

form a curious feature in the landscape. These are in groups of three, four, or half a dozen, and are picturesquely placed enough, the limestone being harder than the adjacent rocks. The kilns are placed near the limestone to avoid the expense of carriage, and the owners of these kilns live on the spot and look after their property.

It is a pretty sight to stand on one of the bridges between two huge kilns and look at the yawning chasm, partly formed by nature, but greatly enlarged by man, on both sides of which are numerous groups of quarrymen actively boring, blasting, and removing the massive limestone, carting it into little wagons, and bringing it up the inclined planes to feed the insatiable mouths that stand ever open for the reception of fresh supplies. Here and there a jagged odd-shaped rock projects from the earth, and may be seen to be a cherty or flinty portion of the rock left behind by the water when eating out a passage between the limestone on the two sides. At a distance one sees curious banded portions, and on approaching nearer a large number of white crystalline streaks, which the practised eye of the geologist at once recognises as connected with fossils, the remains of the inhabitants of the ocean, when these hard rocks were mere soft plastic mud, itself derived for the most part from animal structures.

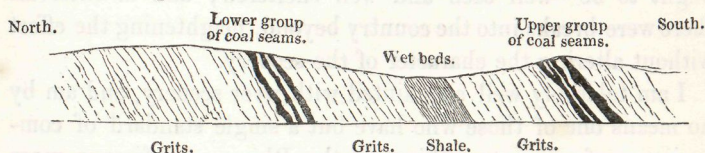
The ground between the Loire and the northern limits of the little coal basin consists of low undulations, ranging nearly east and west. The coal itself is worked on two of these, between which is a swampy bit hardly deserving the name of a valley. A good many high chimneys belonging to little steam-engines now neglected, dispute the title of the scenery to that essentially rural character which it would otherwise undoubtedly possess. These, with numerous small windmills and a perfect forest of fruit-trees, which at the time of my visit (on the 2nd May) were all white with flower, give great beauty to the landscape, which is indeed quite deserving of notice as an admirable specimen of Loire scenery. In this part of the country hedges exist everywhere, and are exquisitely fresh and green—not too straggling, at least in spring, and breaking the usual monotony of the fields of France. The land is highly cultivated, looking for the most part like a garden; and as I had left behind in England, and even on the Rhine whence I had just come, a climate as severe

as winter and much less pleasant, the sudden transition to the warm breath of spring was not the least delightful part of the trip.

My business in this part of the country detained me but one day, examining old coal-pits and new ditches and roads, to see how far it might be desirable to bring capital to bear on the supply of mineral fuel which nature has here provided. The supply is not only small in comparison with coal deposits found elsewhere, but it is also highly irregular. The beds, sometimes only a few inches thick, occasionally swell out to a dozen yards, and it would not be easy for a person unaccustomed to examine coal to recognise in the flaky shining powder brought up, or the earthy stain seen at the surface, any valuable indications worth following. There is, however, no doubt a good deal of mineral fuel, and of a quality quite worth having, particularly when we consider the price of English coal (the only kind available) at the nearest points.

The annexed cut (fig. 1) will give an idea of the position of the coal in this district, and the way in which the shales and impermeable soft beds are indicated by the wet hollows on the surface. The two principal groups of coal-seams inclined at a considerable angle are also shown.

Fig. 1.—Section across the coal-field of Ancenis.



From the coal-field we drove to the little town of Nort, very prettily placed, with several windmills on a small hill by its side, on the banks of a stream very little known, but well worthy of a visit from the true lover of the picturesque. Just as we reached the bridge which here spans the river with three small arches, the steam-boat, which daily travels between this place and Nantes during most part of the year, was not only starting but had actually got under way, but at a sign made by one of my companions and a great shouting from everybody near, the captain was polite enough to put back and enable me and my two companions to come on board. We found plenty of room, and

indeed the vessel claimed to be possessed of a license to carry 250 passengers, a notification of which was proudly placed on the paddle-boxes, but I doubt whether the odd fifty would have found such accommodation as a seat in any part of the vessel. However that may be, there was abundant room for our party, and we were soon paddling away towards our destination. At first and for some miles the scenery was pretty but by no means striking, there being a large sheet of shallow water with low hills rising in the distance, and small villages or large houses dotted about on the banks. After about a third of the way had been accomplished the river banks closed in, rocks began to show themselves on each side, the shores assumed a different and bolder character, and we entered on a succession of the most charming groups of picturesque objects, consisting of rocks, trees, houses, châteaux, little chapels, round towers, and ruined sheds, that can be imagined. The river here winds a good deal, and the character of the scenery is in all respects that of enclosed water, so that for a distance of at least twelve miles we seem to pass through a noble and beautiful lake, its shores covered occasionally with low wood, but more frequently cultivated like a garden. There were pleasant country houses of all dimensions and all varieties of taste on both sides; with villages not less picturesque than those on the Moselle, placed just where they ought to be—well seen and well sheltered; and at intervals there were breaks into the country beyond, heightening the effect without altering the character of the scenery.

I am tolerably well acquainted with river scenery, and am by no means one of those who have but a single standard of comparison, referring everything to the Rhine—a reference more common than it is reasonable. I was certainly not prepared for this little treat, and it thus came upon me by surprise; but I do not think I exaggerate when I say that it is better worth seeing and studying for its effects than half the river and lake beauties that people travel far to look at, and I would strongly recommend every one who is near Nantes to make a little effort in order to judge for himself how far my picture is true. I admit that the weather was pleasant, the time of year favourable, the sky as well as the earth gay, and that during the whole time of our descent through the best part of the river, the clouds produced a succession of fine effects of light and shade, and a

rainbow never ceased to lend its help to throw a charm over everything. Still the scenery itself is unmistakeable.

There is no change except in the natural variety and succession of views, until the huge mass of building that towers over Nantes comes into view; but from this point the bustle and life of a great town begin to alter the style of the scenery. Here too we begin to see on both sides the peculiar and always picturesque Breton costumes—the women with their high head-dresses, and the men in their old-fashioned coats and waistcoats; and soon the streets of the town come into view, and we are landed a few yards from a bridge over a little stream, which passes along a street (and not a very wide one) for a short distance and opens into the Loire. One is not a little astonished to find that this poor stream, which looks marvellously like a ditch, and is at best but a narrow canal, is all that remains of the Erdre whose beauty we have been admiring. In point of fact the waters of the little river are kept back, and made to serve the purpose of a reservoir connected with a canal. Above Nort and below the first lock at Nantes it is nothing; between these points it is a noble and beautiful sheet of water, rich in all that can please the eye and gratify the taste of the traveller who has a love of the picturesque.

CHAPTER THE SECOND.

THE MINERAL BASINS AND LIMESTONE PLATEAU OF THE DEPARTMENT OF AVEYRON IN CENTRAL FRANCE.

COMPARATIVELY few travellers, whether in search of the picturesque or influenced by other reasons, follow the road from Clermont by the Cantal and Aurillac, and so across the department of the Aveyron towards Montauban and Toulouse. Fewer still, unless impelled by special reasons, would think of stopping short at the towns of Figeac or Villefranche, diverging into the valleys of the Lot and its tributaries, and visiting the iron-works, coal-mines, or mineral springs of Decazeville, Aubin, or Cransac. Very few also of the thousands and tens of thousands who traverse France to reach the Mediterranean, are at all aware that they are leaving on one side, at no great distance, some of the most remarkable deposits of coal, ironstone and limestone, and some of the most interesting groups of metalliferous veins that exist in any part of Europe.

Such, however, is undoubtedly the case. Aveyron contains as a department an amount of mineral wealth almost inconceivable in its magnitude, and the valuable minerals exist under circumstances extremely favourable for development, so soon as the iron way shall have been constructed to open a road for their conveyance, and enable them to be distributed over the country in every direction at small cost. The Great Central railway of France now in course of construction will answer this great purpose, so that within a few years the first results may be anticipated, and France may commence to lay open her stores of coal and iron, and perhaps of lead and copper, and thus come into competition on no unfavourable terms with Belgium, and even England, in respect of these important elements of advance in wealth and civilization.

It has long been known that several small deposits of coal, generally of rather poor quality, exist, and are worked in various parts of the South of France. The position of these coal-fields and the quality of the coal are for the most part such that they

have hitherto possessed little value, hardly competing with the produce of foreign mines at the different ports, even those nearest the place where the coal is worked, and in spite of heavy protective duties. In most cases the coal has not been worked without great expense, and has not admitted of either rapid or complete abstraction. Beds and veins of iron ore, although numerous, and in some cases very extensive, rich, and of great thickness, have not been found near enough to the coal-fields to allow of profitable working without high protective duties, almost excluding the possibility of foreign competition on a large scale. The general result has been an unreasonably high price of iron, and a corresponding difficulty in applying the metal in numerous cases where its use was otherwise desirable.

The bringing into operation a very extensive and valuable coal-field, with large supplies of good iron ore of various qualities within a moderate distance, was of itself a very important step, and would have justified great efforts. The construction of a line of railway connecting this district with the chief manufacturing towns and ports in the South of France, both on the Atlantic and Mediterranean seaboard, was the way to ensure the most complete success on the largest possible scale.

The large operations recently commenced in reference to the coal-field of Aubin, and the iron ores of Mondaluzac and its neighbourhood, and the laying open of these districts by the Great Central railway, will in a few years create new and gigantic interests in this part of the department of Aveyron, and it may be interesting to give some account of a district destined in all probability to be the centre of profitable mining and of metallurgical processes far more extensive than are at present carried on in France.

§ 1. COAL AND IRON.

The position of the coal-fields of France in the southern departments is extremely curious. They form a very numerous group, and are often really detached, being distributed on and around the wide sea of crystalline rock, of which the granite and extinct volcanos of Clermont, Cantal, and the Puy de Dome are the centres, and from which spring the Loire and its numerous tributary streams, and the Dordogne and other main feeders of

the Garonne. The Rhone from Lyons and the Saône from Chalons completely cut off this tract by an almost straight line; but neither of these rivers takes away any of its drainage, except a portion removed by small streams rising only a few miles from their embouchure. The district is thus geographically isolated, and belongs in drainage to the Atlantic system, the courses of the Saône and Rhone marking the direction, and almost the actual line of watershed.

The number of coal-fields, or places where coal can be worked, within and immediately around this area is extremely great, and is probably not yet fully known. It includes the basins of St. Etienne, of Alais and St. Germain, of St. Gervais and another near Beziers, several around Rodez, Aubin and Decazeville, Autun, Blanzay and Creuzot, and Brassac, besides many others. Although widely separated, there can be little doubt that these really belong to one group, deposited under circumstances not very dissimilar, and for the most part on irregular floors of granite and gneissic boulders, being associated and interstratified with conglomerates of the coarsest kind.

Of all these coal-fields, the one that appears most likely to admit of rapid development, and profitable working on a large scale, is that of Aubin, partly from the condition, position and quality of the coal, and partly from the fact, that immediately around, within a circle of twenty miles, there are found stores of iron ore, practically inexhaustible, and obtainable at the smallest possible cost.

The commencement of the Aubin basin (which ranges south and south-east, gradually widening in that direction) is about twenty-five English miles south of Aurillac, at a point where secondary rocks, chiefly calcareous, project across from the east, covering the gneiss to a great thickness, and meet a corresponding spur of oolite from the west. It is thus not only isolated in the crystalline rock, as is the case with most of the other basins named, but is almost surrounded and greatly covered up by deposits of the secondary period, which contain the valuable supplies of ironstone rendering the district so important.

Running southwards from Aubin, parallel to the escarpment of the oolites, and at no great distance, is a ridge of granite, at whose contact with the stratified rocks are numerous metalliferous veins of great promise; and as this is crossed by the valley of

the Aveyron, a river of some importance, the country is remarkably favourable for mining purposes.

The Aubin coal basin is chiefly worked at the southern extremity of the bell-shaped area which it occupies, and is there covered up by jurassic rocks. The coal seams repose on and are associated with pale shales, grey grits, and conglomerates composed of large and very unequal blocks of rolled rock, and seem to occupy an irregular trough. The boulders include masses of granite more than a cubic yard in contents, and innumerable blocks of smaller size. The dip of the beds is extremely variable near the edge of the basin, commencing at an angle of 70° , where thin beds of coal are seen with sandstones. The pitch gradually diminishes as we pass into the basin, and alters in direction, showing considerable local movements.

The valley in which the town of Aubin is built is small and narrow. It traverses the coal basin, and is drained by a small tributary of the Lot. There are already extensive iron-works and some other manufactories in various parts of the valley and adjacent country, and more must shortly rise.

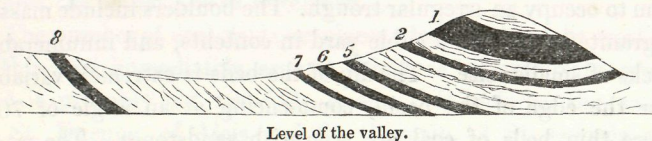
The coal-seams now worked near Aubin crop out on the sides of the hill facing the south. On the opposite side of the valley is a good section of the lower beds underlying the coal, which include some building-stones and a fire-clay of tolerable quality. Towards the upper end of the valley at Cransac is a village and some mineral springs of considerable importance. These latter are not at present very accessible, as the roads are only recently constructed and the accommodation is very poor.

The dimensions of the portion of the basin exposed, and in which the coal crops out at the surface, are about twelve miles in extreme length, with a breadth varying from one to five miles. The Aubin concession alone includes 1800 acres or thereabouts, and that of Decazeville is not less extensive.

There are eight or ten distinct seams of workable thickness cropping out in the Aubin valley, on the hill-side facing the south, and all these contain coal sufficiently good to justify extensive operations. The average total thickness of the beds is not less than 124 yards, as measured on the crop, and all this extent can be reached without sinkings. The roof of the different seams is generally a grit of tolerable hardness, and standing well without timbering. The floor is also generally of the same

nature. Over the roof is a large quantity of pyritous shale, which occasionally burns spontaneously for a long time, producing a singular appearance, not unlike that which may be seen sometimes near Newcastle, where the slack or small coal is left in heaps at the pit-mouth.

Fig. 2.—Section across the thick coal and lower seams in the Aubin coal-field.



Some of the seams worked in this basin are of very unusual thickness, but all appear subject to great and sudden variations. In one mine (les Etuves) the coal is as much as fifty yards thick where worked, and as the whole of this is near the surface (see 1, fig. 2) and above the level of the valley, it is found possible to pare away the surface and remove the coal by a process analogous to quarrying. The actual quantity of available coal in this seam in the Aubin concession cannot be less than 10,000,000 of tons, all above the valley; and the same bed, though disconnected, is repeated at intervals, and is worked in the Decazeville valley.

Two other seams (Fournal (3) and Bois Nègre (4), fig. 3) measure together no less than thirty-eight yards in thickness, and there are others from two to ten yards each where worked. The beds less than four or five feet thick are not even named. It must, however, be borne in mind that the thickness is not the same over any length of section, although the seams themselves appear constant*.

* The following are the names and average thicknesses of the different seams whose relative position may be judged of by the sections (figs. 2 & 3) in the text:—

	Yds.	Ft.
No. 1. Les Etuves (Pelonie haute)	50	0
2. Pelonie basse	4	0
3. Fournal	16	1
4. Bois Nègre	21	2
5. Fraysse No. 3 (Montet No. 1) (Bussonie No. 1).....	7	2
6. Do. No. 2 (Do. No. 2) (Do. No. 2).....	5	1
7. Do. No. 1 (Do. No. 3).....	8	2
8. Passelaygue (Bezelgues).....	10	2

124 1

The quality of the coal is variable, but generally sufficiently good for manufacturing and household purposes. The thick coal (*les Etuves*) burns with a long flame, and is valuable for domestic use; the twenty-yard seam cokes well, and would be valuable for locomotives, and for the manufacture of iron; some parts of it also yield a fair per-centage of gas. The *Passelaygue* (ten yards thick) is greatly valued as an excellent coal for the forge. It is clean and moderately hard, but is interstratified with a small band of shale and pyrites, making it desirable to wash the coal before coking.

Fig. 3.—Section across the middle seams of the Aubin coal-field.



The various seams have been hitherto worked on a system which may be described as a convenient combination of the pillar and stall with the long-wall method, a small proportion of coal only being left behind, and very little timber used. The cost of extraction is very moderate, and it is distinctly proved that any quantity of mineral can be brought to bank at a cost varying from a shilling to twenty pence per ton of twenty hundred-weight.

A few bands of iron ore certainly occur in these coal-measures, but none have yet been worked, and it is very possible that when attention is drawn to this subject, other and thicker layers may be found.

The south-eastern portion of the Aubin coal-field is covered up with beds of the triassic period, which are soon succeeded by soft red sandstones and oolitic limestones. Near Marçillac, the sandstones contain marls in which a considerable amount of copper has been found, chiefly in the form of a small gravel of malachite pebbles. The coal reappears in this direction on the edge of the crystalline rocks in one or two places before reaching Rodez. At this point several pits have been sunk and mines opened.

The Rodez basin (somewhat improperly so-called) consists of a series of beds of coal dipping heavily to the north, reposing on the schists and gneiss or granite of the Aveyron district on

the south, and covered up almost immediately, first by new red sandstone rocks of no great thickness, and then by hard calcareous beds of the liassic period. An extensive and important series of oolitic limestones next succeeds, and ranges for a great distance.

The ground where the coal crops out consists of a series of hills of some elevation flanking the crystalline rocks, and occupying part of the narrow space between them and the river Aveyron. The length of the crop is about six miles from Rodez to Laissac, but the coal reappears near Severac, a distance of about fifteen miles from Rodez, and is supposed to be continuous throughout. I saw no distinct proof of this, although it is by no means unlikely, and indeed there is little doubt that beneath the secondary rocks the coal-measures will ultimately be traced at intermediate points round the whole of the eastern side of the granite and gneiss of Aveyron from Aubin by Rodez, Severac and St. Afrique to St. Gervais, Graissesac, and the other coal-fields already known in the south.

The breadth of the Rodez coal-field as determined by the outcrop of beds of the carboniferous period is extremely limited. Of the coal-seams there are four described, but only two or at most three appear worth working. These vary in thickness from three to as much as eighteen feet each, but cannot, I think, be calculated on as having in all a greater mean total thickness than twelve feet. The middle part of the crop appears to have the thickest beds, but these do not extend many hundred yards without becoming nipped to about a third of their dimensions. The total distance between the crystalline rocks and the new red sandstone does not much exceed half a mile, and hitherto there has been nothing absolutely proved beyond that limit. The beds incline at angles varying from 30° to 60° , and the principal bands of coal are within a thickness of 100 yards of measures. The lines of outcrop, though really continuous, are difficult to trace, and the actual relation they bear to each other is imperfectly made out over most part of the field.

I considered it important to obtain an estimate, however general, of the total quantity of available coal in these concessions, and I therefore made the necessary calculations for the purpose. Owing to the great irregularity in thickness of the different coal-seams, and the very considerable slope of the beds, the

result is small compared with other concessions of anything like equal extent. I cannot anticipate a larger quantity than sixteen millions of tons as the available produce of the district I visited for all the seams, if worked to a depth of 150 fathoms below the water level. It will be understood that the absolute exhaustion of the field to this extent could not take place without a number of deep pits, each provided with all requisite machinery for extraction, and must take considerable time. From any single pit in this district some time must elapse before a quantity of coal amounting to 100 tons per day could be properly taken, as the whole of the preliminary works are yet to be commenced.

The first aspect of the Rodez coal is unfavourable, as it has a stony, dirty appearance and bad colour; but on further examination and actual trial, it proves to be much better than could be supposed. It burns freely with a moderately long flame and much heat. It does not die out rapidly, or consume quickly; and though the proportion of ash is not small, it is by no means excessive. It cokes well, and in large, compact and clean-looking pieces, and the coke, made after washing the coal, would certainly be well adapted to the manufacture of iron. The proportion of coke is about sixty-six per cent. of the washed coal. The present average cost of getting the coal and bringing to bank is considered to be nearly 3*s.* per ton. The cost of the coke properly made from washed coal would not be less than 7*s.* per ton.

The concessions brought under my notice include almost the whole of the field from Rodez to Laissac, a distance of between five and six miles. In most places the coal has been got by shallow pits, and foot-rails or small levels run in upon the coal at its crop. As much as could be carried off thus without timbering, shafts, or cross-cuts, has been already removed, and the result has been to some extent injurious to the upper part of the remaining coal. A large quantity of coal might, however, still be obtained by deeper adits entering in some places from the valley of the Aveyron, although no extensive mining operations could be carried on without arrangements being made for deep sinkings, in which it is not unlikely that there would be a large quantity of water*.

* Since my visit I learn that the coal has been lately reached by a shaft sunk through a moderate thickness of the new red sandstone, and that it is



The principal employment of the Rodez coal has hitherto been for local purposes, such as lime-burning, and for domestic use in the neighbourhood, and the average annual supply from the Bennac mine, the only one at present in work, is about 4500 tons. The greatest amount that has been taken from this mine in a day is sixty tons, nor does the system of working admit of greater development.

The profit has been large in proportion to the amount of sales, being in fact almost equal to the expenses. There is, however, little capital invested, and the cost of management is extremely small. It must be borne in mind that no opportunity exists for greatly increased development, as the demand is nearly, if not quite, supplied, and the market would hardly admit of any addition to the quantity without a reduction of price, nor even then to any great extent, unless the means of communication are improved.

The one great resource for this, as for all the adjoining coal basins, is the establishment of railway communication with the principal towns of the South of France. It is proposed to bring a branch of the Great Central Railway (the main line of which is now in course of construction) to the town of Rodez, and in this case all the coal property would become very valuable, as iron ores are abundant at no great distance.

The chief sources of iron ore to supply the Aubin and Decazeville furnaces, and others in these coal districts, consist of thick and widely extended deposits in the limestone rocks immediately adjacent, belonging to the oolitic period. There are also large quantities of other kinds of ore, valuable for mixing, brought from various places within a radius of twenty or twenty-five miles. Amongst these is a rich and valuable hydrous oxide from Perigord, and some other very rich peroxides combined with silica, from Lunel.

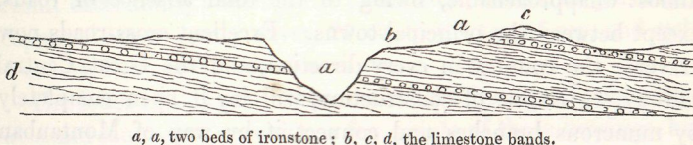
The jurassic rocks on both sides of the Aubin coal-field are remarkably rich in ferruginous deposits in the limestone. At Veuzac, near Villefranche, are two beds, each a yard thick, nearly horizontal, and close to the surface. The cost of getting is less than fifteen-pence per ton. The ore is partly pisolitic, and the beds are traceable on the surface for five or six miles.

much more horizontal and of better quality there than in the mines of Bennac, the nearest point at which it crops. This discovery greatly increases the value and importance of the mineral field.

The principal source of supply of calcareous iron ores is near the villages of Mondaluzac and Cadayrac, a distance of about twenty miles from the iron works at Aubin, but admitting of easy communication, as the deposit is situated on a somewhat lofty plateau, having an easy and almost continual descent of several miles to the valley. A railway was in course of construction at the time of my visit, which would convey the ores to the coal.

The following section will give an idea of the position of these ferruginous bands in the jurassic limestone.

Fig. 4.—Section across part of the Mondaluzac iron-field.



a, a, two beds of ironstone; *b, c, d*, the limestone bands.

The oolitic plateau consists of bands of hard limestone, covered in some places by (in others alternating with) thick beds of highly ferruginous limestone passing into pisolitic iron ore. Two distinct beds are recognized, one of which is worked, but others probably exist. The one in work contains from five to six feet of a dark purple ore of good quality, consisting of a mixed oxide and carbonate of iron with carbonate of lime, the yield averaging about twenty to twenty-two and a half per cent. Occasional bands of pyrites occur, but may easily be avoided, and some rich ochraceous portions may be noticed. In the state in which I saw it, this bed would give at least ten thousand tons of ore (equivalent to two thousand tons of iron) to the acre, and many square leagues of country are available. The other band is at least equally thick, and the quality appears to be quite as good.

The only objection to the use of these ores at Aubin and Decazeville is the cost of transport, which at present amounts to 6s. 8d. per ton. The railway, when completed, will reduce this cost to twenty-pence.

§ 2. COPPER, LEAD, AND OTHER METALS.

There are in France five metalliferous districts, none of which are at present in very active work. The most extensive of them

is that of the central plateau of France, including Auvergne, Limousin, Les Cevennes, and a number of other known localities. It occupies a vast space, but is not now the scene of mining operations, except in a few places where argentiferous galena and some copper ores are obtained, the former being the principal mineral. The southernmost extremity of this great plateau is situated in the department of Aveyron, and is partly covered by the coal-measures, new red sandstone and jurassic limestones just described, but it includes also several groups of metalliferous veins, formerly much worked, although of late nearly neglected. Till within a few years these veins were almost unapproachable, owing to the total absence of roads, except between the principal towns. Excellent cross-roads now traverse the country in every direction, and the Great Central railway, in course of construction, will lay it open completely by numerous branches and connect it by way of Montauban with the Bordeaux and Cette railways and the whole of the South of France, and also by other branches with Lyons and thence eastwards to Italy, and by Clermont with Paris.

Regarding Aubin as a central point, there are three metalliferous tracts around it capable of yielding ores of lead and copper. One extends about fifty miles towards the south-west to the towns of Najac and Pichiguet, along the western contact of secondary deposits with the crystalline rocks and schists of Aveyron. Another extends for about twenty miles towards the north-west to Figeac. The third extends nearly seventy miles towards the south-east to Milhau and St. Afrique, along the eastern contact of similar rocks. The chief towns of the district are Villefranche, Rodez, St. Afrique, Milhau, Najac and Figeac, but there are numerous villages and smaller towns. Three principal rivers, the Aveyron, the Lot and the Tarn, with several of their tributaries (the Alzou, Serène and Viaur being the most important), traverse the whole department of Aveyron, and some one of them is available both for water power and washing or dressing ores at every place where mining operations would be desirable. The district consists of elevated plateaux intersected by deep ravines, and the metalliferous veins are for the most part capable of being worked from adit levels run in from the bottom of steep ground near a stream.

It has already been mentioned that a granitic axis extends