Type 5
15 pages.

(5)

(5.1)

TO PREPARE STEEL FROM IRON

When they would make steel from iron, then they scattered upon the said hot pieces of iron, and afterwards water untill it grows cold, when the said crushed into pieces with beating and knocking. Hereafter they take earthen crcibles with covers, which latter they rubbed or make fast upon it, after that they have done unto every crucible a certain weight of the aforesaid said iron. Further they digged in the earth an square hole about one and an half man's length, deep, and about three Elle (Elle is a Dutch measure, which is somewhat more than three quarters of an English yard) wide, or large below; which run a slope to above, untill that it remained above one Elle wide, upon which is an pipe (or shank, or tunnel) of the same shape and outside straight, and running also a slope to above inside, about one Elle high joined upon the level, or, flat of the earth, in every side of the pipe, at the place,where the same comes upon the earth, is a hole which reached till down below, in order to laying in every hole two bellows, and as such to make a strong fire. If this furnace and crucibles are wel dryd in the sun, then they take the crucibles with long tongs, and placed the same in a proper order quit(e) (p 402) below in the furnace, untill that it stand properly fast (?); after that they put unto the same full with charcoal until the pipe, and whereto they put fire. They stop or covered afterwards this pipe with an cover, in order that the flame should not go out from above, and wherein they put now and then fresh or other charcoal; this fire and blowing will last 24 hours; before the iron will become cleaned into steel.

In the meanwhile stands sometimes a man, upon an height near an furnace, and see unto the same, and take the s which comes out, and replaced also the crucibles, and take out those which are broken and poured the same unto other new crucibles, and placed the same again unto an furnace, al(l) of which they do with the aforesaid long tongs.

When it has lasted as such the whole twenty four hours with blowing and firing, then they let grow cold the fire from itself, and also become cold the crucibles. Afterwards they find in every one a small piece of steel, and which pieces they bring it unto the shape of bars, and claver steel, that is, in bars with points, even as an claver.

Common bars, and claver bars, don't differ very much in virtue; but the claver steel is more flat, (p 403) and gives therefore somewhat s , and even as it could be that it is somewhat finer; because it become thinner beaten.

And that is as far as what concerns making steel of iron; and in which trade the trouble(the) Company have been subjected to several revolts in the countries of Santomannum &c &c.

IOR: Mackenzie Collection PRIVATE: vol 88: Rise and Decline of Coromandel: pages 1-400
According to the concerned catalogue of the Mackenzie Collections the above piece belongs to the main (Rise and Decline of Coromandel by D. Havart, published 1692 or 1693) and should be after page 293 of this volume.The whole is a translation from the Dutch.

The last page in this vol (p 404) has two seals stamped :

Mackenzie Collection
30 April 1803
PRIVATE

E.I. Company's
Library

(52)

J. Farquhar on Beerbhoom Iron Mines to Bengal Government: May 1778

To
The Hon'ble Warren Hastings Esq, President and the Other ~~XXXXXX~~
Gentlemen of the Council of Revenue
Hon'ble Sir And Gentlemen

It is with the greatest reluctance I bring myself to trouble you with a fresh application; but the many inconveniences (p 118) I foresee ~~(xxii~~ I should have to labour under in executing your orders of the 20th February if possessing no influence amongst the miners, oblige me once more to request that you will be pleased to grant me the farm of the duties on the Beerbhoom iron; and, as this has no connection with the farms of the lands, and yields to Government only 776 Rupees a year, I flatter myself you will not deem my request unreasonable.

I beg , Gentlemen, you will likewise please to order that I be furnished with a letter of credit on the Burdwan Council to the amount of five or six thousand rupees for carrying on the work.

I have the honour to be with the greatest respect

Calcutta,28 April 1778. J. (?) Farquhar (p 119)

Minute of Governor General: 1.5.1778

I agree to grant Mr Farquhar's request, that is, that the iron mines be let to him in farm for the rent at which they are at present estimated; but in this case the trial which Mr Farquhar was ordered to make of 4 iron guns to be/at the /cast mines will be unnecessary, and should be revoked. The advance will be therefore unnecessary.

Warren Hastings
Agreed; R.Barwell, M. Wheler.

Mr Francis: I agree to his holding the farm for one year.

Agreed that the Provincial Council be written to as Follows:
To
Mr Alex Higginson (p 120), Chief and Council?, Provincial Council of Burdwan.

Gentlemen,

Enclosed we transmit you a copy of a letter which we have received from (Mr) Farquhar. We desire that the iron mines of Beerbhoom may be let in farm to that gentleman, for the rent, at which they are at present estimated.

We have informed Mr Farquhar that the trial which he was ordered to make of 4 iron guns to be cast at the mines is unnecessary, and that no advance will be made him on that account.

We are &c

Fort William, 1 May 1778

IOR: Bengal Rev Cons: P/50/9 (28.4 to 12.5.1778; pp 648, charts)
: Cons 1.5.1778
NOTE: There is a brief reference to Farquhar in M.G.Ranade

(5.3)

(Iron Manufacture at Doohaung, near Gwalior: May 1785)

BERRYE:551 miles
(from Surat ?)
Sunday 1st May 1785

At this place as well of as Doohaw or Doohaung are several furnaces for extracting the iron from the ore, which is found in a number of mines in great quantities amongst the hills, a little more than 2 Coss (p 112) to the eastward of this, but in no other place as I could learn. The ore is brought from the mine on bullocks, a load in general about 4 Surat maunds, for each load at the mine 3½ pice and on an average yields about 22 or 23 siers of good iron.

The furnaces are worked with charcoal, which is brought from about the neighbourhood of Choorpoora (mentioned in our yesterday's march) near Dologur; each house has a separate furnace, They are small not working more at one time than one bullock's load; the number of hands at present does not exceed 60 families, formerly a prodigious number resided both here and at Doohaung, but are reduced by the late famine to the present small number. The mode of working the furnaces and extracting the metal is as follows.

An excavation is made in the earth (p 113) about four feet, above which is a circular vessel open at the top and grated at the bottom, which does not rest on the ground in the hollow or excavation above mentioned. A boy seated and under each of his feet is a pair of bellows whose pipes communicate with the bottom of the circular vessel; above this vessel on each side are two holes thro which the ore and charcoal are let in no exact proportion, and when it has received a sufficient heat the drop separates and falls thro the grates at the bottom of the vessel. The iron remaining not being sufficiently healed to liquify (?). I saw some of the iron and it appeared perfectly good. The country hold it in great esteem and say it possesses very superior qualities. Besides the furnaces here and at Doohaung many are worked at Nurwur (or Narwah) and at (p 114) several other places but all from the same mines. Doohaung, is a very large town and inclosed with a wall of loose stones, has a Gurry within it, and several decent looking buildings, which has not been a very common sight to us for some days past.

Berrye is also a very large town and has several good buildings. It is enclosed with a wall of loose stones and has a Gurry. Some of the Nullahs has very little stagnant water which appears rather to have been from a fall of rain some days since, rather than what is usually the case at this season of the year. So that I shall remark this day's march as having no water except from wells. To the N E of the town, close as a Hindoo Snaw (?) of a circular form now in decay and must originally have been too small to be very convenient. In taking my observation today I found my compass (p 115) vary upward of three points or 34° which must have been occasioned from the vicinity of the iron mines. The south point of the needle drew towards the mines.

Latt Observed 26 8' N ; Distance 17 M ; Thermometer(Tatteys) 90

GUDLIER or GOWLIER : Monday 2nd May 1785

Marched at 3 A.M. One mile from Burye the road crosses a small nulla and 1¼ from thence another. About half a mile from this the road passes the village of Rajepoore close at the left of the road; about ¾ from hence is the river which runs thro a valley between two ranges three (p 116) miles the road the whole way upon the banks or in the bed of the river which occupies almost the whole space between the two ranges. The road crosses the river in many parts but the banks are low and the passes not attended with any particular difficulty. At the end of the three miles the the river runs off to the left along the hills which here begin to open on either hand. About three miles from hence is a large well on the left of the road. From hence 1¼ the road crosses the same river. The south point of the fort of Gualior stands close on the northern bank.

568 Miles

IOR: MSS Eur B 13: Journal March from Surat to Agra & Dehly:12.3.85 to by Capt Charles Reynolds, Surveyor. pp 158

(Edvuman: in Trans- XIII 224-6)

(5.4)

DOCTOR HEYNES REPORT OF THE IRON WORKS AT RAMANAKAPETTAH

Samulcottah, 1 September 1795

Owing to that natural impulse which I feel of attending closely to such objects as have once been voluntarily taken in hand my mind has frequently recurred to my last report of the Letcheimporam Iron Works; thinking that an attention to this branch of science, or rather Indian manufacture, may prove of essential benefit; which has induced me, to avail myself of the first opportunity that offered, of seeing works of the same kind, at other places; whilst I also entertained the hopes, of being thereby enabled to point out a place where works of that nature, of consequence, might be erected, with a full prospect of success, if it should be thought advisable to establish them in this country.

It so happened also that my excursion to the diamond mines of Mallavilly, proved favourable (p) in this respect, for I learned on the road, that many places in the Nooneed Zemindary, furnished iron for common use; and the nearest place to the Mallavilly, was, for obvious reasons, preferred to others more distant. This was Ramanakapettah, a village 3 coss from Nooneed to the northward. The way to it from thence, is mostly through a jungle the greater part of which, lies, in the vicinity of some fine large tanks, from which in favourable seasons a very sufficient quantity of water might be furnished to produce a very plentiful harvest of paddy, were their hands enough for cultivation.

A greater number of palmera trees growing in the thickest part of the jungle, sufficiently evince the existence of former villages and greater population.

The soil in the high ground, both cultivated and uncultivated, mixed with gravel and clay, often of the kind which the Gentoos call Rawda, is clay mixed with gravel.

Ramanakapettah(p), has much better buildings than Nooneed. The streets are very broad, and the houses, in the fashion of the natives, good and large. A choultry, one of the best I have seen in the Circars is in the middle of the village, and a fine large tank near it, to the south affords one of the greatest comforts to the inhabitants. The nearest of the hills, are to the eastward; and forms a kind of amphitheatre, opening to the southward. In this lies the village and all the iron mines. Before the famine (@), there were besides 40 smelting furnaces, a greater number of silver and copper smiths, here, who were in a state of affluence; but their survivers are now poor and in a wretched situation.

The iron mines are to the northward, a mile from the village and half a mile from the hills; from whence they bring the ore, in baskets, to the furnaces that are close to the ~~mining~~ village. In former times, they seem to have found the ore nearer to it. The smelters do not, (p) here, as at Letchemporam, themselves, work in the mines, nor do they burn their coals, but rather buy both articles, the former in baskets from the mines and the latter from labourers who bring them from the hills.

The ore runs in beds or layers, immediately under the first stratum of the ground (which consists as beforesaid of gravel and sand) and is scarcely one and a half foot in thickness. These layers are of a small extent, and of all dimensions; seldom broader than two feet, and from two to four in thickness. The ore is very easily worked, as it consists of small round

IOR: Board's Collections: Vol 1: No 613: (collection to Madras Public Despatch dated 4.10.1797; vol 23 page 639)

stones, which are in no way connected. It by no means derives its fusibility from the admixture of chunam (or lime) as does that at Letchemporam. Neither is any addition of other earths used, in order promote that quality. Altho it does not partake of the nature of ~~of~~ any of the common iron ores in Europe, it comes nearest, to the hamatites. It has for its properties, that of sticking on its fracture to the lips (p), when moistened; and is of a fine grain, that it admits of being made into a very fine powder, which seems slightly to effervesce with acids. It appears to have very little of a selicious admixture, or except some stones that consist entirely of a silicious aggregate cemented together with ochreacious clay, but these the smelters pick out as useless. Having no loadstone I cannot say whether the iron in it is in a state attachable by it; but might I be allowed to guess, I think it must exist in a semireguline state, which I find to my great satisfaction is admitted by some learned mineralogists which is an opinion that I merely offered as my own in my report on the Letchemporam works.

Of the outward appearance of the mines I can say nothing, but that from a distance they bear, a striking resemblance to Fox-holes. Their furnaces which were forty in number before the famine, are now reduced to ten and are in no ways different from those of Letchemporam; nor does (p) their mode of proceeding, differ in any essential degree.

The coals they use in common are from Minosa Sundra of Dr Roxburgh, (and Sandra of the Centoos) which I am told grows on the nearest hills in abundance. They however find any other firm wood answer their purpose as well. Four gunny bags of coals is sold for one rupee and two annas: It is the quantity required for every smelting. For the ore, they pay one dubb per basket, of which 12 are reckoned sufficient for one smelting. The ore is not reduced into smaller pieces, but thrown into the furnace just as it is dug up. The scorias (?) are let out only twice the last time just before they cease working the bellows.

With respect to the subsequent necessary addition of coals and ore, after the smelting is begun, and the first article consumed, they proceed more rationally than at Letchemporam; by discontinuing to throw these articles into the furnace, more than an hour before they remove the obtained metal.

The (p) whole produce of 1 maund is sold for 2 ruppes after it has been heated and hammered, to separate the scoria with which it abounds. For its more ready disposal, they make it into small pieces, weighing 2 pounds. It is still however in a very rude state, but of a soft nature, and thus so the more easily applied to common purposes. There is a greater demand for it than they can possibly supply the the greatest part of the year they are employed in the smelting business.

There is no doubt, but that, this place will be found eminently deserving of notice, in the event of adopting any large works of this kind, in the Company's possessions. The ore can be procured in any quantity that is required, and probably at a less expence than anywhere else. The nearest hills afford wood for coals in plenty; and what is of still more consequence, there are many people who would be glad to be employed in a business, which, under their own contracted management, has hitherto afforded but a scanty subsistence. (©)

Every furnace requires at present, nine men, who are chiefly employed in working the bellows, an operation might be soon and easily (p) improved by a proper mechanical apparatus, through the medium of fire or water, or both, by which the number of hands would be easily reduced.

Besides this village I am told there are six more in the

Noosood country and in which iron is constantly fabricated, of which however I cannot as yet know any thing more than their names. But as soon as opportunities offer to me of examining these, or any other works of the same nature, I shall not fail to give that subject the best attention in my power; so as to enable me to furnish my further information which my limited knowledge may enable me to offer.

(A True Copy)

@ In 1795 Dr Benjamin Heyne was acting company's botanist employed in the Madras administration. The above piece was sent by him with a letter to the Madras Governor in August 1795.

An edited version of some of Dr Heyne's pieces, both informational and those giving his opinions of the manners, religion, customs etc of the Indians, was published under the title "Tracts, Historical and statistical on India" in 1814. Tract No 24 in this publication is "Account of the method of making steel in the Mysore country". In contract to the description of Ramanakapettah and of its good and large houses, very broad streets, and the "state of affluence" of its people "before the famine" the printed tract states: " The people engaged in this work are of an emaciated sickly appearance, forming a striking contrast with the other inhabitants of this part of the country. This I have observed at all other iron works on the coast, but am not able to account for the circumstance."

The famine referred to in the above piece occurred during 1790-2. According to the Committe which enquired into the affairs of Noosood (arising out of some diminution of revenue received by British authority) the population of the Noosood Zemindary was reduced from 100374 in 1786 to 57,865 at the end of 1793. According to the same report the revenue collections from 1787 to 1792 ~~Garrumcontrofx~~ "exclusive of Nakasahs, Agrahams and Enams" were:

1787	1,64,296-15- 8	(Madras Pagodas)
1788	1,41,414- 3- 6	
1789	1,62,445- 2- 5	
1790	1,60,059-14-12	
1791	1,06,036-11- 1	
1792	1,17,560-13- 1	

The fact that about half the population, with probably very little stock of cattle, seed and other accessories, was forced to pay in years of continuing famine in 1790 as much as it had paid in 1789, and in 1791 and 1792 two-thirds of the previous revenue perhaps amply explains the reduced state of Ramanakapettah at the time of Dr Heyne's visit and the reduction in the number of furnaces from 40 to 10. With such reduced resources it is not surprising that there were many people who would have been glad to resume their former business. (Data in this para is from Proceedings of the Madras Board of Revenue dated 16.1.1794, consideration of the report dated 10.1.1794 from Noosood Committee).

(5.5)

ON THE ESTABLISHMENT OF COPPER AND IRON WORKS IN INDIA

It will, I presume, satisfactorily appear from my tracts on India, and from other writings that have been before the hon'ble court of directors on this subject, that copper and iron ores are found in great abundance, the former in a very extensive tract of country, the latter in almost every part of that vast continent, and both relatively very highly advantageous in situations. The copper ore occurs at no great distance from the sea, so that it may be exported and serve as ballast for the Indiamen; and being in a jungly country, furnishing abundance of the best fuel, it might be smelted and manufactured on the spot, should it be thought preferable.

Iron ores of the best kind are so universally dispersed, that in the interior, it is only necessary to point out the places most convenient for the purposes to which it should be applied, to establish the largest works to advantage.

From the analysis of Dr Thomas Thomson, of the copper ore, as read before the Royal Society and annexed to my tracts, (and from that of Mr Rush made by order of the Hon'ble court of directors)* it fully appears that the copper ore sent from Madras in considerable quantity, is the richest that ever has been found in such abundance; the average produce, (p 560) whereas that of the English mines is only 9 per cent, being 50 per cent. On account of its purity, it being uncontaminated with sulphur, or with any obnexious metal, (Mr Mallet suggests)* it has been suggested also that it might be advantageously introduced for the purpose of alloys, for other precious metals, and some other uses for which the Swedish copper has been hitherto generally preferred. In India it would supplant the copper of Japan, which always has been in great request for many purposes, for which the English will not answer.

The Indian iron ores, being universally of the best kind (species of magnetic ironstone and hematites, free from any admixture of sulphur or other noxious substances) yield, even by the present imperfect method of fusing them, an iron, which according to the opinion of all who have had an opportunity of seeing it used, is superior to any produced in this and most other European countries. In the state of iron, it is as soft and tough as the best of the kind, and manufactured into steel, it is deemed now, by some of the most experienced workmen in this article in London, preferable to the English cast steel, which hitherto, has been esteemed the best produced in Europe. That the great hardness which it (woots) possesses, is owing to the superiority of the iron from which it is made, is evident from the circumstance that English cast steel can be made only from the best Swedish iron, which in its general properties approaches nearest to that of India . To determine whether it be advisable to establish iron and copper works in India to any great extent it becomes necessary to enquire whether it would be permissible on principles of political (p 561) economy, and whether it would be advantageous to the enterprisers, and what in this case, would be the most likely means to ensure success.

It is almost presumptuous in me to attempt to speak of what is right and proper in a political view, yet will I say, that in my humble opinion which is formed on common sense, and on general information and an obvious view of the object, the present time and circumstances do not only admit of a supply of good copper and good iron from the colonies belonging to the British Empire, but they imperiously demand it.

IOR: Home Misc vol 258: pp 559-64: Enclosed with letter dated 16th July 1814.

* cross-out in MS.

Copper has risen in latter years amazingly in price and within this year the sheet copper from 13 d (pence) per pound, to 17 and 19d owing it is said to the advanced price of the ore, and consequently to its scarcity. No material objection therefore could be made by owners of mines in England; if some quantity of this metal were introduced from India, particularly if by these means the Swedish and other foreign copper could be superseded and totally excluded.

With more confidence may it be asserted, that it would be advisable on all economical political principles, to work the mines in India for the internal consumption of that country. The quantity at all times required is immense, and now chiefly drawn from the coinage, this metal being used for all utensils in the household of an Indian, as these, unlike vessels constructed from earth, cannot be so defiled as not to be easily purified again; and further as the demand will be increasing considerably, should ship-building be encouraged, which on account of the superiority of other materials abounding in that country (p 562) is most likely to take place. But at the present high prices of copper in England, the supply of this article must be entirely given up to such foreign merchants as may be allowed to trade to India, and who from their respective countries, whence they derive it, almost free of duties, and consequently would injure if not ruin the English trader in this article. It would therefore be undoubtedly better to allow the latter to use the means, which bountiful nature offers him in the colonies, of enriching himself and at the same time the mother country by adding his wealth to the common stock.

The same arguments apply nearly as well for the working of the iron mines of India. A quantity sufficient to substitute that which is derived from Sweden might be allowed to be introduced from India without detriment to any but the foreign manufacturer of this article, and the merchant engaged in the Swedish trade, but to the greatest benfit to the enterprising Englishman in India and to the country at large; and the Indian is so partial to his own steel and iron and so convinced of its superiority, that he could not be easily persuaded to use that brought from England if offered even considerably cheaper than his, which will never be the case.

It remains now for me to shew that a speculation of working the iron and copper mines would prove advantageous to the enterprisers, and to point out the means of ensuring success.

To produce an article at a moderate - or at the cheapest (p 563) rate, is the first object in establishing a manufacture, and that this can be done better in India, than in any other country is evident from the well known cheapness of labour and of all articles of consumption. It is further required (to enrich the manufacturer) the article must be good, saleable, and in demand; which I believe no body will deny to be the case with good copper and good iron. And ultimately the market must not be liable to be overstocked by competitors, and here it will occur to every body that the Indians at present cannot cope with the English manufactures in that country who carries on his work by means and on principles so different and so incomparably superior. To this may be added that both copper and iron ores are superficially situated in the part of India, to which I allude, that neither skill, knowledge, or machinery is necessary to bring them to light, while in England and in other countries of Europe the greatest means and expences are requisite for that purpose.

As a particular inducement I must mention now that labour may be had for the most extensive establishment of this kind without any expence whatever, should the work be carried under the direction of Government on account of the hon'ble Company. There are in all the provinces of India an immense number of convicts

in the zillah prisons who must be fed and clothed, and whose work is at present of little or no utility, so that if they should be employed, their labor might be reckoned, to have been obtained without expence. (p 564) The best manner of managing them, under those circumstances, would be the only point to be considered; and individuals should be permitted to work any of those mines and should be allowed the use of those men. It would be necessary to ascertain the value of their labor and the mode of ensuring the public safety, and the proper treatment of those convicts, objects which can be only determined according to local and other circumstances.

As much depends on mining and smelting on practical knowledge, it would be advisable to send some intelligent men from England; some who are thoroughly acquainted with the mode of working in the mines, and others who understand equally well the smelting process. For although the ores are at present quite superficial and extremely fusible, it may become necessary to go soon to greater depths, and ores may be found that require a different management in the smelting process to produce the metal in its proper quantity and quality. It would be absolutely necessary, at all events, to have in each great work a person capable of instructing the natives, particularly at the commencement, and to superintend the work.

This I mean particularly of the copper works. For conducting the iron works there would be only one person necessary, for the smelting process, as the ores are inexhaustible at the surface of the country and do not require any knowledge or skill for their production, but what is possessed by the Indians. For working the roots into bars as Mr Stoddart ~~says~~ in his letter suggests to me on the subject, annexed to my tracts on this article, it would be also necessary to employ an European should such a manufacture be established.

Dr Benjamin Heyne, the author of the above, was a little before he sent this to the court of directors of the E.I.Co (on 16.7. 1814, from Deptford) holding the post of 'Naturalist' on the Madras establishment. His letter seeking reappointment to this post added:

Should I be fortunate enough to obtain your appointment and support, I should propose the following as the objects of my peculiar province.

1st The iron and copper mines, on which I have the honour herewith, to submit a memorial to which I beg leave to add, that in the commencement of such an undertaking I may feel myself not inadequate for directing the necessary operations.

2ndly. The working of diamond mines on a similar plan.

3rdly The statistics of the country in a more connected and extensive scale, than has hitherto been attempted in India.

4thly Among the sciences pertaining to natural history, mineralogy and geology, as yet wholly unattended, by others.

5thly Some economical improvements as brewing of beer ...

6thly The introduction of useful plants, both from Europe, China and other Eastern countries, of which I beg leave to mention the tea plant from the latter and fruit trees from the former as particularly deserving of attention. --

Before 1814 Dr Heyne had been in India for some 20-25 years.

(5.6)

MR DUNCAN'S EXPERIMENTS IN IRON WORKS IN BENGAL

Public Letter from Bengal: 6.6.1812
(Extract)

200. On our proceedings noted in the margin (Con 21 Feb: No 41-44; 20 March: No 52-58) your hon'ble court will find recorded several papers ~~xxxxxxxxxx~~ from Mr Duncan on the subject of iron ores of this country, and on the expediency of erecting an iron manufavtory

201. Mr Duncan, it appears, served from early life in the extensive iron manufactory at Carron in Scotland. He afterwards proceeded to Russia (p 64) with Sir Charles Gascoigne who employed him in establishing the iron works at Petersavasky: he continued at those works for about 15 years, and is stated to have acquired during that period the requisite degree of knowledge of their economy, mechanism, and operations, to qualify him for undertaking the management of the business of an iron foundry. Mr Duncan quitted Russia and returned to England on the war breaking out between those countries in 1807. On (p 65) Mr Duncan's arriving in Bengal in the year 1810, the Governor General reported generally the foregoing circumstances to the Board, but deferred any recommendation of Mr Duncan for employment in the service of Government, until he had concluded an investigation which he proposed to make in the nature and qualities of the iron ores produced in the districts of Midnapore, and Balasore, and had ascertained, by experiments, whether the reducing of them into fusible, (p 66) and malleable iron held forth any prospect of advantage to the public interests.

202. The success which has attended Mr Duncan's labors is fully explained in his letters of the 30th of November and 7th of February last. ... (continues to end of para 206 ending page 74)

Dispatch?

Public Letter to Bengal: 29.7.1814
(Reply to above)

8. As the expence of Rs 20,398 has been incurred in the erection of a foundry near Cossimbuzar, for the purpose of making experiments upon the iron ore found in the adjoining provinces, and as Mr Duncan, whom you have employed in conducting those experiments, (p 80) is represented by you to be peculiarly qualified for that service, we do not object to the temporary allowance you have made to that gentleman.

9. But as we entertain strong doubts as to the policy of encouraging the prosecution of such works to any extent, we direct that no further expence may be incurred than what may be necessary to enable you to report to us the result of Mr Duncan's experiments, specifying the quantity of good iron, wrought or cast that may be obtained respectively from certain given quantity of ore, the quality of the iron so obtained, and the uses to which it may be applied (p 81) also the cost thereof per pound, and what it will fetch in the market.

Public Letter to Bengal: 4.12.1816
(Reply to Letter of 23.6.1814)

126. For a reply to those paragraphs, we refer you to our letter in this department of the 29th July 1814, paragraphs 8 and 9. It is only necessary here to enjoin your particular observance of the directions contained in the latter of these paragraphs.

IOR: Board's Collections Vol 825: No 21927
NOTE: Bengal Pub Letter (paras 408-10) dated 23.6.1814 is on pp75-8 and refers to Cons: 14.1(No 42-3), 1.4(21-2,Report of progress and enquiry by Mil Com), 10.6(15-6), 3.6(46-8, additional pecuniary assis)
Public from Bengal dated 7.10.1815, paras 144-8(pp 85-9) informs "results not so favorable as expected" economically but"work creditable to Mr Duncan". Refers to Cons 9.9.1814 (70-2), 20.12(9-13), 4.4.1815(1-2,60-2), 9.5(32), 30.5(44), 4.7(7-8), 9.8(23), 9.9.(44-6) 13.9(21) . Pub from Bengal 5.7.1817 informs of Duncan's death 11.1D 1815.
Correspondence ends with Pub Letter to Bengal of 28.6.1820(103-60) expresses disappoint at non-disposal of plant etc.

(57)

J.M.Heath on Iron Works in Southern India: 27.10.1824

To
The Hon'ble the Governor in Council, Fort St George

Hon'ble Sir,

For some years past, much of my attention has been directed to the subject of the manufacture of bar iron, in this country, and from accounts which I have recently received from England, I have reason to believe, that the favorable expectations I have all along entertained regarding it, are likely to be realized. It is my wish, in consequence, to embark in this undertaking, on a larhe scale, provided I receive from your excellency's Government, (p 12) and from the hon'ble court of directors, the encouragement that is indispensably necessary to enable me to do so.

The territories under the Madras Government contain facilities for the manufacture of iron, that are not exceeded by those of any country on the globe, and up to this time these mineral riches have been turned to no account worth notice. The quality of the iron made here is of the very best description; samples, which have been sent to England by me, have been declared to be equal to (p 13) the best foreign iron, for the purpose of making steel. It is well known that England is entirely dependent upon foreign countries for all the iron required for this purpose, and last year the importation of foreign iron into England, for the purpose of making steel alone, exceeded 12,000 tons.

This quantity could easily be supplied by this country, and at a cheaper price now, than foreign iron can be imported into England; in consequence of a representation made by a friend of mine in London to the chancellor (p 14) of the exchequer, the duty on Indian iron has been reduced to £1 per ton, which is about one fifth of what it was before the act for modifying the Indian tariff was published in July 1823. The duty on foreign iron is now £6-10 a ton, and the liberal boon thus granted to the manufacture of this country was; for the express purpose of encouraging the importation from our own possessions of an article of indispensable necessity in England, and for her supply of which she has hitherto been absolutely dependant (p 15) on Sweden, and Russia. Year after year does the Society for the Encouragement of Arts offer a premium for the manufacture of English iron fit for steel making, and to this time the premium has never been claimed; nor is it likely that it ever will, from the nature of the English ores, and the inferior quality of the English fuel.

The manufacture of iron in this country is a process of much simplicity, and involves none of the risk, and uncertainty of a mining speculation ; there are in almost every district, (p 16) inexhaustible deposits of the richest ores, and, in most situations, abundant supplies of wood for fuel; no expence is required to raise the ore, beyond the labour for conveying it away; whereas, in mining operations, generally, the principal expence is the labour of searching for the ore.

Simple, however, as the process of raising the raw material for an iron work is, yet to carry it on profitably, a very large capital must be sunk in the erection of blast furnaces, and forge apparatus. Iron may (p 17) be ,and, indeed, is made by the natives in furnaces, and forges, that cost the merest trifle, but the iron made by this process, besides being very imperfectly prepared, costs about four times as much as it would do, if made according to the European process. In the commencement of an undertaking of such magnitude as this must be, in order to be profitable, and of a nature so novel in this country, there will be many difficulties to contend with. From want of experience on my own part, and from the necessity of (p 18) procuring all the apparatus from England, so that were I to enter upon the business immediately, I do not think that I could reckon upon establishing works that

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would give any return in a shorter period than five years from this date. One set of works, however, being established, there would be little difficulty in carrying the undertaking to any extent afterwards; and, indeed, its extent would be limited only by the extent of capital applied to it; for the materials are to be found, almost every where, in inexhaustible abundance.

My object, therefore, (p 19) in addressing your excellency now, is to solicit a grant of the exclusive right to establish iron works in the Company's territories in India, for such a term as may afford me a security for reaping the profit of my labour. By soliciting this grant, I do not mean that it should interfere, in any way with the native manufacture of iron, nor do I ask for what will interfere with any existing right possessed by Europeans, for, supposing the grant to be given to me, the native smelters may go on every where with their own operations,(p 20) at the same time that mine are proceeding. No European in this part of India, has ever thought of engaging in this undertaking before me, but I have little doubt that, when the difficulties of it shall have been surmounted by me, there will be numerous eager to embark their capital in a business that promises to be so lucrative, and attended with so little hazard.

The attempt to establish an iron works in Bengal, made by Mr Andrew Duncan, shews in what light the advantages (p 21) of such undertaking are viewed by a gentleman, whose abilities and great experience in iron works, entitle his opinions to the highest consideration.

It is true that Mr Duncan's attempt failed, but the causes of the failure were obvious, and might easily have been remedied, had he lived and had the support of Government continued to him. I may here remark, that Mr Duncan's failure, however instructive to me in many respects, does not possess any of thing of the nature of a precedent, to (p 22) discourage me from the project I have in view. Mr Duncan's object was to continue the business of a foundary for cast iron, with a bar iron work, and in manufacturing the latter article, he appears to have contemplated under-selling British iron in this country; he has no where expressed an opinion that the iron he expected to produce would be fit for making steel; and from what he says of the ore he proposed to use, there is no probability that it would have answered for steel.

The Madras territories (p 23) are now almost deprived of the means of making any return to England for the articles imported from thence; here is an article that promises to be of greater importance than any other has been hitherto, supplied from Madras; I am desirous of turning the mineral riches of this country to account, but to do so, I must sink a large capital, and I must give up my prospects in the service during the time I may be engaged in the undertaking. All I wish to ask from your excellency's Government, is (p 24) such encouragement as would be sufficient to induce a person of ordinary prudence to undertake a speculation of such magnitude. This, I conceive, would be secured to me by a grant of the exclusive right to erect works for making iron in India, for the remaining term of the Company's Charter, and a lease of the right of cutting fuel on sircar waste land and raising ore at such mines as I should erect works at, within the same period. I mention this time, because, as I said before, I do (p 25) not reckon on being able to produce any iron in less than 5 years, and it would require several more to obtain any return from the works for the capital laid out upon them. At the end of the period I have specified, I should consider the business to be too well established, to apprehend any loss from the competition of those who might be induced to set up in opposition to me,

It may be supposed that the establishment of iron works in this country would interfere with the produce of England; but this will not be (p 26) the case in any degree; my object is solely

to offer to Britain a substitute for Swedish and Russian iron, for the purpose of being converted into steel: English bar iron which is now used for almost all purposes, but that of steel making, can be manufactured for about £ 10 to £ 12 a ton so that there is no possibility that the iron made by me in this country should ever displace a pound of English iron from the home market; and in this country, the freight from England adds so little to the (p 27) cost of bar iron, that it can be sold at from £ 12 to £ 14 a ton; so that it would be much less profitable to me to attempt to undersell British iron, at this price, than to send it to England to contend with the produce of Sweden, and Russia. A large proportion of all the iron brought to this country from Europe is Swedish, and Russian, and, as it brings usually, a price of 50 per cent higher than the British, it might be worthwhile, especially in time of war, (p 28) to substitute for this foreign article the native produce of the country.

In this point of view then, I trust, it will not be considered exaggeration, if I represent the project I am about to engage in, as one of national importance, and, as such, deserving of the encouragement which I solicit. It has for its object, to supply Britain, from her own territories, with an article of the very first importance in her manufactures, which (p 29) cannot be produced at home. As for the quality of the article, it may be sufficient to state that a difference is found to exist between the produce of India, and that of Sweden, and Russia; but that the difference is entirely in favor of the former. Steel made from Indian iron is now allowed to be decidedly superior to any other.

To myself the encouragement I have applied for is of the very first importance. I have already gone to a considerable (p 30) expence in pursuance of this project, and I am preparing to embark a considerable capital in it: To prsue it I must relinquish my prospects in the civil service, at a time when my period of service might be supposed to have given a value to my claims, and at a time of life, when it would be difficult to make up for lost time, should the project fail, after some years of trial. The only ground of apprehension, however, which I have of failure, is from the(p 31) interference of rivals. When the difficulties insepa-rable from the establishment of a new work shall have been sur-mounted by me, supposing that no protection were given to me by Government, it would be easy for any person, possessed of sufficient capital, to start up by my side, and profit by the results of my experience, avoid the mistakes, and consequent expence, I might have fallen into, and run away with a large share of the profits, which the concern might yield. I am far from (p 32) expecting that this consummation should never take place, or that a permanent monopoly should be granted to me; but I ask protection for such a term only as may enable me to derive some return for the sacrifice I make, and sufficient to allow me to get my project securely established, before the pursuit shall be thrown open to competition.

I have the honour to be, Hon'ble Sir,
Your most obedient humble servant,

Madras,
27th October 1824

J.M. Heath

(58)

T. Munro, Governor Madras, on Proposal of J.M.Heath: 18.1.1825
(Extract)

I have delayed giving my opinion on the request submitted by Mr Heath in his letter of 27th October last until I should have ascertained from personal communication with that gentleman the precise nature of the exclusive privileges he required. Having now satisfied myself that there is nothing in them which may not with propriety be granted I have no hesitation in recommending his plan of establishing iron works in the Company's territories in India.

Mr Heath states that the iron ore is of the best quality (p 34) and in great abundance in this country, and that there is great facility in raising it; that the samples sent to England by him have been declared to be equal to the best foreign iron for making steel; that in England they have never yet been able to manufacture iron fit for making steel, but are entirely dependent for that article on foreign iron; that twelve thousand tons, the quantity of iron imported into England last year, could easily be supplied from this country, and at a cheaper rate; that iron works in this country would not interfere with the produce of England, because English bar iron, which is used there for all purposes (p 35) except steel making, can be sold at from £ 12 to £ 14 per ton, and that it would therefore be more profitable to send Indian iron home to contend with Swedish and other foreign iron; that it is a national object to supply Britain from her own territories with an article which cannot be produced at home; and that steel made from Indian, being better than that made from Swedish or Russian iron, it would be highly beneficial to both countries, more especially, when Madras has so few returns to make to articles from Europe, that England should be supplied with iron for steel making from India. (p 36)

The privileges which Mr Heath solicits in order to enable him to accomplish this object, are as follows:

(p 39)As it may, in my opinion, be regarded not only as a public but as a national object, it appears deserving of every encouragement. I should be averse to the exclusive privileges now solicited were it to interfere with any established rights, or the profits of any trade in iron, likely to be undertaken; but there is no chance of its causing any such interference. The richness of the ores of Salem and of other districts have been known above thirty years without any thing been done to extend their produce, and unless some advantage is held out to the person who attempts to render them useful, they will (p 40) probably, at the end of thirty years more, be as much neglected as now. ...

I,therefore, propose, that the request of Mr Heath be transmitted to the hon'ble the court of directors with the earnest recommendation of the Board, that they will take such measures as may be deemed (p 41) proper for obtaining for Mr Heath the exclusive privilege which he solicits.

Thomas Munro.

Resolution of Government on Proposal of J.M.Heath: 18.1.1825

Agreeably to the sentiments expressed in the foregoing minutes, it is resolved, that the application of Mr Heath ...be transmitted to the hon'ble court of directors, with an earnest recommendation that they will take such measures as may be deemed proper (p 46) for obtaining for that gentleman the temporary exclusive right which he solicits; and that they will also authorize a compliance with his other requests specified in the minute of the President.

Resolved also, that the resolution to make the recommendation above stated be notified to the Governments of Bengal and Bombay, with the expression of the hope of the Governor in council that it will receive their concurrence.

IOR: B.COL: NO 21927: Ext Public Pro :18.1.1825: Munro minute is dated 30.12.1824; Graeme 10.1(p 41-2); Ogilvie 11.1(42-3);Cochrane 12.1.1825 (p 43-5).

Public Letter from Madras on J.M.Heath Proposal: 21.1.1825
(Extract)

2. We have the honour to transmit, for the consideration of your hon'ble court, a copy of a letter which has been addressed to us by Mr J.M.Heath of your civil service,(p 2) relative to a plan which he has formed of establishing iron works in this country for the purpose of making manufacturing iron of that description which is required for making steel. We also transmit copies of separate minutes which have been recorded on the subject by our President and the several members of our Board.

3. The nature of the undertaking which Mr Heath proposes to engage in, and the encouragement which he solicits for it, as, well as our sentiments conveying the national importance of the one, and the expediency of affording the other, are fully explained in those papers. We (p 3) hope that they will receive your favourable consideration, and we beg earnestly to recommend that you will take such measures as may be deemed proper ...

6. We have given permission to Mr Heath to proceed to England.(p 8)

We have the honour to be, with the greatest respect, Hon'ble Sirs,
Your faithful humble servants,
Thos Munro, H.S.Graeme, J.W.D.Ogilvie, J.Cochrane

Fort St George
21 January 1825

Public Despatch to Madras: 12.4.1826 @
(Extract)

2. We now reply to your letter dated 21st January 1825 relative to J.M.Heath's proposal for establishing iron works in India.

5. We have not failed to give due consideration to the case thus submitted for our decision, but we are of opinion that the grant might (p 735) be attended with incon venience, and we agree with the Bengal Government in thinking, that as Mr heath claims no new invention or discovery there is no sufficient ground for conferring upon him a privilege which might eventually be injurious to other individuals or to the public interest.

6. We must therefore decline conferring upon Mr Heath the exclusive privilege which he solicits.

7. The scheme however appears to be deserving of every encouragement which Government can with propriety extend to it, and we authorize you, in case of Mr Heath's prosecuting the undertaking without any exclusive privilege (p 736), to confer upon him a lease for the remainder of the term granted to the Company by the act of 1813 (in the event of his so long continuing the manufacture of iron on the European plan) of the right of cutting fuel on circar waste land, and raising ore at those mines at which he may erect works; and authority to rent land which produces the materials for his manufacture from zemindars, polligars and other land-holders. You will however take care to guard against any rights or immunities at present enjoyed by the natives being effected by any lease or (p 737) authority which you may confer upon Mr Heath.

8. Mr Heath will of course be subject to the rules laid down in ~~this department~~ in our letter in this department dated 26th January 1825, concerning public servants engaging in mercantile pursuits.

Public Despatch to Madras: 26.1.1825 @@
(Extract)

2. With respect to those of our servants who may have already entered into mercantile partnerships or firms, you are directed to communicate to them copies of the present orders and to acquaint them that if they do not drop those connectiond within the period of three years from the date of such communication they will be considered at the expiration of that period as having quitted our service.

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