resulting from the free use of the public road.

Art. 34.—Provides for the possible revocation of the concession before the end of the period for which it is current without any indemnity being claimable.

It is provided also that the concessionaire shall deposit a certain sum as a guarantee for the due execution of his work, which shall only be repaid to him after the line has been passed.

I will conclude this section with a translation of some Bye-laws issued by the Prefect of Milan on May 15th 1881 and which apply to all the Milanese Tramways.

Art. 1.—Prescribes that each locomotive shall carry a driver and fireman but no one else without express sanction, and under no circumstances more than four persons.

Art. 2.—Prescribes that drivers and firemen shall not be admitted to the service of tramways until they have proved their qualifications.

Art. 3.—Limits the speed to 11·2 miles (18 Kilomètres) an hour unless specially fixed otherwise in the deed of concession. Also lays down that under no circumstances shall the maximum speed, however fixed, be exceeded. Also that in passing through villages or over a level crossing the speed shall be limited to that of a man's walk, and the train preceded by a servant of the Company to warn foot-passengers and vehicles to be on the look-out. Special arrangements requiring special sanction required in certain cases.

The time-table to receive the approval of the Prefect.

Art. 4.—No train to have a greater length than 98·43 feet (30 metres) including the locomotive, nor to carry a weight exceeding 29·5 tons.

Not more than one locomotive to be attached to any train, and no train to consist of more than four carriages. Locomotives and carriages to be furnished with breaks under the charge of a special guard.

In the special regulations for each tramway the break-power required on each incline will be stated.

Art. 5.—A handle to be in each carriage within easy reach putting in action a bell on the engine.

Art. 6.—The present ordinance and all others that may issue to be fixed in each carriage and stopping-place.

Art. 7.—The approach of a train to a stopping-place to be signalled by means of a trumpet.

Art. 8.—The train to slacken speed or stop should the line not be clear ahead, or should a horse or other animal appear so frightened as to render an accident possible.

Art. 9.—Regarding lights after sun-set.

Art. 10.—Stoppages may not be prolonged to take in water, or to clean out the grate and ash-pan, except in the places set apart for these purposes.

Art. 11.—The number of seats available to be clearly notified on each carriage both inside and outside.

Art. 12.—Forbids any one to enter a full carriage or to cling on outside; or to get in or out, or to pass from one carriage to another, while the train is in motion. At intermediate stations the Company is

not bound to furnish more places than there happen to be seats vacant when the train arrives.

Art. 13.—Forbids passenger to carry firearms, unless unloaded, which should be certified to by the guard, or any inflammable or explosive material, or one which emits dangerous or noxious fumes.

Art. 14.—Lays down that no one in a state of intoxication, indecency, or suffering from a contagious disease shall be allowed to enter any carriage.

Art. 15.—No animals to be admitted except small dogs, muzzled, and in charge of their owners.

Art. 16.—The servants of the Company to be dressed in a distinct uniform. The Head-guard to have a way-bill in which particulars of the train, times of arrival and departure, unusual occurrences (with the localities), shall be entered.

Art. 17.—A register to be maintained in each station and by each Head-guard in which complaints can be entered. In case of any accident notice will be given of it within 24 hours to the Prefect and also to the Railway Commissioner.

Art. 18.—Revokes a previous decree.

Art. 19.—Lays down that contraventions of the present decree will be dealt with under the Highways Act, independently of any major penalty transgressors may incur, and without prejudice to any civil action for damages that may arise.

The Agents of the tramway to be responsible for any contraventions they might have prevented, or which they do not report in the proper quarter within a reasonable time.

Art. 20.—Describes the procedure to be adopted in proceedings under this decree and mentions the officials who are charged with the enforcement of it.

XI.—GENERAL.

With a few general observations I may now conclude.

Firstly, as regards speed. This must not be fixed too low, for the reason that I have given on page 27 of my first pamphlet, and I would recommend 12 miles an hour as being the maximum speed at which the trains should be permitted to travel. At this rate they could stop dead on level ground in 10 yards.

Secondly, as regards the formation of Companies to work tramways. It would, I think, be far better for Companies than for Local Fund Boards and Municipalities to undertake their construction and maintenance, the latter not having the necessary knowledge or staff. I would therefore suggest that the statistics as regards traffic obtained in reply to G. O., No. 2,018-W. of August 17th should be tabulated and published, and that it should be made known that Government were prepared to receive applications for tramway concessions. In that view the terms that would be imposed on the concessionaires should be roughly drawn up so that applicants might have a general idea of the conditions they would have to conform to. I assume that Government would reserve to itself the right of granting concessions, and would not allow this to be done indiscriminately and irresponsibly by Local Fund Boards and Municipalities. It seems necessary to point out that this is a consideration which is, at present, somewhat in danger of being overlooked.

Thirdly, as regards a guarantee. It might be asked for or it might not. If not, so much the better. But if asked for not much risk would be incurred by a moderate guarantee for a limited term of years —say 3 per cent. for 10 years—and it is scarcely

necessary to point out the amount of encouragement that would thereby be afforded. No Indian railway—to which the proposed tramways approximate—has yet been able to raise its capital without a guarantee, and putting aside the forcible argument of precedent, there remains the general principle that the direct interference of the State in construction and control constitutes a claim to State support.* But the guarantee I contemplate is, as I have said, not Imperial or Provincial, but Local Fund or Municipal.

This brings me to my last point. Is it probable that capital will be attracted to this new enterprise? I have reason to believe that it will, if judiciously encouraged. I have been somewhat surprised at the criticism that has been passed on what I have said in my first pamphlet in this connection. On page 28 I have remarked that "enterprise in India is timid, justly timid." To this it has been objected that it is absurd to say that enterprise in India is timid when millions are being sunk in gold-speculations. No worse example could be cited. It would be almost as logical to urge that every one who throws down handfuls of gold pieces on the gambling tables at Monaco or elsewhere must be rich because he is reckless. It is only the glitter of the gold that attracts the speculator to the gold mines, and the chances of a stupendous profit; and by him the prospect of a fair percentage offered by more sober investments is not cared for because it is moderate and dull. But there are investors who are not speculators, and who are content with moderate returns, knowing well enough that hundreds and thousands per cent. are seldom realized except in

* NOTE.—This is the case in France. It is stated that there is likely to be a great development of tramways there in the course of the next few years and the late Chamber passed a measure authorising the Government to guarantee an interest of 5 per cent. on the capital invested in tramway construction.

the imagination, and to them a fair prospect such as is offered by Indian country tramways has its attractions. I should say this with confidence in any case. In this case I say with it with the more confidence that I have reason to believe that it is so, and I would therefore urge that such particulars as may be forthcoming regarding the probable traffic, and the conditions to be imposed, may be made public as soon as possible.

(Signed) C. VINCENT,
Under Secy. to Govt., P. W. D.,
Irrigation Branch.

MADRAS,
10*th October* 1881.

APPENDIX.

DECAUVILLE'S SYSTEM.

Reference has already been made on page 13 to Decauville's system, and I now append an estimate for a 15 mile line so constructed, in order that a comparison may be instituted between its cost and that of a regular tramway line as previously given. I have adopted the published list of prices for materials delivered in trucks at Bombay.*

* The cost delivered at Madras would be about the same.

I should first observe however that so far as I can gather from the inventor's elaborate catalogue, no such line as is now contemplated has ever yet been laid on his system, which has been employed with one exception for small contractors lines, or else for the little railways that are laid in the interior of large factories to facilitate transport. The one exception is the line the Russians have laid from the Caspian to facilitate their invasion of Turkestan. The latter line, so far as I can judge, is laid along a perfectly flat desert, and it is probable that the speed along it is very limited. The latter will also be the case in the factories, &c., in which the line is otherwise laid, so that it may be said that the laying of it along a road to carry a moderately fast traffic will involve a somewhat new departure, and the inventor's statement that a speed of 15 miles an hour can be maintained with safety with ten loaded trucks must be taken on trust. There is also this to be said, that in no case could cart-traffic cross the line, for the rail is very light and lightly attached. These are obvious objections. But on the other hand it will be seen that an average saving of Rs. 7,700 per mile is effected on the 15 miles, and the system is so available, so easily laid down and so easily removed,

that a strong presumption may be established in its favour for employment during a famine crisis along important lines of communication.

But beyond this, and possibly, I will not say probably, in the other case I have alluded to on page 13, M. Decauville's system is not, in my opinion, likely to recommend itself.

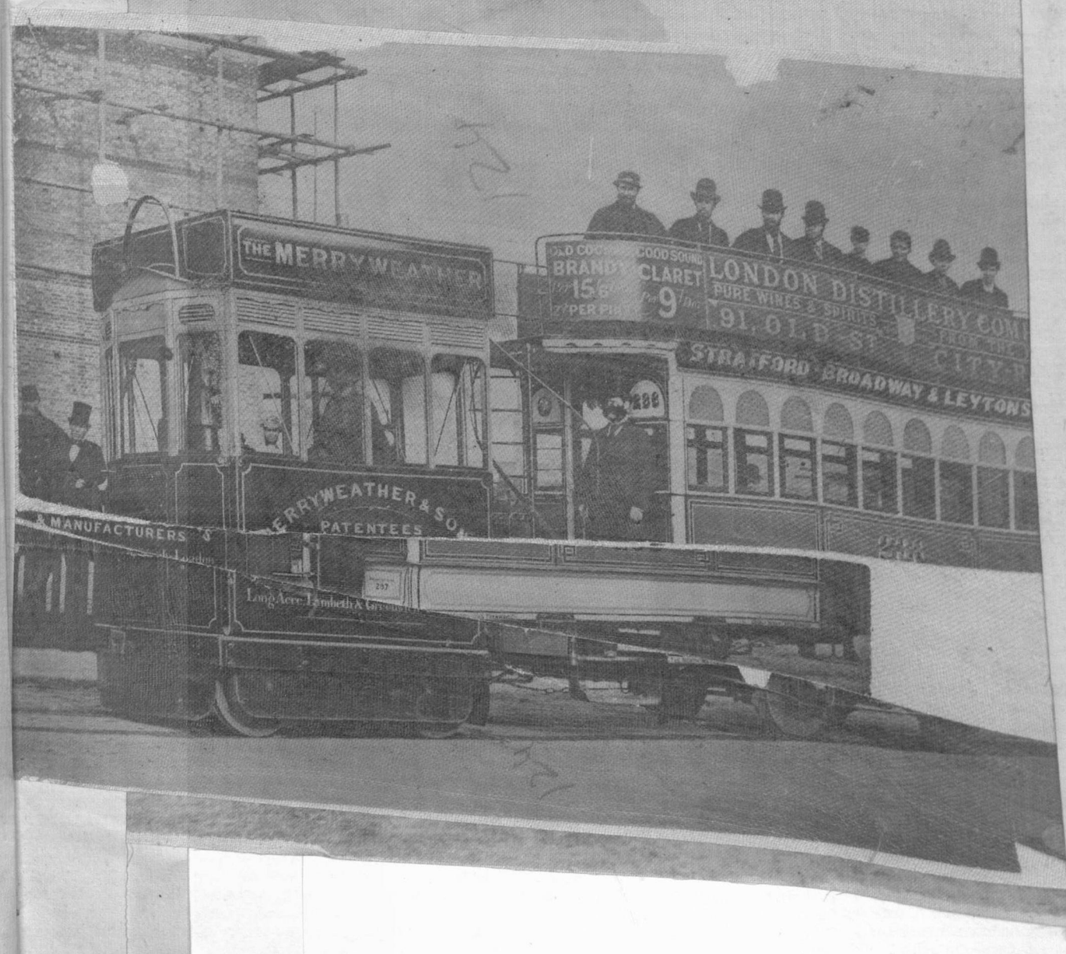
Estimate of approximate cost of a Tramway Line 15 miles long laid on the Decauville system along an ordinary road. Gauge 24 inches. Rails weighing 14lbs. to the yard.

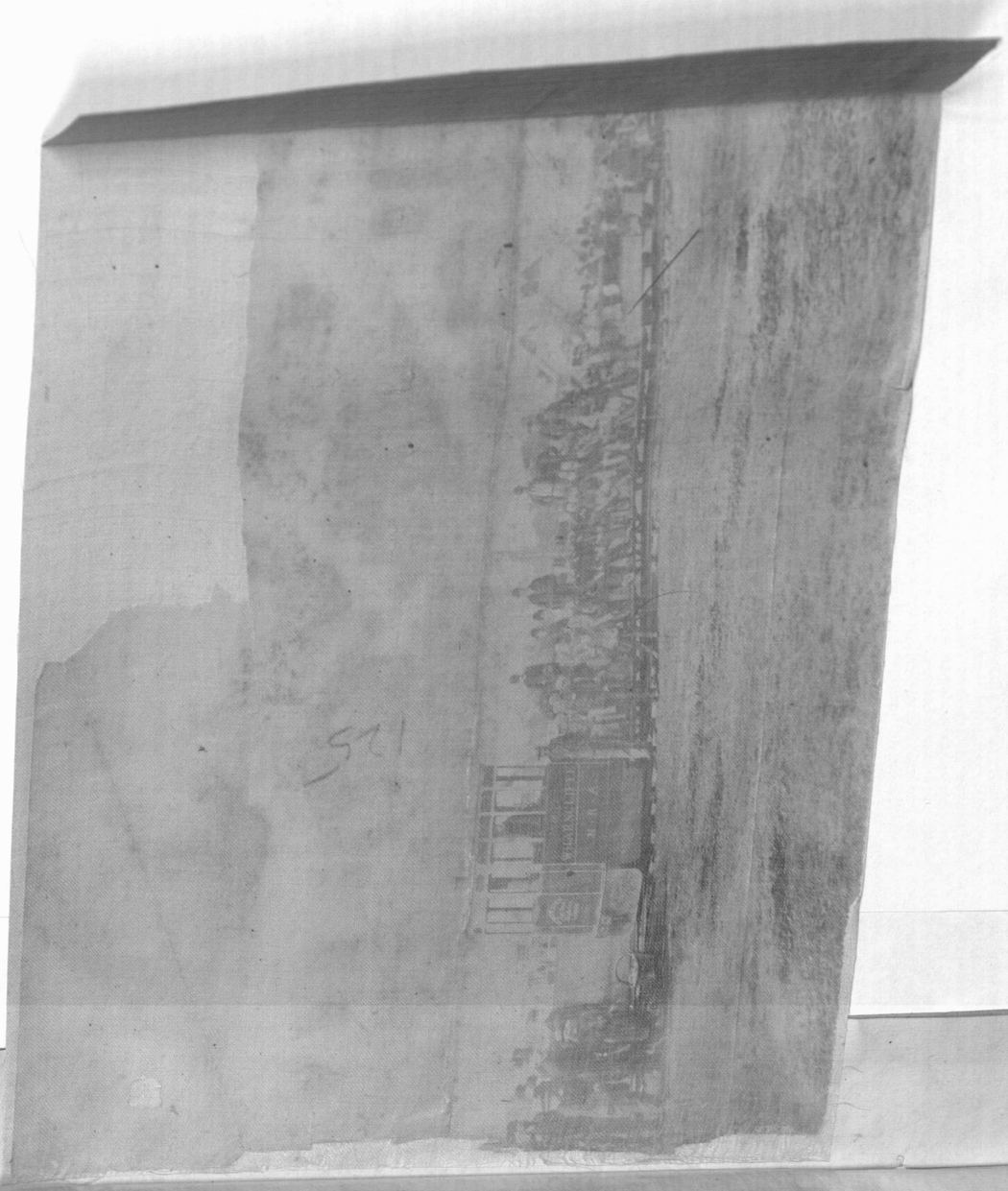
		Rs.	Rs.
1	*Permanent Way.*		
	Cost of preparing road for the Line, say Rs. 1,000 per mile for 15 miles ...		15,000
	Rails per mile ...	6,732	
	Bringing to locality at 1 per cent.	67	
	Laying at 4 annas per yard, per mile ...	440	
	Total per mile...	7,239	
	For 17 miles as on page 21 ...		123,063
2	*Locomotives.*		
	Three complete with tender, each of 12 H.P., weighing 4 tons and costing Rs. 7,976 ...		23,928
3	*Carriages and Trucks.*		
	Two passenger cars at Rs. 618 each, carrying 12 passengers...	1,236	
	Thirty open Goods Trucks, each weighing about 1 ton, carrying 2½ tons and costing Rs. 592½...	17,767	
			19,003
4	Sheds ...		1,000
5	Tools, &c. ...		1,500
6	Sundries ...		1,006
	Total Rs. ...		184,500
	or		
	Rs. 12,300 per mile.		

I have only allowed two passenger cars, pre-supposing that the line would be laid almost solely for goods-traffic.

There are no sufficient data as regards the cost of working to enable a Revenue estimate to be made out, nor is such of much importance, as it is not contemplated that the line would be laid down with a view of being commercially successful. The cost of longer lines can easily be roughly estimated from the data above given.




THE MERRYWEATHER
MERRYWEATHER & SONS
PATENTEES
MANUFACTURERS
LONDON DISTILLERY COMP
PURE WINES & SPIRITS
91, OLD ST
STRATFORD BROADWAY & LEYTONS
Long Acre Lambeth & Greenwich



ENGINEERING DEPARTMENT.

BOLLING & LOWE,
Formerly
WM BIRD & Co

2 Laurence Pountney Hill.
London. 31st Aug. 1880
E.C.

Endosure

A. T. Fraser Esq
Messrs Grindley & Co
55 Parliament St SW.

Dear Sir,

Enclosed we beg to give you copy of Manchester section just received from the Makers. You will see it is very heavy, & the price delivered at Makers Works is £11. 15/. per ton. nett.

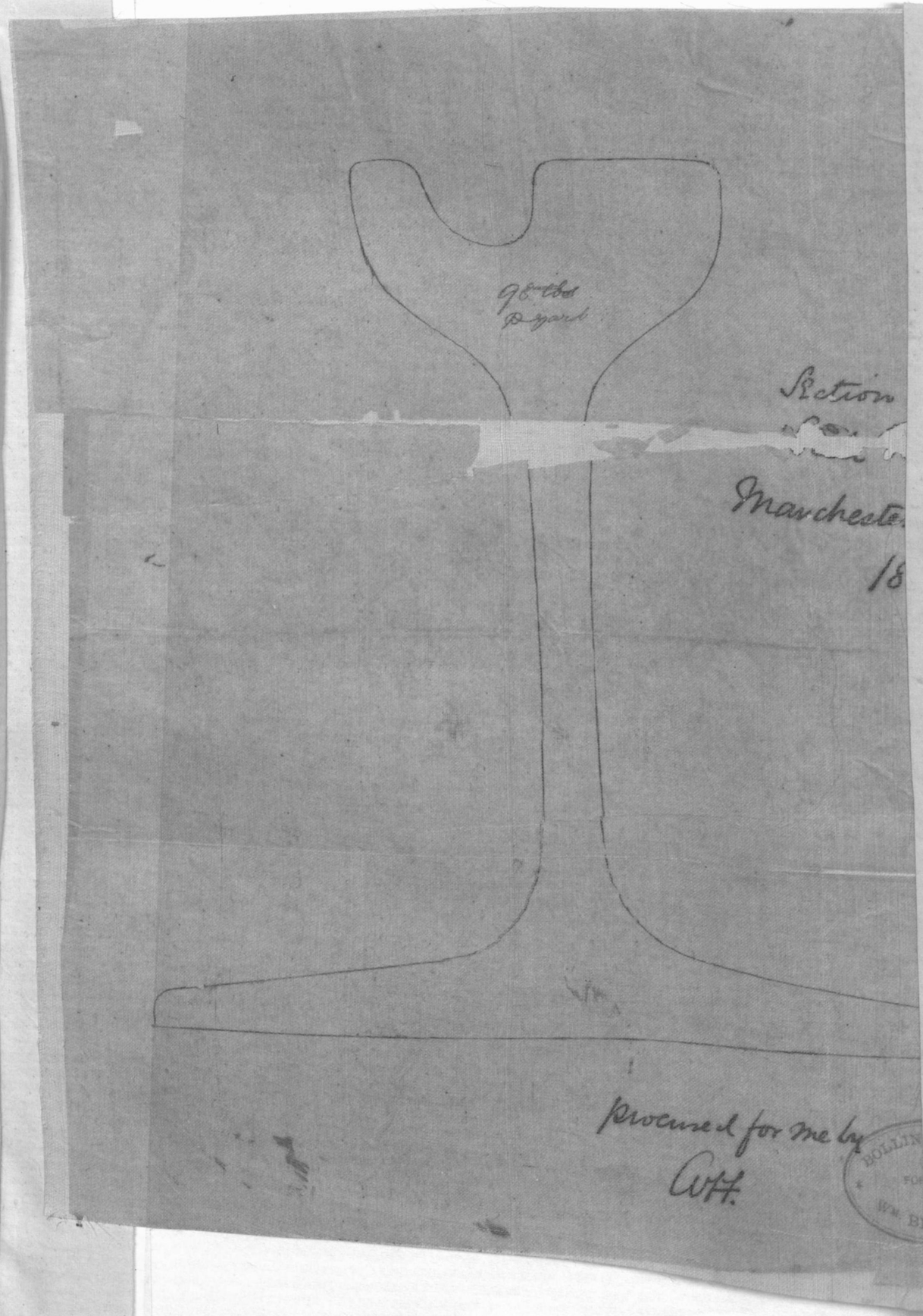
If we can succeed in getting any lighter section we will send them to you

Yrs truly

J. L.

BOLLING & LOWE

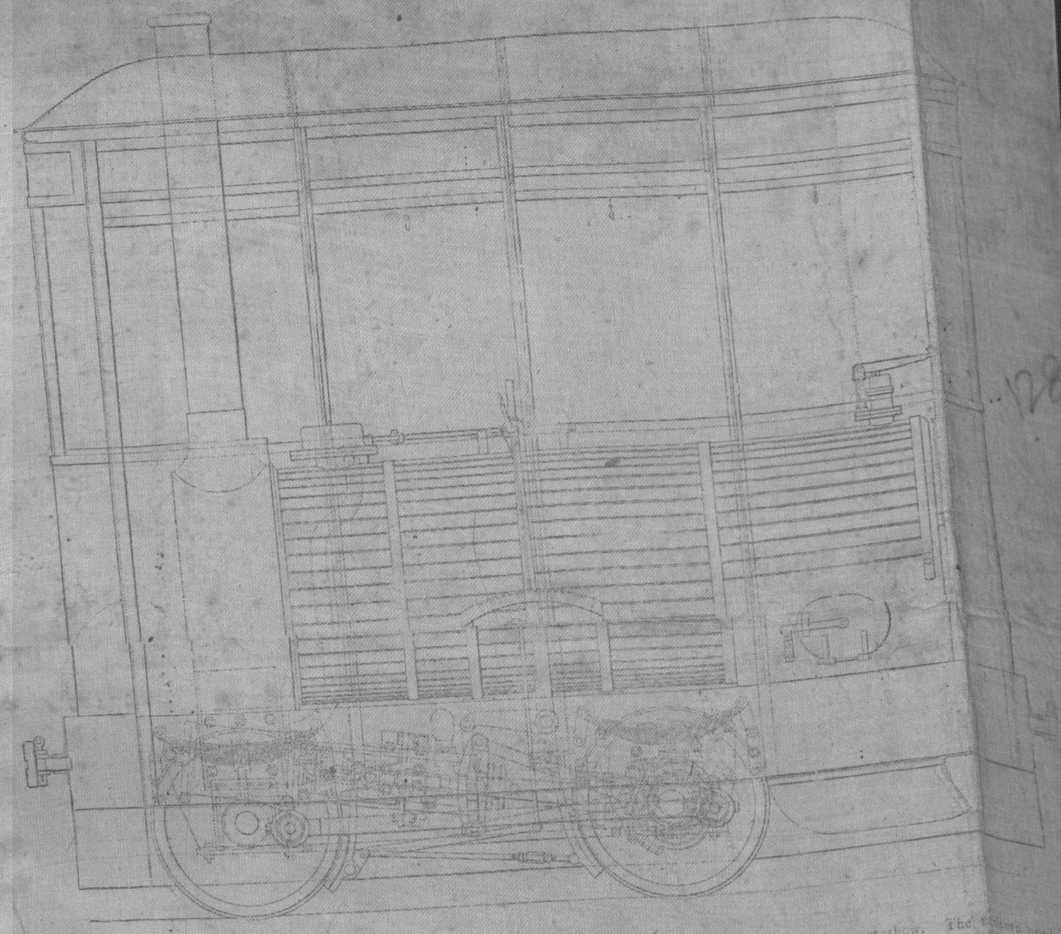



98 ths
Dyard
Section
Manchester
18
Procured for me by
Aff.

TRAMWAY LOCOMOTIVE.

Constructed by Messrs. Merryweather & Sons, Engineers, London.

"Engineering," March 28th, 1879.



We give above an engraving of the patent steam tramway engine exhibited by MESSRS. MERRYWEATHER AND SONS, London, at the late Paris Exhibition. This engine is a light one, of very neat appearance, and is capable of taking a large loaded car up an incline of 1 in 20, or two or three cars at once on a more level road. Our illustration is a side elevation with one side of the cab removed, and shows the position of the various levers as arranged for the driver to stand at the side of the boiler. It will be noticed that by placing the driver in this position, only one set of levers is required, and he has simply to turn himself round to command the motion of the engine in either direction, at the same time obtaining an unobstructed view both in front and at the sides of the engine.

The cylinders, which are placed inside the frames, are 6½ in. in diameter by 10 in. stroke, and are jointed together in the middle, forming a steam chest for the two, whilst a saddle cast half on each carries the smokebox end of the boiler. The guide bars are of steel, and the crosshead slippers of cast iron, with large wearing surfaces, the crosshead itself being cast steel. The bars are supported by a wrought iron belly plate, placed some distance from their ends; this plate also carries the valve spindle guides. The link motion is of the ordinary shifting link type, but made unusually heavy in proportion to the size of the engine, to allow for the extra rough usage these engines get in practice; the eccentrics and straps are of cast iron, the coupling rods have solid ends with phosphor-bronze bushes working on case-hardened crank pins, all oil cups are forged, or cast solid on the moving parts, and every precaution appears to have been taken to insure durability.

The boiler is of the usual locomotive type of Lowmoor iron throughout, and double riveted in the longitudinal seam. It is fed by a feed pump worked by a separate eccentric and a Giffard's injector.

The wheels and axles are of steel, the former being 2 ft. in diameter, and the wheel base being 4 ft. 6 in. The brakes applied to all four wheels by the driver's foot, and by means of a powerful toggle joint an enormous sufficient power is obtained to hold the engine if required, even on a gradient by a right and left-hand nut on the push rod, which is very easily adjusted.

The feed tanks are placed one on each side of the smokebox, and are connected by a copper pipe. A fender-plate is securely fixed at each end of the engine to remove obstructions, and render it impossible to run over any person; plates are also run along each side to conceal the wheels and coupling rods from view. The whole of the engine work is unusually strong for the dimensions of the cylinders; this has been found necessary, owing to the dust, and dirt, and rough usage these engines meet with on tramways. The boiler is kept low in order that the outside of the cab may look as unlike a locomotive, and as much like a car as possible. In this engine the exhaust steam is delivered into a copper tank in the smokebox, and thence discharged through a rose jet into the chimney; this is found to expand the steam sufficiently to prevent the beat being heard, and to superheat it, so that unless in very cold damp weather it does not show. The [illegible] apply water condensers to some of their engines, but the above arrangement is practically efficient enough for general use without the expense attached to water condensing.

We noticed that the engine shown at Paris was No. 80, and considering the short time that steam has been introduced on tramways, the progress it has made that has had to be overcome, the progress is very creditable. The engine has been constructed under the superintendence of Mr. Jakeman, MERRYWEATHER'S works manager, and it is evident some of the [illegible] practice has been carefully studied in its design. MERRYWEATHER engines are at work on the tramways of [illegible] as well as on tramways in Germany, Holland, Spain, Portugal, &c.; in fact MESSRS. MERRYWEATHER have, we understand, at the present time, made upwards of one hundred of these engines. The [illegible] exhibited at Paris has been purchased for the Adelaide Tramways, and makers have now in hand six engines for the Dutch Tramway Company, who have tramways in connection with their [illegible]. With reference to the employment of steam power on tramways, we may mention that on Monday the 3rd inst., Their Carp, the [illegible] Tramway Company, when giving evidence before the [illegible] tramways stated as the result of two years' experience with steam on his lines, that they did not emit smoke, and made exceedingly little noise. There had been accidents in [illegible] instances, but in each case the driver of them had been found to be in fault, no blame being attributable to the engines or [illegible] of them. In the town the engines travelled at the rate of [illegible] while the town the speed was increased to about [illegible] engine could be brought to a dead stop in their own length. We [illegible] the opinions to the same effect of [illegible] and have no doubt of the success or inconvenience of the system, particularly as the Company is an English one. "friends at court." In a report recently issued respecting [illegible] it is stated that they have been in full working operation [illegible] power (six of MESSRS. MERRYWEATHER'S engines are [illegible] the most satisfactory results, both as to efficiency of service and working expenses. The Minister of Public Works of [illegible] officially, remarks: "The locomotives having fulfilled [illegible] all the conditions necessary for security, the engineer [illegible] desirable to authorise the city of Rouen to continue [illegible] on the trial of the train of two cars has also [illegible] success, it is proposed to continue it and extend it even [illegible]

Altogether we have received excellent reports of the working of MESSRS. MERRYWEATHER'S tram engines, and we hope hereafter to illustrate some further improved arrangements of such engines which they have lately adopted.

Dft Mrs H. Eadie
D. of 20 Candidates
dated 5th December
2018

For order

In cumulative the
annexed note on
Steam tramways
Suitable for introduction
in the Jammu Zone
in this Presidency I
would beg to draw
attention to the paper
which I have just sub
mit.

(1) A memo on Steam N.T.
Traction Rly.
(2 " " Colonel Shaw-Stewart

Draft for the Govt. Calcutta
from Mr. C. Vincent-Allen C.E.
on the Subject

If the Govt. consider
it desirable to institute
the enquiry which I

Submit the enquiry
is now desirable
if Govt. institute it
in the first place -

F.B.
5/8/85

R. 16-8-85
Rl 118 - Cir 4-8

have ventured to
suggest at the end
of any note, or to
direct a conference on
the subject, it would
probably be in order
to have these papers
printed "in extenso"
in the Proceedings
as affording grounds
for discussion.

Pl

Memorandum by Major A. J. Fraser RE on Steam Tramways for the metalled Roads of India.

Being at Wellington New Zealand in November 1879 where a steam tramway 2 miles long is in operation I was much struck with the ease with which it was worked, the simplicity of construction, & the evident applicability of the System to Indian roads. The trains consisting of an Engine and two Coupled omnibuses were carried with steadiness & certainty at a speed of ten miles an hour, over just such roads and gradients as are usual in India. There was no interruption of the ordinary traffic. The trains stopped like horsed omnibuses to take up & set down passengers, they turned sharp round the corners of streets, and went up inclines of 1 in 35. It was marvellous with what unconcern, stones, mud, & chance rubbish, were passed at full steam, & though the groove in the rails was exceedingly slight the train showed no tendency to leave the line. The Switches were simple hinged bars which the conductor set down and adjusted with his foot, the points, sidings, & crossings, were all of the plainest and most obvious description; formed chiefly by common workmen out of the rails themselves. At one end of the line there was a Shed to accommodate the rolling Stock, and a small workshop for repairs. It was quite clear that if such a tramway could be laid for 2 miles upon a comparatively uneven road, which accommodated at the same time a heavy traffic of quick moving vehicles, there was nothing to prevent its being successfully introduced for much longer distances on the metalled roads in India.

As regards its rails, the Wellington tramway is not a model for adoption. The rails are simple bars of iron of about 3" × 1" in section, rolled with a groove. So far being capable of being turned out in India, they have a useful form; but they require to be supported on a strong framework of

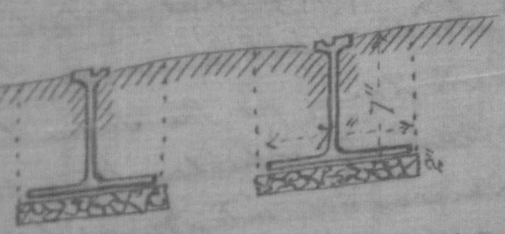
longitudinal & cross sleepers, which would be much too costly for the ordinary roads. Perhaps if Portland Cement concrete could be laid as a substructure instead of timber, bar rails could be fastened to slabs of concrete, & thus employed. The plain bar is the handiest rail as well as the earliest pattern used on tramways, & if permanent way with concrete is desirable. In rolling however attention has to be given to the shape of the groove. Mr. Clark lays down the best form as that which has the side next the rolling surface vertical, and the whole of the slope on the inner side; or such a section as the following;



It has been found that a depth of flange of only ½ an inch is sufficient to keep the wheels on the line. I saw a similar tramway to that at Wellington in work at Dunedin.

The only part of the Indian tramway problem which remained unsolved by what I observed in New Zealand was how to support the rails without the use of large quantities of expensive timber.

I happened to visit Manchester in April 1880 & there accidentally noticed a new description of steel tramway rail being laid in one of the streets, which was just the kind of permanent way wanted for India. A diagram of the section is as under;



Two parallel trenches
were dug in the roadway
only a couple of inches
of concrete laid down
upon this the flanges
of two deep rolled steel joists having the top member formed into a tramway rail. The joists were rolled in one piece in 30 ft. lengths & I am informed that were was subsequently planed out. When laid they were fished at the joints and the causeway was packed to restore the roads.

It is obvious that such a rail is likely to keep a firm position imbedded in the metal of a road & as it dispenses with all timber is exactly suited to Indian requirements. Having been only recently introduced in England so much so as not to be even noticed in the latest books on Tramways particulars as to its durability cannot be given, and in any case trial is necessary under Indian conditions before its advantages which may be safely predicted can be determined.

But if these steel rails turn out to be all they promise tramways can be opened with great rapidity. For unlike railways which require surveys, of new routes a fresh set of cuttings & embankments & bridges, and supersede existing roads formed and maintained at considerable expense, tramways can be laid down on the roads as they stand almost as quickly as the rails are delivered. No station buildings are required along the line, road & tramway maintenance can be amalgamated & the ordinary traffic can still use the roads. But it is worth mentioning that while the traction on common macadamized roads is 44 to 67 lbs per ton on a level it is only 17 to 25 lbs per ton on Tramways. Hence it is probable that private enterprise would largely place cattle drawn trucks on the line in addition to the public steam trains for which every facility could be given by appropriate crossings.

The Engines on the Wellington tramway bore the name of Messrs Merryweather & Sons the makers of Steam Fire Engines in London. I have called at their Office, in Greenwich & obtained rough Estimates of the plant needed to work a tramway.

Messrs Merryweathers can furnish a passenger tramway car like those in Photographs A 13 weighing 5 Cwt

unloaded and 5 tons loaded with 26 passengers inside and 20 outside for £250.

A locomotive of about 20 HP weighing 7 to 8 tons capable of a speed of 15 miles an hour would for occasional gradients of 1 in 30 draw 3 such Cars and cost from £850 to £1000.

They can supply Goods waggons weighing 4 to 6 Cwt according as they are covered or open at a cost of from £180 to £200. The waggons will carry from 3 to 4 tons of goods.

A cheaper kind of passenger Car seated for 20 placed back to back as in photograph C can be supplied for £60 to £80 each, and the Cross Seated pattern of photograph B for £130 each.

For India the working parts of the Engine would have to be lifted out of reach of the dust which is so prevalent on the roads and the furnace would have to be adapted to burn wood.

Merrymeathers Engine is stated to require 550 lbs Coke per 100 miles run at 8½ miles an hour average speed from which basis calculations can be made of the demand of fuel for an Indian tramway.

It would not be difficult as part of a tramway scheme to have enough land taken up and forest planted to yield a constant supply of firewood along each line. India has no coal in the South but can make up for this by the rapidity with which the growth of timber proceeds. Firewood could indeed be produced in India with far greater ease than the cattle food which would contribute an equal tractive force.

Although there are many tramways working, chiefly however in towns, I have not seen a single example which combined the rough and ready characteristics of the New Zealand lines with the use of the Manchester steam car

To give the system therefore a fair trial it would be necessary to lay down a few miles of tramway on a selected metalled road in India. There are obtainable at once in the market the rails Cars & locomotives suited for the experiment.

For a length of fifteen miles or one & a half hours run at 10 miles an hour the rough Estimate would be as follows

254 1 tons of Steel rail (10% spare) at £11.15		298
	Freight	38
3 Locomotives at £850		25
6 Passenger Cars at £250		150.
2 Open passenger Cars at £80		160
4 Goods waggons at £200		800
	Freight	75
		£ 38753
	at 11/9 per R	Rs 442891
15 miles laid &c in India at Rs 2000		30 000
Sheds & Workshops		8000
		Rs 480891

So that for Rs 481 000 or at the rate of Rs 32000 a mile an experimental tramway 15 miles long could be set in operation.

Mr Clark, an authority on tramways, mentions that the locomotives made by Messrs Merrymeather, from their moderate speed & indraught, only consume from a third to a fourth the fuel that a Railway Engine does per Square foot of grate.

Six trains each way on 15 miles would give a train mileage of 180 miles & a consumption of 990 lbs of Coke, Equivalent to 2970 lbs or 1⅓ tons of inferior firewood during a day. Beyond fuel the working Expenses would consist of the wages of a Conductor for each Car, a corps of Stokers for each Locomotive, a clerk or two to keep accounts oil & petty stores, & a certain sum yet to be ascertained

for renewals & repairs.

A mere allusion may be made at present to the prospect opened up by Col Beaumont's Compressed air locomotive. It is stated that one of these, weighing 4½ tons, with reservoirs for air at 1000 lbs per Sq. inch pressure affording 65 Cft. space, can run for 6½ miles on a level with a load of 4 to 5 tons. This type of Engine will no doubt be further improved.

It would be convenient to have Stationary Compressing Stations at fixed intervals, & that the Locomotive should only carry air with it as far as economical means of transferring power to a distance at present through electro-Motors has been discovered.

Meantime the question is whether Rolled Steel Rails can be laid profitably as Tramways on Indian Roads. For better forms of rolling Stock can hardly be imagined than those now procurable.

It may be asked why if Tramways are so cheap and simple they are not universally put on the roads. As a matter of fact the system meets with a good deal of prejudice, and the Countries which have adopted them in towns are those in which for the country a higher rate of speed is demanded than Tramways can pretend to give. But nothing seems to have retarded their introduction more than the pernicious Gauging which has hitherto formed the permanent Way of Tramways.

A. Fraser

London
Sept. 2 1880

PL 134

Note on relative cost of broad and metre gauge railways.

For purposes of comparison based on the experience obtained in this Presidency, we may take the South Indian Railway, which has constructed lines on both gauges. The cost of the 168 miles of broad gauge between Negapatam and Erode averaged, on 30th June 1870, £7,902 per mile. It had then been open on an average for nearly 6 years; and, on 30 June 1874, the cost had risen to £8,470 per mile. Since the latter date, no separate accounts of it have been kept.

kept.

The cost of the 215 miles of metre gauge line south of Trichinopoly averaged, at the end of 1878, when it had been open for more than three years, a little over £ 5,000 per mile. The cost of the line from Madras to Tanjore is somewhat higher, and will probably average at the present time about £ 6,000 per mile.

The sections between Negapatam and Erode, and between Trichinopoly and Tuticorin, compare fairly as to the nature of the country traversed. Both have the same ruling gradient (1 in 100), and the amount of waterway per mile is probably nearly equal. Figures are

are not at hand for the old line, but the openings provided on the other section average 45 lineal feet per mile, which is somewhat below the average of other lines in this Presidency.

The permanent way for the metre gauge lines was purchased when the price of iron was at its maximum; and, at present prices, a considerable saving would be effected.

The Madras Railway has cost £ 11,800 per mile, but the country traversed is somewhat more difficult than in the case of the South Indian Railway.

Owing to the experience gained in past years, it may be assumed

assumed that broad gauge lines could now be constructed somewhat more cheaply. The Nilgiri branch of the Madras Railway cost about £8000 per mile, exclusive of rolling stock; and it is estimated that a branch to Cochin would not cost more than £9000 per mile; also excluding rolling stock.

The figures here given provide for a first-class line of broad gauge railway. We have no experience of light broad gauge lines with rails weighing 56 or 60 lbs. per yard, and with engine wheel-weights to correspond. The rails for the Madras Railway and South Indian broad gauge weigh 75 and 68 lbs respectively.

The

21 October 1879.
No. 2006.

The accompanying Proceedings of Government contain some information respecting the cheapest lines of railway yet constructed in this country. The Muttra-Hatheas line, therein referred to, has yielded an average dividend of 4·9 per cent during the last three years.

The class of line to be selected must depend much on the nature of the country traversed, and the speed required. In difficult country, the difference in cost between the broad and narrow gauge would probably be much greater than shewn on the South Indian Railway. A metre gauge line can be opened out at reasonable cost, even through difficult country; e.g.

the

the line from Kalwar to Gadak
is estimated at £7,500 per mile
only, including plant, and interest during construction.
only. In moderately easy country,
a metre gauge line could probably
be opened out for £45,000 to £50,000
per mile, at present prices of iron;
if station accommodation be restricted
to actual wants, and the speed be
limited to 15 miles an hour. As
the Vizagapatam lines will link
in with the metre gauge extension
of the Nagpur branch, probably
this would be the best gauge to
adopt; but the country might
be opened up at first by a tramway,
if considered sufficient for the traffic
expected. Some useful information
on this point could probably be
obtained from the Government of

India

India, in regard to the Darjeeling
Tramway.

The following extract is
a summary of Mr. Molesworth's
conclusions respecting the broad
and metre gauges:-

1st.— The capacity of the metre gauge
is sufficient for all purposes
of railway transport.

2nd.— The carriages and waggons on the
metre gauge railway are
nearly equal in capacity to
the ordinary stock of English
railways.

3rd.— The locomotives designed for low
speed on the metre gauge are
equal in tractive force to the
large express engines design-
-ed for high speed on English
railways.

4th.—

4th.— The rolling stock of the metre gauge will be perfectly safe at a speed twice as great as that proposed for the State railways of India.

5th.— The metre gauge, in my (W. Molesworth's) opinion, is sufficient for all commercial and military purposes.

6th.— The cost of a broad gauge railway (60 lb. rails), with structures designed for the engines and other rolling stock of the Guaranteed Railways, will (excluding very large bridges) exceed the cost of the narrow gauge by £1,650 or £2,000 per mile.

7th.— The cost of a broad gauge railway (45 lb. rails), with structures designed only for the carriage and wagon stock of the Guaranteed Railways, (but not for the engines) will exceed the cost of a narrow gauge railway by £720 or £1,000 per mile.

8th.— The cost of a broad gauge railway (40 lb. rails), with structures designed for the same axle-loads as the narrow gauge, will exceed the cost of a narrow gauge railway by £350 or £500 per mile.

9th.— The last of these three would practically be as great an obstacle to the interchange of traffic as if a break of gauge existed.

10th

10th:— There will be no appreciable difference between the working expenses of the broad and narrow gauge railways.

11th:— The break of gauge in a commercial point of view, though an evil, is not one sufficient to justify the condemnation of the narrow gauge.

6-10-80. WJ.

Note by the Chief Engineer

The questions now under the consideration of Govt with reference to the Famine Code, as also the Correspondence as yet incomplete with the Govt of India on the subject of "protective" works appear to invite special attention to the applicability of steam tramways for certain selected lines in the famine zone of this Presidency.

2. The Famine Commission (page 169 to 171 Part I of their Report) have gone at length into the subject

of Railways as a means of distributing food in famine, and they have planned as an ideal system a series of lines each 300 miles long, serving 25 miles of country on either side.

3. This was much the same as the plan Sir Andrew Clarke had previously in view when in his speech in the Viceroy's Council on famine work he observed that "the "Railway System must "continue to expand and "will expand till every "inhabitant of India is "within 50 or 100 miles of a "Railway."

4. When applied however

to the actual circumstances of the famine zone in this Presidency there are two very patent difficulties to be encountered.

(1) Neither the Indian nor the metre gauge railways can be built with any hope in ordinary years of yielding any adequate return on their prime cost.

(2) Unless a sufficiently close net work of lines be established, the means for distributing food grains will not meet the requirements of extreme famine accompanied as the case in was the last calamity by the great loss of draught cattle.

5. Sir Andrew Clarke
well observed in his speech
that "A great famine
"may be said to be as
"bad as a grain famine"
and the Famine Commission
remark "In time of
"draught and famine the
"substitution of mechanical
"for animal power for
"purposes of transport is
"another very important
"advantage which it is
"not possible to forego by any
"money Standard."

6. Again in his late
pamphlet on steam tramways
Mr Vignoles remarks that
the block at the Raichur
Railway Station during the
last famine owing in

very great measure to
the thousands of bullock
that had died" must
"have been seen to be
"believed"

7. Although it cannot
for a moment be supposed
that by the adoption of
a cheap system of steam
tramways for aiding in the
distribution of food grains
during famine, the difficulties
above adverted to can by
any means be entirely over-
-come, it is still clear
that they can be in great
measure minimised

8. As regards the question
of Expense it will be seen
from the annexed Memo.

by Colonel Shaw-Stewart that "In a moderately "easy country a metre gauge "line could probably be "opened out for Rupees 45,000 "to Rs 50,000 per mile at "present prices of iron if "station accommodation be "restricted to actual "wants and the speed be "limited to 15 miles an hour"

9. In his pamphlet Mr Vincent gives as an approximate Estimate for a steam tramway on the Standard 5 ft 6 inch gauge 15 miles in length with Bessemer steel rails 35 lbs to the yard £2,500 (or Rs 30,000 @ 1-5/8 per Rupee)

per mile - and for a similar work on the metre gauge with steel rails, 30 lbs to the yard £2,200 or Rs 26,400 to the mile.

10. Major Fraser in his Memo: of the 3rd September 1880 gives also an Estimate for 15 miles of tramway on the Merry-weather System the probable cost at Rupees 32,000 per mile.

11. Colonel Shaw-Stewart's Estimate for a metre gauge Railway does not, it is believed, include the cost of locomotives and rolling stock while these are included in the above,

it may therefore apparently be accepted "prima facie" that steam tramways on even the broad gauge could be built at two-thirds the prime cost of metre gauge railways.

12. But as the problem to be solved requires as a "sine-qua-non" that all outlay shall be reduced to an absolute minimum compatible with the attainment of the immediate object in view, it does not appear improbable that a very sensible reduction could be effected even on the low estimates above

13. It is in the first place well recognised that the metre gauge for state Railways was a compromise of conflicting opinions and that 2½ feet, represented much more nearly the width of a truly narrow gauge. The Sirt Modor line is only 1' 11½" gauge and works up to 30 miles per hour.

14. There may be technical objections to a gauge of 2 feet in reference to the most economical form for the engines, but if these could be overcame

there is no other reason apparently against its adoption.

15. Speeds again of 15 and 20 miles per hour are solely accepted on the demands of the British travelling public, but are by no means applicable to the case under consideration.

6 or 7 miles per hour average speeds with 10 miles as a maximum would it is thought amply suffice.

Throughout the famine Zone the beds of large streams and rivers are quite dry excepting for a very few days in the year, and they might easily be crossed by causeways, thus saving the cost of all large bridging.

These principles accepted a corresponding reduction in the medals to 20 lbs or at most 25 lbs per yard might

might it is believed be effected - No fencing and few or no stations would be needed as pointed out by Major Fraser.

On the whole therefore it is not too much to assume that lines of steam tramways might be established along selected routes for Rs 20,000 or at most Rs 25,000 per mile or at little more than double the cost of a metalled and bridged cart-road -

It may also be assumed that before very long

by employing compressed air, electro motors, or other economical means as noticed by Major Fraser great reductions may be effected in the working expenses.

It is now sufficiently recognized that in the famine Zone of this Presidency navigable canals and new irrigation works of a promising, much less of a paying character are out of the question, there would thus appear to be only a choice of two alternatives

if famine is to be
effectually combated
(1) the people must
move to the food on
the one line of Railway
at present existing
or (2) mechanical
means of distribu-
-tion by steam trans-
-ways or Road Engines
must be adopted.

For an agricultural
population, who
require to be sufficiently
near the fields to
take instant advantage
of a favorable change
in the weather the
first plan could
hardly be adopted

as a general working
policy though no
doubt in some cases
applicable.

Mechanical means
for distribution seem
therefore alone left
for choice and of these
the ordinary Road
Engine at least in
its present form
(excessively cumbrous
and expensive to work)
is apparently not
suitable for adoption.

If the Government
are satisfied that an
effort should be
made in the direction
above indicated the

following points might be made subject of early enquiry among selected Revenue and Public Works officers viz:-

(1) To what tracts Tramways as Protective works would specially apply.

(2) The lines in order of importance within the famine Zone (which consists of the marginally noted districts) which it might be desirable to carry out

Bellary
Kurnool
Cudalapah
Nellore
Chingleput
North Arcot
Salem
Coimbatore
Madura.

(3) The probable cost per mile - the gauge - rate of speed &c.

(4) A rough estimate of the Traffic Returns

in ordinary years.

(5) A general idea of the advantages that might result from the lines in famine years.

(6) Whether and if so to what extent, applicable outside the famine Zone.

R. D. Lawley
Colonel R.E.

4/8/81

P. W. Department.

No. 2018 W

PROCEEDINGS of the MADRAS GOVERNMENT.

Under date the 17th August 1881.

READ the following

Memorandum by Major A. J. Fraser R.E. on Steam Tramways for the metalled Roads of India (London), dated 2nd Sept. 1880.

Note by the Consulting Engineer for Railways on relative costs of broad and metre gauge railways, dated 6th October 1880.

Steam-Tramways for India an introductory pamphlet by Mr. Claude Vincent, A. M. I. C. E. Under Secy: to Govt. P. W. D. Irrigation Branch

Note by the Chief Engineer, P. W. D. dated 1st August 1881.

819

The Honorable the Governor in Council fully concurs in the desirability

desirability of instituting the enquiries indicated by the Chief Engineer.

The questions brought forward will therefore be considered and reported on as follows by Public Works officers and such officers of the Revenue Department as may be nominated by the Board of Revenue.

(1) By Supt Engineers and Collectors

(2) " do - do -

(3) " The Con Engineer for Railways

(4) " Collectors

(5) " do -

(6) By the Board of Revenue, through whom the replies of Revenue officers will be submitted.

2. The papers will also be forwarded to gentlemen not immediately in Govt service who may be disposed to favor the Govt with an expression of their views on the subject.

Supt Engrs - ✓
Con Engr for Rys: ✓
Board of Revenue ✓
Revenue Departt " ✓
Financial Departt " ✓ Delay 11/8/81 7/2/81

P 20 169

1881/8/W

Govt. of (1881) Madras.

PUBLIC WORKS.

To

Dated

Rcvd. 15-8-81

Answd

Read. Encl.

G. O. 17 August 1881, No. 2018 W

Nos.

Steam Launches for

Madras

Introduction of steam-

launches in the Madras

Presidency