

## **INDUSTRIES.**

### **THE OLD TIME INDUSTRIES.**

The physical features of Palamau along with the non-availability of the arteries of communications, electricity and incidence of technical skill delimited the nature and scope of the old time industries. Proper communications are a landmark of progress and so is the availability of electricity. As has been mentioned elsewhere communications are only developing since very recent times. Without a network of communication facilities, it could only be cottage industries that flourished in this district in the olden times. Here also the type of the cottage industries was limited by the availability of communications. The scattered villages of small population and a very few townships and the inaccessibility of many of the markets necessarily narrowed down the scope of the cottage industries which had to cater to the wants of small sections of consumers. The forest offered a subsidiary living to the inhabitants who utilized the jungle grass, reeds, bamboos, etc., and developed a few typical cottage industries like rope-making, catechu manufacture, cocoon rearing and lac industry. There were excellent grazing fields which attracted a large bovine population and the milk products gave occupation to hundreds of people. The *ghee* and butter of Palamau have still a tradition behind them. Another cottage industry was the utilization of the cotton trees. Palamau, a century before was well noted for cotton weaving as was observed by G. Thompson who carried out the revenue survey and his notes were published in 1866. There was a big cultivation of cotton trees, which led to a flourishing cloth weaving industry. Indigo was once tried but cultivation of indigo did not find a good response. The patches of sugarcane here and there brought in a small gur-making industry. These cottage industries still exist and will be noticed elsewhere.

### **INDUSTRIAL IMPORTANCE OF THE DISTRICT.**

From the geological report it appears that there are deposits of various minerals. The important minerals which are available in this district in commercial scale are coal, limestone, fireclay and laterite. There are also traces of deposits of iron-ore, graphite, dolomite, red ochre, yellow ochre, bauxite and lead. . As to the commercial value of all the minerals, it is difficult to say whether a large-scale industrial development is possible except in the case of coal, limestone and fireclay. This is because there has not yet been a proper investigation from the angle of the possibility of a large-scale industrial development with these minerals as base. So far as coal is concerned at present two collieries, one at Rajhara and the other Hutar colliery at Barwadih, are working.

In earlier days there were classes of persons whose main avocation of life was to smelt iron from soft Iron ore with the help of coal and limestone or dolomite. These people were known as Agarias or iron smelters. The iron recovered by country-made crude process were mostly used for agricultural implements. Since the extraction from iron-ore in that way

became uneconomic with the advancement of time, the number of iron smelters gradually decreased.

At the time of the publication of the last District Gazetteer in 1909 the only organized industries were shellac and coal. By the time the District Gazetteer was revised in 1926 a cement factory had grown up at Japla.

## **POWER SUPPLY.**

At present Palamau is receiving Damodar Valley Corporation power from Barun through two departmental receiving sub-stations, viz., Daltonganj and Japla. In Palamau only three towns-Daltonganj, Japla and Garhwa have been electrified. The villages which have been so far electrified are Barwadih, Betla, Chhipadohar, Chianki, Betla and Rehla. The Damodar Valley Corporation power is now also consumed in the Hutar Coal Mine, Sakra Graphite mine and in the Japla Cement Factory. The other coalfields of the district have their own power supply.

An investigation is going on at two places, viz., Barwadih and Japla for the installation of the Thermal Power Station. It is hoped that it will be taken up during the Third Five-Year Plan.

## **MINING AND HEAVY INDUSTRIES.**

Coal has the most important place among mining and heavy industries. Major G. Hunter Thompson, Superintendent, Revenue surey, Chotanagpur Division in his notes, geographical, statistical and general on Lohardaga written during 1862-66 and published from Calcutta in 1866 observes as follows regarding the availability of lime, coal and iron :-

"There is a bundance of lime in Palamow. It is found all over the surface of the country

on the western portion of the Purgunnah. The surface lime is of two descriptions the "Gooteen" or "Kunkur" nodular limestone, formed from the red clay, and the best for the hydraulic purposes; and the "Ghuttee" or calcareous tafa, a vegetable formation, found in large concrete masses on the edges of precipices or ghauts, and carried by drainage into the beds of nullahs and over the country generally. Mountain limestone underlies the sandstone rock, and is visible in some of the deep nullah or ravine sections of the country.

"Coal is very plentiful in Palamau. I believe that an inexhaustible supply will be found in the valley of the Koel river, for the entire length of its course through the Pergunnah, some 90 miles. It is visible, on the surface at many places, on both banks of the river, in tuppehs Baresand, Rhamee Doorjag, Dhoothoo, Kate, Imlee, and Turriya.

"Iron, also, is as plentiful as coal; and when it is considered how much both of these valuable minerals are required, on the Railways that are now in progress in the N. W. Provinces, and that the cost of both, if brought from Palamow, Sirgoojah, Rewah, and Singroolee, would be far less than is now paid, for what is brought from Bengal, it is surprising that up to this date nothing has been done to open out, by good road, or canal communication, the vast resources of these provinces.

"It has been stated that antimony, copper and lead, are to be found in Palamow, but no indications of these ores were seen during the survey operations; and from careful enquiry, nothing was heard about them. The natives state that copper is plentiful in Rewah."

## COAL.

It is interesting to observe that the availability of coal in this district that had been mentioned by Major G. Hunter Thompson in his notes in 1866 had already attracted a very considerable attention by 1877 when W. W. Hunter's *Statistical Account of Lohardaga District* was published. Hunter had observed that the only important coal bearing area in Lohardaga district is situated to the north of Daltonganj, the administrative headquarters of Palamau subdivision". The importance that the coalfield near Daltonganj had attained was due to the working of the Rajhara. Coalfield which has an interesting history that could be repeated.

Messrs. Carr-Tagore and Co. was a partnership firm formed in 1834 by Dwarkanath Tagore (grandfather of the world renowned poet and philosopher, Rabindra Nath Tagore). William Carr and William Prinsep carried on a considerable trade in indigo and silk with England. This firm in 1836 purchased Raniganj Colliery, originally opened by William Jones. After this purchase the firm of Carr-Tagore was enlarged by bringing in Messrs. H. B. Henderson, I. Dean Campbell and Dr. McPherson as additional partners. The Calcutta office of the firm was managed by Donald McLeod Gordon and the supervision and running of colliery being made over to Mr. C. B. Taylor, under whose management the coal interests of the firm were rapidly expanded, and included the acquisition and opening of the Rajhara Colliery in Palamau district.

There are some extremely valuable old letters regarding the availability of coal in Palamau district. Through the courtesy of the Chief Mining Engineer of Messrs. Andrew Yule and Co., Ltd., the following valuable historical background of the Rajhara Coalfield has been obtained.

From copy of a letter dated 1st March, 1841 (the original of which is in the office of the Bengal Coal Company, Ltd.) from Mr. C. B. Taylor to his Principals, Messrs. Carr-Tagore and Co., it appears that Captain Sage, the Engineer conducted operations at Singrah on the Amanat Nudde in 1833. He remained there along with four European soldiers for about three to four months and despatched 400 maunds coal on bullocks to Dinapore at a cost of Rs. 1-8-0 per maund. Captain Sage spent about Rs. 18,500 in course of the operation. It is mentioned in the report that the "Coal of the Amanat is on the east side of the Coyl..... the coal of the Amanat field does not omit any flame and produces very little smoke, it however gives out a great heat in burning and is slowly combustible. I set fire to a maund a weight and it kept in a state of combustion for 3 days and nights. If it contains any bitumen, it

must be a very small proportion, from the absence of this substance, and its non-inflammable quality it has erroneously been called anthracite on Blend Coal, its fracture is slaty and not conchoidal".

Captain Sage likewise examined two other coal sites, viz., Balsarh and Barwadih. The coal found at the former place was of inferior quality like the former. Though the coal found at Barwadih was of superior quality still due to the paucity of water the operation had to be abandoned.

Taylor mentioned in his letter to his Principals that the next operation was conducted by Mr. Homfray in 1837. In the report submitted to Lord Auckland, Mr. Homfray had mentioned that underneath these rock are immense number of places where coal is found which I contrived by sinking and tracing to conduct from one mine to the other. Mr. Homfray remained at Singrah only for nine days. Mr. Homfray in his report to Lord Auckland had mentioned the existence of valuable iron-ore but Mr. C. B. Taylor could not discover any appearance of iron-ore, except some sandstone of a reddish colour. Lord Auckland was not satisfied with the progress of the work and the operation had to be closed. Taylor thought that Homfray's report to Lord Auckland was not a faithful one.

Mr. Tytler, a civil engineer stationed at Dinapore was deputed in 1839 to examine the coalfields in palamau under the control of Captain Johnstone. Mr. Tytler carried on mining operations about 20 yards to the westward of the spot where Capt. Sage had run in the gallery; he took out a large quantity of coal but only dispatched to Dinapore 500 maunds, it was carried on bullocks at an expense of Rs. 1-8-0 per maund. The coal found was useless. Mr. Tytler spent about Rs. 4,000 in course of one and half months stay at Singrah. Taylor could not discover that Tytler had investigated any other site for coal. Taylor held that Government were not satisfied as to the value of Singrah coal. Cazeer Golam Muhamed was sent by Mr. Ravenshaw of the civil service. The Cazeer went to work (April to August, 1840) there in 1840. But this operation had also ended in a failure. The Cazeer had spent Rs. 26,500 and could send only 100 maunds of coal to Dinapore by boats from Sicksicky up to where the coal was taken by bullock-carts.

Having given details of operation conducted by Government, Mr. C. B. Taylor mentioned in his letter about the work done by his own men. They left Raniganj in March,

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1. From a letter of Capt. Sage, dated the 27th April, 1886, which is quoted in Dr. McClelland's Report on the Coalfields of India it appears that Capt. Sage prospected this area in 1850. This is confirmed by Mr. C. W. Hope, Executive Engineer, Western Sone Survey Division in his note, dated 18th of October, 1876.

1840, and after examining the coal sites of Bulserah and Barwadih they came to Singrah and took a lease of the last named place from the Jagirdar Sankar Singh Jamadar. They first sunk to a depth of ten or fifteen feet to the south of Capt. Sage's Singh gallery but the site was abandoned as the coal found was of inferior quality. The present site of the Rajhara was discovered by an accident as one of the men when walking to the village of Rajhara came up to a Jogee's well around which were several pieces of coal, which on being ignited burnt with a fine flame. But after examination Mr. C. B. Taylor said that "the coal found in the Jogee's well was only 3 feet thick". At the distance of 446 feet to the north of the Jogee's well they sunk another pit, from

this pit to the mine now in operation is 573 feet 6 ½ inches. Mr. C. B, Taylor had further mentioned that the coal found near the pit burnt well with a bright white flame though it was not so compact as Raniganj coal but was highly bitumenised and possessed more heating power. The distance of the min from the *ghat* on the bank of the river Roil where the coal was deposited was 1,318 yards.

About transport, C. B. Taylor had mentioned as follows:- "I intend having the coal transported on boats of 100 maunds each to Sicksicky below the Ganesh Rocks, from this place boats of any size can convey the coal to Dinapore, for which we shall have to pay at the rate of 13 rupees per 100 maunds, this being the sum paid by the Cazee; the people will not take the less, but should the result of this season prove satisfactory, we must build boats ourselves of 6 to 800 maunds each to take the coal to Dinapore, we have now got 10 small boats of 100 maunds each ready, and are preparing 20 of a larger size to carry the coal down the Sone to Dinapore."

At the outset Mr; C. B. Taylor had mentioned that in 1840 he had to bear a loss of Rs. 1,076-12-0 due to several causes. In addition to this he rejected 7,000 maunds of Rajhara coal, all that was broken into small pieces or of a slaty appearance. <sup>1</sup>

### ***Daltongani Coalfield.***

The Geological Survey had investigated the Daltonganj coalfield. The following accounts from the *Memoirs of the Geological Survey* are quoted in Hunter's Statistical Account of Lohardaga :-

"THE DALTONGANJ FIELD lies partly in the valley of the Koel river and partly in that of the Amanat, extending altogether a distance of 50 miles from east to west. Its total area is nearly 200 square miles. This statement of its size, however, conveys a very erroneous idea of its value as a coal-bearing tract, for out of the 200 miles, scarcely 30 belong to the Damodar series. The boundaries of the field are very irregular, and for distances of considerable length, they are often so obscured by alluvium that they have been plotted only approximately. The most eastern extremity is near the village of Loharsi (which is just within the Palamau boundary after leaving Hazaribagh District). The most western extremity is probably near Chitorpur, a mile or so beyond the town of Garhwa. Hitherto, it has been the custom to call this field the Palamau, and not the Daltonganj coalfield. There are, however, many coal-bearing areas within the sub division of Palamau, and the name consequently of the Palamau field as applied to anyone of them is not sufficiently

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1. Taylor had prospected the availability of limestone as well and quotation from the same letter on limestone may not be inappropriate: - "the lime is found at some distance from the river (Sone) to which it is carried on bullocks, a very expensive method of conveyance and which will admit of improvement; the limestone instead of being blasted with gun powder is separated with the hammer and wedge at about 3 times the cost. I give you underneath the price now paid by a Sircar who is procuring (by contract) 40,000 maunds of quick lime for the Executive Engineer Officer at Dinapore:-

Quick lime purchased on the spot at per 100 maunds	...	...	Rs.8
A tax levied by collector per 100 maunds	...	...	Rs.1

Bullock hire per 100 maunds to Aokberpore...	...	...	Rs.7
Boat hire per 100 maunds to Dinapore	...	...	Rs.8

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Rs.24”  
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In the last paragraph of his letter Mr. O. B. Taylor has mentioned about copper as follows:-

"I send in the box containing specimens a substance, which I read in the newspaper sometime ago was called coppers or sulphate of iron, of course erroneously, although I doubt not but what coppers may be produced from it. It contains a large portion of sulphur. I suspect, the mineral is found near Rohtasghur."

distinctive. The designation would be admissible did any coal-measures occur near the town of Palamal: but that town happens to be far distant from any locality in which coal-measures exist. To indicate, therefore, more precisely the geographical position of the field, a fresh name has been adopted from the Civil Station of Daltonganj, which lies just beyond the southern borders of the field. The surface of the country, within the limits of the field, is an undulating plain with no rising ground (consisting of sedimentary rocks), that has any pretensions to the name of hill. All the inliers of gneiss-and there are several-have been planed down; and although bordering the field there are hills of the same or nearly of the same lithological character, that rise to a height of over 200 and 300 feet, and even considerably more above the level of the Amanat, still the metamorphic rocks, where within the area of the field, have failed to express a definite physical contour distinct from that of the Talcher type. The principal drainage channels are the Roil and its affluent the Amanat. The latter river enters the field at its eastern extremity about two miles west of Loharsi; and then flows steadily westwards until it joins the Koel five miles north of Daltonganj. None of the sections that it exposes in its passage through the Talchers and Damodars are important either geologically or economically; and the same remark applies to those of the Koel. The tributaries of the Amanat are small streams with the exception of the Jinjoi, which may be further noted as the only one of its important feeders that exhibits coal in its banks. The Koel, soon after its entrance into the field runs between high alluvial banks for about two miles, but when it enters into the area of the Barakhars its banks lose their conspicuous height. Its most important tributaries are the Durgaoti, with its sub-tributaries, the Sudabah and the Danro or Garwa river. The last-mentioned stream exposes no coal, but it displays the entire series of the Talchers in the west of the field.

"In ascending order, the formation usually developed in the coalfields of Bengal are :-I.

Talcher; II. Damodar-(1) Raniganj, (2) carbonaceous shales, and (3) Barakar; (III) Panchet-Upper and Lower. In the Daltonganj field, only the Talcher series and the lowest group of the Damodars occur. I shall proceed to treat of the economic Value of the field."

"On account of the limited area occupied by the Barakars and the paucity of coal seams, the economic value of this field is small. There is, indeed, but one workable seam-that which occurs at Pandua and Rajhera; and in calculating the available yield of coal, I would leave out of consideration the seams at Singra and the one in the Sudabah river, as they would only be worked for supplying fuel should their proximity to a lime or brick-kiln give them the

advantage of position over the Rajhera seam. For any demands from a distance that may be made upon the Daltonganj field, the Rajhera (or Pandua) seam only would be available; and as I question whether any local demand will ever arise a computation of its yield will give the true index of the value of the field. The area covered by this seam may be estimated at three miles by one, and assuming that there is 6 feet of coal, the yield would be 18,000,000 tons. But a considerable correction has to be made on account of waste, &c. in working. From the 18,000,000 tons of possible coal, I do not think a deduction of 6/10 would be excessive, and we shall have remaining 11,600,000 tons of coal available. Although this amount is small, it is sufficient to supply for the next fifty years any centres of industry that might find it advantageous to draw their fuel from the Daltonganj field.

"In the office of the Geological Survey, the following analysis of the Pandua coal, which had been exposed for several years was made by Mr. Tween, viz., carbon, 64.4; volatile matter, 22.4; ash, 13.4. In the *Indian Gleanings in Science*, Vol. m, page 283, the following analysis are recorded :- (1) Slaty coal, S. G., 1.482; water expelled on sand bath, 9.1; carbon, 52.1; volatile matter, 37.4; ashes, 10.5; percentage of ash in coke, 16.8. (2) Coal without lustre, S. G. 1.419; water expelled in sand bath, 7.1; carbon 54.1; volatile matter, 37.4; ashes, 9.5; percentage of ash in coke, 14.9. Considering that the coal assayed by Mr. Tween had been exposed for several years, and possibly some of the volatile matter had been dissipated, there is a close approximation to the results obtained and recorded in the *Gleanings in Science*. I have little doubt that these assays are of the Singra coal, and if so, it shows that the coal of the field is of pretty equable quality. Ten to thirteen per cent of ash is in excess of the better kinds of Damodar coal, but for ordinary purposes, this amount of inorganic matter is no serious drawback. The coal of this field is capable of performing the duties which Raniganj coal has hitherto accomplished. The Bengal Coal Company once worked the coal at Rajhera and at Pandua. Several shafts have been sunk, and two of them are of large dimensions. The finest is one south of the village of Pandua, which is 13 feet in diameter. The water in it stood at a level of 50 feet below the surface of the ground, on the 18th February, 1869. Since 1862, operations have been suspended; but now that the project of the Son Canal has been sanctioned, a demand for coal may arise to bring into activity a branch of industry which so materially affects the welfare of the people. A road has lately been constructed to facilitate the carriage of coal from Rajhera and Pandua. It runs in a north-westerly direction, skirting the hills which border the Koel. It diverges from the Koel near Muhammadganj, and passing by Haidarnagar and Japla touches the Son near Budwa. The following returns of the coal raised between the years 1859 and 1862 are taken from the *Coal Resources and Productions of India* :- 'In 1859, 28,648 *maunds* or 1,048 tons; 1860, 30,900 *maunds* or 1,131 tons; 1861, 33,343 *maunds* or 1,220 tons; and in 1862, 43,772 *maunds* or 1,602 tons."

From the reports of G. B. Taylor, Major G. Thompson and report of the Geological Survey, it would appear that the resources of the Daltonganj coalfield could not be properly utilized because of want of communication. Bullock-carts and boats appear to have been the only means of conveyance. Practically no roads existed but some tracks. The report of the Geological Surveyor India quoted in Hunter's Statistical Account of Lohardaga mentions that a road had lately been constructed to facilitate the carriage of coal skirting the hills which bordered the Koil.

It can safely be said that for want of better communication the Rajhera colliery had not been fully exploited till the end of the 19<sup>th</sup> century. The opening of the Barun-Daltonganj railway in 1901 brought this area within the reach of Kanpur and the other manufacturing centres in the United Provinces (now Uttar Pradesh) and after that the work was undertaken on a large scale. In 1901 the Bengal Coal Company commenced systematic operations at Rajhera with an output of 3,881 tons, the production rising to 33,557 tons in 1903.<sup>1</sup>

From the account given in the last *District Gazetteer of Palamau* (Revised edition) published in 1926 it appears that its output rose to 86,000 tons in 1915, during which year an average labour force of 855 men, women and children was employed. It is mentioned there that the colliery was eventually abandoned because the extraction of more coal could only have been effected at a disproportionate cost and because the company were faced with the expenditure involved in developing the Hutar field, of an important area of which they had taken a lease. At the time of writing no coal, but only fireclay was being extracted at Rajhera, the number of persons so employed being between 50 and 100. Over 5,000 tons of fireclay were produced in 1923."

It is reported that from 1953 the colliery began to work regularly and since then its raisings had been on the increase. It is reported that an average of 650 labourers worked daily in the coal field in 1959. The statistics of the output of the coal from 1953 to 1958 are as follows :-

Year.					Output in tons.
1953	...	...	...	...	23,467
1954	...	...	...	...	61,446
1955	...	...	...	...	84,707
1956	...	...	...	...	75,429
1957	...	...	...	...	86,121
1958	...	...	...	...	88,206

This coal field produces natural soft coke of superior quality (smokeless). This coal is considered the best coal for domestic purposes. The coal is supplied to various places in India but the bulk of it is exported to Japan and Pakistan.

The wages of the workers have been fixed under the Labour Appellate Tribunal's Award which came into force with effect from 26<sup>th</sup> May, 1956. Besides wages the labourers whose emoluments are less than Rs. 100 get once in a year uniforms and footwear at a concessional rate of 50 per cent, 7 paid festival holidays in a calendar year and railway fares both ways when they proceed home on leave earned under the Mines Act, 1952.

The working conditions of the workers are regulated by the Mines Act, and may be briefly indicated as they affect the raisings. The Act contains provisions for ensuring safety, sanitation and health, etc., of the labourers. The Mines Rules contain provisions in regard to the first medical aid and medical appliances, leave with wages, welfare amenities and maintenance of various registers. The Regulations also contain the provisions for transport of men and materials, mine workings, precaution against certain dangers, ventilation, lighting, explosives and shortfiring, machinery and plant, etc.

The company maintains a hospital at Rajhera under the charge of a qualified medical practitioner for the treatment of the workers. Bad cases are sent to Daltonganj Hospital. In



accidental cases, all expenses in connection with the treatment of the workers are borne by the company. A creche has been provided for the children of the workers under six years of age. Under the Mines Maternity Benefit Act, of 1941 the women employed in a mine are entitled to receive a payment at the rate of twelve annas a day for four weeks preceding delivery and four weeks after delivery. A pithead bath has been provided as required under the Coal Mines Pithead Bath Rules. There is a canteen and shelters have been provided near the work places for taking food and rest. A safety committee, consisting of an equal number of members of the company and the workers, has been set up to discuss matters relating to safety. A Welfare Officer has been appointed to look after the welfare of the labourers and for the implementation of the various Labour Laws and Awards.

A welfare fund has been created through the contribution of the company and workers for meeting the expenses of the labourers during extraordinary circumstances, viz., serious accident, prolonged sickness and others. The workers are also entitled for the Old Age Benefits under the Coal Mines Provident Fund Scheme.

Rajhera Colliery is not connected by Telephone which is a handicap to some extent for the administrative officers.

### ***Hutar Coalfield.***

Regarding Hutar coalfield the last *District Gazetteer of Palamau* published in 1926 mentions as follows:-

"The Hutar coalfield, which extends over an area of nearly 79 square miles, lies to the south of Daltonganj and west of the Auranga river and is traversed by the Koil flowing from south to north. Regarding the quantity and quality of the coal in this field Mr. Ball wrote as follows:-

'The coal measure rocks of this area present many striking differences from those of the Auranga field. To this rule the coal is no exception, as will at once be apparent by a comparison of assays. From the Daltonganj coal that of Hutar differs in containing a notably smaller proportion (7.15, per cent) of fixed carbon, and would, therefore, have a less heating power. The proportion of ash, 10.7 per cent is the same in both. On the whole however, the Hutar coal is quite equal to the average of Indian coals, so far as regards quality. Much uncertainty must attach to any estimate of quantity. Only three seams of good quality, containing a thickness which could be worked with profit, are known to exist. I do not at all despair of this field being found to contain workable seams of value, but the facts at present available do not justify any confident expression of opinion that such will certainly prove to be the case.'

"Dunn<sup>1</sup> estimated that over an area of 4 square miles, 32 million tons of average, Indian-quality coal are available. Known since 1779, parts of the field have been explored from time to time and it will unquestionably attract more attention in future. The Sone Valley Portland Cement Co. commenced mining at Barichatan in 1926, in two seasons which were originally opened up by the Bengal Coal Co. in 1925. The coal said to contain 31.4 per cent volatilit matter, 51.8 per cent fixed carbon and 16.8 per cent of ash, with calorific value

of 6,600 calories, is brought to Barwadih railway station by Rope-way for use in the cement works at Japla."

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1. *India's Mineral Wealth*, by J. Coggin Brown and A. K. Dey, published in 1955, p.23.

The statistics of raisings and despatch of the Hutar coalfield from 1953 to 1958 are as follows :-

Year.		Raising (in tons).		Dispatch (in tons).
1953	... ..	68,008.05	...	...
1954	... ..	63,642.40	...	51,085
1955	... ..	61,598	...	44,906
1956	... ..	29,299	...	34,597
1957	... ..	19,485.40	...	19,745.25
1958	... ..	25,981.32	...	25,277040

### ***Auranga Coalfield.***

Regarding Auranga coal field the last *District Gazetteer of Palamau* published in 1926 mentions as follows:-

"The Auranga coal field extends over an area of 97 square miles along the course of the

river of the same name in the south-east of the district. It contains numerous coal seams, some of large size, and the total quantity of coal available has been estimated at 20 million tons, but the fuel is of indifferent quality. Mr. Ball wrote as follows:-

"The coal which occurs in the rocks of the Raniganj group is of too unimportant a

character, whether as regards *quality* or thickness, to be considered as affecting the question of the amount economically available in this area. The improbability of this field containing a large supply of really good coal is very great. The appearance of the seams, and the result of the as says, both point to this conclusion. At the same time, it should be remembered that there is not a single fresh and clear section of the rocks and that the coal has never been quarried to the smallest extent'."

The seams, although up to 40 ft. thick, consist largely of carbonaceous shale and the coal itself is so high in ash and moisture that its large shale systematic exploitation is said to be doubtful. Be this as it may a colliery, at which operations were started in 1944, supplies fuel to brick works and cement factories. This coalfield does not work regularly now. From the statistics available from 1954-58 it appears that it worked only in 1956 and 1957 and the raisings were only 1,117 and 1,064 tons respectively.

A small portion of the large Karanpura coalfield of which the greater part falls in Hazaribagh, is situated in the south-west of the district at a distance of about six miles from the Auranga field. The coal is exposed here and there in the beds of the rivers. This

Karanpura coalfield contains several thick coal seams similar to those of South Karanpura which wholly falls in Hazaribagh, but remains to be exploited.

### ***Iron Industry.***

Regarding iron, W. W. Hunter in his Statistical Account of Lohardaga has mentioned that "three varieties of iron-ore also occur in Palamau-bibi, *bali* and *dherhar*. *Bibi* is said to be really the best, as it is the most ductile; but the natives prefer *bali*, as it is harder, and makes better ploughshares and agricultural implements". Iron-ore is found in many parts of the district, and is particular in the neighborhood of the coal mines. But the deposits of iron-ore are not of much

Importance and no attempt has been made to exploit these ores.

*Iron smelting.*-Iron-ore is plentiful in the south, where it is smelted by the aboriginal tribe known as Agarias. The following is a description given by Mr. Ball of the primitive process of smelting practised by them :-"The furnaces of the Agarias are generally, erected under some old tamarind or other shady tree on the outskirts of a village or under sheds in a hamlet where only Agarias dwell, and which is situated in convenient proximity to the ore Or to the jungle where the charcoal is prepared. The furnaces are built of mud, and are about 3 feet high, tapering from below upwards, from a diameter of, rather more than 2 feet at base to 18 inches at top, with an internal diameter of about 6 inches the hearth being somewhat wider. Supposing the Agaria and his family to have collected the charcoal and ore, the latter has to be prepared before being placed in the furnace. Three varieties of ore are recognised. viz., *bali*, i.e., magnitite, *bibi*, i.e., maematites from coal-measures, *dherhar*, i.e., haematites from laterite. *Bali* is first broken up into small fragments by pounding, and it; then reduced to a fine powder between a pair of mill-stones. The haematite (*bigi* and *dherhar*),it is not usual to submit to any other preliminary treatment besides pounding.

"A bed of charcoal having been placed in the hearth, the furnace ill filled with charcoal and then fired. The draught is produced by the usual pair of kettle drum like bellows, which are worked by the feet, the heels of the operator acting as stoppers to the valves. The blast is, conveyed to the furnace by a pair of bamboo twyers, and has to be kept up steadily without intermission for from six to eight hours. From time to time, ore and fuel are sprinkled on the top of the fire, the proportions used not being measured but probably the operators are guided by experience as to the quantities of each which produce the best results. From time to time the slag is tapped off by a hole pierced a few inches from the top of the hearth. Ten minutes before, the conclusion of the process, the bellows are worked with extra vigour and. the supply of ore and fuel from above is stopped. The clay luting of the hearth is then broken down, and the ball or *giri*, consisting of semi-molten iron slag and charcoal is taken out and immediately hammered, by which a considerable proportion of the included slag, which is still in a state of fusion, is squeezed out.

"In some cases the Agarias continue the further process, until after various reheatings in open furnaces and hammerings they produce clean iron fit for market; or even at times they work it up themselves into suitable utensils. Not unfrequently, however, the Agarias, work ceases with the production of the *giri*, which passes into the hands of the Lahars. Four annas is a common price paid for an ordinary sized *giri*, and as but two of these can be made in a

very hard day'Singh work of 15 hours duration and a considerable time has also to be spent on the preparation of ore and charcoal, the profits are small. The fact is, that although the actual price which the iron fetches in, the market is high, the profits made by the *mahajans* and the immense disproportion between the time and labour expended with the outturn, both combine to leave the unfortunate Agariain a miserable state of poverty." <sup>1</sup> The iron used to be made into axes, plough-shares, well-buckets, and other agricultural implements and also into guns, which were sold according to the length of the barrel at Re. 1 a span; the best guns used to be made at Herhanj and Daltonganj, but this industry *is* now dead.

### Fireclay.

The Daltonganj coalfield has supplied a highly plastic fireclay from quarries at Rajhera.

The fireclay extracted at Rajhera is of superior quality. It *is* supplied to various factories for manufacture of crockery and fire bricks. On an average about 60 labourers worked daily in fireclay mine in 1959.

The raisings of fireclay of Rajhera are as follows:-

Year.					Raisings in tons.
1953	...	...	...	...	8,053
1954	...	...	...	...	6,760
1955	...	...	...	...	13,340
1956	...	...	...	...	9,484
1957	...	...	...	...	6,205
1958	...	...	...	...	11,360

Besides Rajhera, fireclay is also available at Tiniakhar, Tipu Khurd and Tupu Kalan near Latehar, and Mahuamilan, Ohakla, Chitrapur and Dadhu in Tori estate. Mining operations are being conducted successfully in these areas and they are supplying fireclay to Kumardhubi and Mugma factories.

### Other Minerals.

A number of other minerals are found in the district but have not been worked on a commercial scale. Limestone, sandstone and graphite are known to exist, and bauxite is reported to be found in the neighborhood of Netarhat. The bands of limestone of Archaean age are found in Khalari south-west of Daltonganj. Copper has been found at several places in Palamau, but it is said that the size of the lode is too small to be worked with profit. There is further scope for investigation into the prospects of commercial utilisation of the minerals known to exist. Investigations by the Geological Survey of India are still continuing.

The total number of persons engaged in mining and quarrying according to 1951 census was 1,093 out of which 1,075 were males and 18 females. The break-up figures were as follows:-

	Total.	Employers.	Employees.	Independent workers.

		Males	Females.	Males	Females.	Males	Females	Males	Females.
1	2	3	4	5	6	7	8	9	
1. Non-metallic mining	60	..	..	..	..	60	..	..	
2. Coal mining	546	10	14	..	410	10	122	..	
3. Iron.ore mining.	239	..	55	..	19	..	165	..	
4 Stone. quarrying clay and sand pits.	97	8	2	..	7	..	88	8	
5. Mica	.. 133	..	4	..	118	..	11	..	

There are reasons to believe that these figures are an under-estimate. It has to be remembered that this type of labour fluctuates according to seasons.

## **LARGE-SCALE INDUSTRIES.**

### *Sane Valley Portland Cement Co., Ltd., Japla.*

The Sone Valley Portland Cement Co., Ltd., Works at Japla started production in the year 1922 with a single plant to produce 60,000 tons of cement per year. The Company belonged to a British Firm, the Associated Portland Cement Manufacturers. Ltd., London. Now it is one of the units in the chain of Sahu Jain Industries. Owing to high quality of cement being produced and maintained here and with its increasing demand, four kilns and its auxiliaries have been erected and its total production has gone up to 2,50,000 tons of cement per year.

The difficulties before these works are late running of pilot and placement of wagons for loading. Recently for the last two years there has been shortage of workable orders due to glut in cement trade which has resulted in accumulation of huge cement stocks, thereby hampering the normal production. The bulk of increase of demand from 1950 to 1956 was due to multi-purpose projects and road developments. Imports were completely banned in 1957. The demand for 1960-61 is between 12.5 to 13 million tons but this has not developed as anticipated due to largely inadequate supply of steel and due to pruning of some of the Five-Year Plan Projects, based on over-optimistic demands, possibly result of an inadequate appreciation of market conditions, and interrelationship between prices and off-take capacity in excess of consumption has been created. In export market also Japla cement is meeting a keen competition from other countries, e.g., Europe, Japan, etc., and consequently Indian market is not developing. Due to non-availability of suitable coal and its movement production in India has been affected.

The manufacture and utilisation of Portland Cement involves several distinct fields of science and art. An adequate treatment of anyone of these themes, however, cannot ignore their inter-relationship. For better understanding of the use of cement it is necessary to give a brief outline of both.

Portland Cement is defined as the product obtained by intimately mixing together calcareous and argillaceous materials with fluxes and burning them at clinkering temperature and grinding the resultant clinker. After burning no material other than gypsum or air-entraining agents is added. Limestone quarries are situated at Baulia and Chuhhatta in the



1957	...	...	...	...	177,210
1958	...	...	...	...	203,120
1959	...	...	...	...	164,780

Destination of the markets where cement is sent:-

North and South Bihar:- Patna, Gaya, Nawadah, Bhagalpul, Monghyr, Saharsa, Samastipur, Muzaffarpur, Purnea, Kishanganj, Daltonganj, Garhwa and Ranchi, etc.

West and North Bengal:- K. p. Docks (Calcutta), Sealdah, Saheb Bazar, Burdwan, Asansol, Bankura, Contai Road, Burnpur, Siliguri Town, Alipurduar and Coach Bihar, etc.

Assam:- Gauhati, ,Jorhat Town, Tinsukia, Shillong, Dibrugarh Town, Bauarpur, Karimganj and Nowgong, etc.

Uttar Pradesh:- Gorakhpur, Izatnagar, Sultanagar and Varanasi.

There are 1,267 labours employed at these Works. The following welfare measures are available:-

(a) Canteen, (b) Creche, (c) two clubs, one for staff and the other for labour, both These clubs are well equipped, (d) Children Park, (e) two Cinema shows in a month to staff and labour are shown free of cost, (f) Co-operative Stores, (g) Annual Sports, (h) Cultural Programmes as arranged from time to time, (i) a well equipped hospital with indoor and outdoor (44 beds) and a maternity ward as well, (j) Prohibition Drive is also arranged from time to time and (k) a High School with free education up to class VII.

In case of any dispute it is always tried to be settled by negotiation and most of them are settled mutually at the initial stage. Always it has been the endeavour of the Company to promote harmonious relationship between the labour and the management. Their grievances are immediately beard and looked into as far as possible. Major issues, if not settled by mutual negotiation, are referred to arbitration or conciliation to the Labour Commissioner.

There are about 400-500 quarters for labour and staff and all quarters are furnished with light, fan and water pipes. Endeavour is being made to build more quarters under the Industrial Housing Scheme.

### **SMALL-SCALE INDUSTRIES.**

Palamau lags far behind in the small-scale industries. There are practically no textile and sugar industries in the district. Handloom industry is in a somewhat flourishing condition and meets the requirements of the people to a, large extent. The number of rice, flour, oil and *dal* mills in the district in 1951 was a few. The number of such mills registered under the Factory Act in the census of 1951 was only nine in which 48 persons were employed. It appears that the census of 1951 had not taken into account all the existing rice, flour, oil and *dal* mills and had based their figures on the information supplied by the Labour and Industries Department. It is reported that the number of rice, flour, oil and *dal* mills in the

district is now 88, out of which 52 are flour mills, 23 rice mills and 13 oil-pressing mills. The actual number of persons engaged will not be large and is below 1,000 persons.

### **Shellac Industry.**

The shellac industry, one of the flourishing industries of the district, to all intents and purpose is a cottage industry. The cultivation of lac is widely spread in the district and lac industry is a valued subsidiary occupation of the cultivators. Due to the presence of a large number of *palas* trees, considerable quantity of lac is produced. The principal crop of *palas lac* is obtained in April and May, the *Baisakhi* crop; but some of the lac is then left on the trees until October or November when it becomes fit to be gathered and sold as brood lac. This is the *kartiki* crop. The *Kusum* lac is more valuable, but less extensively cultivated. The principal *Kusum* crop is in October and November.

Lac is a resinous incrustation found on the twigs of certain trees, which is produced round the bodies of colonies of the lac insect. The latter subsists on the sap that it sucks up by means of a proboscis from the succulent tissues of the tree. When the young insects escape from the dead body of the female, they crawl about in search of fresh sappy twigs; this is known as swarming and at this time the twigs of trees infected with the lac insect will often be seen to assume a reddish colour, owing to the countless masses of minute insects that are moving all over them. Those that become fixed drop their legs and at once proceed in the process of digestion to transform the sap sucked up by the proboscis and to exude from their bodies the resinous matter with which they become ultimately incrustated. At this stage when it is evident that the swarming is beginning, the twigs of an old tree with the insects on them are cut off and tied on a fresh tree, which it is proposed to bring under cultivation, at the base of the new shoots which have grown as the result of previous pollarding. After a time the insect crawls up the branches of the fresh trees, and, piercing the bark at some place sufficiently soft, fixes itself down and commences to exude lac. The greater and the better part of the lac is exuded by the female after mating. The quality of the lac depends upon the brightness of the colour, the thickness of the incrustation, and the comparative freedom from parasites. The cultivator lops off the twigs on which lac has formed with an axe and then separates the lac from the twigs with a sickle. Two important lac assembling centres of the district, viz., Daltonganj and Garhwa, are situated on the banks of the river Koil. Other important centres are Latehar and Tori.

The average production (1951-55) of the above centres cropwise is as follows<sup>1</sup>:-

	Baisakhi.	Katki.	Total.
	Mds.	Mds,	Mds.
Daltonganj .. ..	46,000	7,400	53,400
Garhwa .. ..	24,000	4,800	28,800
Latehar .. ..	16,800	5,150	21,950
Tori .. ..	13,000	2,600	15,000
Rest of the district ..	12,000	1,350	13,350
Total ..	1,11,800	21,300	1,33,100

1: Report of the Indian Lac Cess Committee, Ranchi, 1956.

In addition Garhwa usually receives on an average 25,000 maunds annually from Surguja and mirzapur districts. A small quantity of Kusumi lac comes to Latehar, the average of which annually comes to 1,000 maunds. Thus on an average about 1,60,000 maunds of stick lac are handled in Palamau district.



The annual report (1957-58) of the Indian Lac Cess Committee has given the statistics of stick lac in Palamau in 1957-58 in comparison to the previous four years as follows :-

Baisakhi.	Katki.	Total of all crops.					Normal
		1957-58.	1956-57.	1955-56.	1954-55.	1953-54.	
1	2	3	4	5	6	7	
Mds. 1,00,000	Mds. 20,000	Mds. 1,20,000	Mds. 1,83,000	Mds. 1,51,500	Mds. 1,11,500	Mds. 86,000	Mds. 1,31,500

In the census of 1951 there were 24 shellac industries registered under the Factory Act in which 1,362 labourers were working. From the report of the Indian Lac Cess Committee it appears that there were 41 factories in 1955-56 with about 500 *bhattas* (only one factory Baralota uses power and is equipped with two washing barrels). The labour force was roughly between 1,500 to 2,000. The shellac factories are mainly concentrated at Baralota, Chainpur, Garhwa, Latehar and Chandwa. The number of dependants on this industry is said to be about 40,000.

Lac industry is in a slump now. The foreign market has been substantially lost owing to synthetic products in the American and other foreign markets. It is also unfortunate that in the past differences have been found between the samples sent and the actual bulk supply. There has been a steep drop in the prices of lac all over India.

Lac is a precious earner of foreign exchange. Indian Lac Cess Committee, the Central and State Governments and the lac industrialists are trying to find more avenues of consumption of lac within India. An internal market would be more dependable as a stabilising factor. The Lac Research Institute at Namkum (Ranchi) has made some useful contribution to it. For example, a coating of lac on earthen pots adds lustre and durability to them. Such earthen water bottles are common in Jaipur but not so in Bihar although Bihar's lac is the largest in India. The proper distribution of seed lac, fight against deteriorating factors and increase of knowledge for enhancing the consumption field among the people should receive serious attention of all concerned if lac industry has to improve.

*Manufactures Association,-* In 1943, the manufacturers of the district formed the Palamau Shellac Association to safeguard their common interests. The object of the Association is to improve the condition of the industry. In 1949 there was a conference of shellac manufacturers with the same purpose. The industry has had many vicissitudes as the main consumption is in foreign countries and the foreign market is being slowly lost.

*Labour position.-* Manufacturing shellac is a skilled process and labourers for it were imported from Chatra and Raniganj. Slowly the local labourers picked up the work and these days most of the work is being done by them. Up to 1933-34 the daily wage was Re. 1-0-6 for a team of three workers. As prices of shellac rose and the labourers became better organized the rates increased to Rs. 2-2-0 and subsequently to Rs. 3-1-0. With the passing of the Minimum Wages Act it was raised to Rs. 5-8-0 in 1950 for the same team of three workers.

The relation between the labourers and factory owners is not always very happy. Because of the increase of the wages the manufacturers now mainly manufacture seed lac, and many lac labourers are out of employment and have found other avenues. Furthermore, a large quantity of stick lac is being sent from this district to mechanized factories in Calcutta. The local manufacturers with their small capital cannot compete with these firms in buying the raw materials and, therefore, their factories remain partly idle thus increasing unemployment. The factory owners have moved the State Government and the Ministry of Commerce and Industry, Government of India, to ban export of stick lac from Bihar or fix a quota of exports of stick lac from Palamau to Calcutta. The stick lac is now mainly exported through road.

### ***Biri Making Industry.***

*Biri* making industry is widespread throughout the district. About 2,00,000 bags of *Kendu* leaves are annually produced from the forest of the district. The Indu Biri Factory, Krishna Biri Factory, Jain Biri Store, Jaisummerddin Biri Store and Vijoy Biri Store located at Daltonganj are registered *biri* factories of the district. On an average 50 labourers work daily in these factories. Two unregistered *biri* factories are running at Garhwa. A number of them are in a disorganized form and are running with the joint co-operation of the family members.

### ***Saw mills.***

There are 24 saw mills in the district. They are located at Daltonganj (3), Chhipadohar (8), Latehar (5), Chandwa (2), Garhwa (1), Rehla (2) and Barwadih (3).

### ***Engineering.***

The Japla Engineering Works manufactures 41.19 tons of cast iron material annually. Besides, concrete spun pipe is manufactured at Japla by the Bijoy Company. The average annual production is 320 tons of concrete products. About 20 labourers work daily in these factories.

### ***Ice and Creameries.***

In 1951 there were two ice and ice-cream industries in Palamau in which 19 labourers were found to be employed. The details of the Working factories for the year 1955 were as follows:-

Number of factories registered- 69.

Number of working factories- 81.

Mandays worked- 7,18,983.

Total number of workers- 2,691.

Ice-creams although of very poor quality have a market in the summer season in the urban areas.

### **Cottage Industries.**

*Cloth weaving.*- The weaving of cotton and wool is an important occupation to the majority of the Adibasis. The hand-woven cloth which though coarse is durable, is mostly seen amongst the aboriginal and the semi-aboriginal tribes. In the Chhechhari valley it is widely prevalent and mill-made cloth is found in rarity. There had not been any census of looms but it is understood that more than 5,000 looms are in work for weaving cotton and wool. These looms are all handlooms of primitive design, the fly-shuttle looms are a few in the district. The wool weaving is done by the men of the caste known as Gareries.

The other cottage industries are rope-making, blacksmithy, pottery, goldsmithy, bee-keeping, carpentry, basket and bamboo wares; palmgur making, *tassar* rearing, match box making, leather tanning and leather goods making and *ghee* making. Mostly these industries are running in a disorganised form, located in the extreme interior lacking the suitable facilities for transport, technical and financial help.

Efforts are being made by the Industry Department to develop these industries with technological and artistic development. Four training-cum-production centres have been opened to impart training in the respective crafts and industries to the artisans or persons interested in the particular craft in the locality. After training for one year the trainees are expected to form and start co-operative production centres in the particular craft and the financial requirement has also been given by the Government under the Bihar and Orissa Industries Act. 1923. The following centres are running in the district:-

- (1) Leather goods making training-cum-production centre at Daltonganj.
- (2) Dyeing and printing-cum-production centre at Daltonganj.
- (3) Cotton weaving tutorial class, Pokbari (Latehar).
- (4) Wool-weaving class, Makari (Garhwa).
- (5) Bee-keeping centres are running at Satbarwa, Chattarpur, Chandwa, Kundri, Garu, Panki and Balumath.
- (6) *Gur* and *Khandesari* centres are running at Japla and Panki.

*Tassar industry.*-The raising of cocoons for silk was an important industry of the district but due to the absence of patronage from the Government and foreign competition, the industry received a great set back after the First World War. The revenue from *Koa* (silk) used to be a good part of the revenue derived by the Chero Rajas from Palamau, and theoretically Government held a monopoly of the cultivation of the commodity and of *kath*

(catechu) throughout, the *pargana* of Palamau down to the year 1851, when they relinquished their claims in respect of villages not held *khas*. The contract for cultivating silk in the Government Estate was auctioned annually but the proceeds used to be very small.

The cocoon rearing industry is carried on mainly by the Adibasis and the poorer sections of the people. The State Government after independence in 1947 tried to retrieve the silk industry by affording technical and financial assistance to the rearers of the cocoon. The Government had opened a Tassar Seed Supply Station at Daltonganj in 1956. The majority of the *tassar* rearers are found in Lesliganj, Nagar, Bhaunathpur, Daltonganj and Barwadih thanas.

After survey it was found that the number of food plants viz., *asan*, *arjun*, *sal*, etc., in Palamau is quite adequate for rearing cocoons, but heavy taxes levied by the Forest Department and indiscriminate cutting of the food plants had rendered great disservice to this industry. An appeal was made and now a general rate of royalty has been fixed to Rs. 2 instead of Rs. 18-12-0 for 100 trees.

The Tassar Seed Supply Station at Daltonganj distributes disease, free layings of *tassar* eggs and it is reported that the production of *tassar* had been high due to this activity. In 1959 three Reeling and Spinning Demonstration Centres were started at Lesliganj, Nagar and Bhaunathpur and two rearing centres at Patan and Barwadih. The statistics below will show the work of the Tassar Seed Supply Station, Daltonganj.

Statistical information showing the activities during the year 1959 of the Government Tassar Seed Supply Station, Daltonganj Palamau.

Number of persons trained in scientific method of rearing.		Number of disease free layings manufactured.		Number of disease free layings Distributed.		Number of persons Newly took up rearing.	Number of rearers to whom D.F.Ls. supplied.		Number of rearers in the area.	Quantity of cocoons produced in the area.		Actual consumption of D. F. Ls. in the area.
Tassar.	Eri.	Tassar.	Eri.	Tassar.	Eri.		Tassar.	Eri.		Tassar.	Eri.	
1	2	3	4	5	6	7	8	9	10	11	12	13
721	15	10,320	720	10,320	715	89	606	26	1,500	54,98,239	6,984	Bhadai—75,000, Katki—2,25,000 for the whole district.

Production of yarn.													
Damonstration in reeling and spinning.			Number of persons trauiued in reeling and spinning boiliug and spinning of silk cocoons.	Production of yarn.						Number of paddle charkhas introduced.	Number of persons took up mulberry cultivation.	Area of land.	
				In the station.		Local.							
Schools.	Hats.	Vill.		Hand spun yarn.	Reeled yarn.	Hand spun Yarn.							
14	15	16	17	Sr.Ch.To.	Sr.Ch.To.	Sr.Ch.To.			21	22	23		
43	90	99	1,530. Not habitual Spinner.	22	8 2½	1	3 3½	18	12	0	26	15	5
								Spun on Dhera as they have no spinning charkha.					

## Catechu Manufacture.

Regarding catechu manufacture the last *District Gazetteer of Palamau* (1926) mentions as follows:-

"An interesting, though not a numerous, group under this head are the catechu collectors.

Catechu or cutch is the astringent resin extracted from the '*khail* (*Acacia catechu*) tree. The manufacture of this drug is carried on by Mallahs, who come annually from Gaya and other districts for the purpose. The first thing they do is to choose a suitable site for encampment in a locality where the trees are plentiful and where water is to be had. As soon as a central spot has been selected the whole party set vigorously to work to erect a sufficient number of huts for the shelter of each family. The worksheets are then erected, and furnaces prepared by digging circular holes about 2 feet in diameter and 4 feet in depth, with a flue sloping down from above. The men are now daily in the forest engaged in cutting down the trees and lopping off the branches, after which the trees are taken to the encampment in lengths of 10 to 12 feet. As soon as the supply begins to come in, the women bark the trees and chop off the outer white wood, leaving the inner wood only. The heart of the tree, which is of a dirty red colour and full of sap, is then cut up into small chips which are packed in large earthen jars called *chaitis*, The latter are placed over the furnace or oven and their contents boiled from 12 to 16 hours. The juice (*ras* or *arah*) which boils over is poured into another jar, replaced on furnace, and stirred till it attains the consistency of syrup. It is then poured off into a circular earthen vessel, and followed to settle for a night, and next morning is strained through a large basket; the liquid portion thus strained off is poured into a ditch dug dose by, and is made into second class cutch, called *khaira*. First class cutch, called *pakhm*, is made from the thick residue left which remains in the basket for about a month, during which it further thickens .according to the temperature and the weather. The mass is next poured in a layer in the ground over ash, upon which it is kept for eight or ten days during which it hardens. It is then cut up with a knife into squares, in which shape it is sold to the trader. Cutch can only be made during the cold weather. It fails to harden on hot days, and Mallahs, therefore, close work before the end of March. They believe that, unless they keep perfectly pure and clean drum the whole time, the cutch will be spoiled. They pay royalty to the zamindars according to the number of *chattis* they keep in use".

The observation of the last District Gazetteer still holds good. With the passing of the Bihar Land Reforms Act, 1950, the royalty is now paid to the State Government. The average annual amount of cutch exported from Daltonganj, which is the main centre for cutch exportation comes to about 3,000maunds. It is mainly exported by rail.

## ***Gheemaking.***

*Ghee* making industry is an old indigenous industry of the district. Even a few years before hydrogenated oil was unknown in Daltonganj, the district headquarters and ghee was the chief medium of cooking. In the extreme interior of Palamau the people are still unaware of the hydrogenated oil. *Ghee* of Palamau is still cheaper than the other districts of Bihar. *Ghee* is mainly exported to Jamshedpur, Ranchi and Calcutta.

## ***INDUSTRIAL POTENTIALITY.***

The district has vast natural resources but they have not been fully exploited. In the forests of Palamau the bamboos are found in abundance. There is a great potentiality for the bamboo pulp industry in the neighborhood of Chipadohar. A vast number of bamboo pulps are exported from Chipadohar to Dehri-on-Sone and Titagarh in Calcutta. This industry can be developed if it is properly exploited. There is also great potentiality for the development of ply wood factory in Palamau. The forest industries have been covered in the Chapter on Forests. It has also tremendous resources for tire-bricks factory and the catechu industry.

Underground minerals some of which have been indicated earlier are also not being worked to their full capacity. It is also understood that there are rich deposits of atomic minerals in this district. With the opening up of communications and pooling of financial resources and State encouragement, there is no doubt that Palamau district will be one of the first class industrialised districts in India in some near future.