

**Description**  
**of the**  
**Mountains and Valleys**  
**of**  
**Neuchatel and Valangin**

by

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Translated by

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2008

Translated from:

*Description des montagnes et des vallées qui font partie de la Principauté de Neuchatel et Valangin*, Neuchatel: Samuel Fauche, 1766 (second edition).

Other translations and books by Richard Watkins:

Berthoud, Ferdinand and Jacob Auch: *How to make a verge watch*, (1763 and 1827) 2005 (ISBN 0-9581369-6-3) (with E.J. Tyler)

Borsendorff, L.: *The history of a watch followed by a conversation on the horology industry between Mr Trotteville and Mr Vabien*, (1869) 2007 (ISBN 978-0-9581369-9-0)

Buffat, Eugene: *History and design of the Roskopf watch*, (1914) 2007

Crespe, François: *Essay on repeater watches*, (1804) 2006 (ISBN 978-0-9581369-8-3)

David, Jacques: *American and swiss watchmaking in 1876, reports to the International Committee of Jura Industries on the manufacture of watches in the United States*, (1877) 2003 (ISBN 0-9581369-2-0)

Favre-Perret, E.: *Philadelphia Exhibition 1876, report presented to the Federal High Council on the Horology Industry*, (1877) 2004

Francillon, André: *History of Longines preceded by an essay on the Agassiz comptoir*, (1947) 2005 (ISBN 0-9581369-7-1)

Graupmann, Emile: *The finishing of the watch case*, (1910) 2004

Grossmann, Moritz: *Prize essay on the construction of a simple and mechanically perfect watch*, (1880) 2002 (ISBN 0-9581369-0-4)

Hillmann, Bruno: *The keyless mechanism, a practical treatise on its design and repair*, (ca1920) 2004

Lalande, Jerome: *Jerome Lalande, diary of a trip to England 1763*, (1763) 2002 (ISBN 0-9581369-1-2)

Marsh, E.A.: *History of Early Watchmaking in America*, (1890) 2006

Marsh, E.A.: *History*, (1921) 2006

Societe Suisse de Chronometrie: *Some notes on Pierre-Frederic Ingold and the work of E. Haudenschild*, (1932), 2004

Watkins, Richard: *Mechanical Watches, an Annotated Bibliography of Publications since 1800*, 2004 (ISBN 0-9581369-5-5)

These are available from [www.watkinsr.id.au](http://www.watkinsr.id.au)

Articles by Richard Watkins:

*Berthoud, Harrison, and Lalande: A Near Myth*, NAWCC Bulletin, No. 359 (December 2005): pp. 773-743.

*Jacques David—and a Summary of “American and Swiss Watchmaking in 1876” with Emphasis on Interchangeability in Manufacturing*, NAWCC Bulletin, No. 350 (June 2004): pp. 294-302.

*Confabulations - A Humorous Look at Complications*, NAWCC Bulletin, No. 367 (April 2007): pp. 163-172.

These are also available from [www.watkinsr.id.au](http://www.watkinsr.id.au)

## The map

The map which accompanies this translation is from Johann Bernoulli *Beschreibung des Fürstenthums Welsch-Neuenburg und Vallengin*; this was published in 1783, seventeen years after Osterwald's book. Although a good, contemporary map, it has some faults. Most importantly, a few of the places mentioned by Osterwald are not named or have different names, and most minor roads and tracks are not shown. Also, it must be remembered that Neuchatel is a very small area, being only about 35 miles or 60 kilometres from end to end.

DESCRIPTION

DES

MONTAGNES

ET DES

VALLÉES

*Qui font partie de la Principauté de*  
NEUCHÂTEL ET VALANGIN.

SECONDE ÉDITION

*Revue, corrigée & considérablement augmentée.*



A NEUCHÂTEL

*Chez SAMUEL FAUCHE Libraire.*

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MDCCLXVI.

# DESCRIPTION

*OF THE*

## MOUNTAINS

*AND*

## VALLEYS

*Which form part of the Principality of*

# NEUCHÂTEL AND VALANGIN.

SECOND EDITION

*Reviewed, corrected and considerably enlarged.*

In NEUCHÂTEL

At Samuel FAUCHE Bookseller.

1766

## Advertisement.

This booklet was published in the *Journal Helvétique* of December 1764, and then a number of copies were printed from it. It owes its birth to a trip made by two young Lords in that part of the country which is the subject, one of rank and one of very distinguished merit. It was made up from some notes but there was not time to put them in a suitable order and form. The attention that the public gave to this trifle, the curiosity which it has excited in nearby countries, and the desire to make himself useful to his native land by making it better known, are the reasons which urged the Author to re-examine his work and try to give it some merit, either by including more insight on details, or by correcting it with regards to the manner of presentation. He has consulted various informed people, who had the kindness to provide him with their opinions, and he took advantage of a letter on the same subject, which appeared in the *Journal Helvétique* of February 1765, which described part of the *Mountains* that the two Lords did not have time to visit. He has dared to add some opinions to the description of the places. The feelings which animate him justify this freedom. Can one know the inhabitants of these happy regions without being interested in their fate and wishing to contribute by some means to their well being? Finally it does not contain anything other than that which was confirmed by himself, or by the testimony of people worthy of faith. When truth alone is enough to excite a legitimate curiosity, it would be supremely ridiculous and unforgivable to include the fictitious and even to allow exaggerations.

## DESCRIPTION

Of the MOUNTAINS and VALLEYS which form the Principality of  
NEUCHATEL and VALANGIN.

The Principality of NEUCHATEL and VALANGIN is contained partly in the mountains, in which the ridges, running parallel from east to west, are separated by more or less broad, small valleys, and all are well populated. As a result it is like an amphitheatre, crowned by mount *Jura* which limits this state in the west and north. These small valleys are the *Val de Travers*, the *Val de Ruz* and the *Vallons* (the small valleys), which are in general called the *Mountains* and which are situated in the highest part of the country. Various natural curiosities that are seen here, together with the rare genius and the extraordinary industry of their inhabitants, make these places famous throughout Europe and often attract foreigners, distinguished by their station and their knowledge. It is in the light of giving clear directions to those, for whom such a reason determines them to undertake this small journey, that I propose to describe the country, which deserves to be seen, showing the route which it is advisable to follow to survey it completely.

But first it should be observed that, as we find in these mountains narrow, gravel roads, we are obliged to use a type of carriage called a *Charabanc*. It is none other than an ordinary carriage with four wheels, on which there is a padded bench, long enough so that three people can sit themselves there conveniently. It has a back, a footboard and is surmounted by a top. The facility to alight and remount justifies the choice. If it is supposed that a traveller thus leaves Neuchâtel, with the intention making a tour of the mountains, here is the route which he should take and what that route will be able to provide him of most interest.

Hardly have we left the walls of the capital, heading west by the highway to France, than we start to ascend by way of *Peseux*, a village half a league<sup>1</sup> from the city, located at the foot of a mountain covered with oak and fir trees, and surrounded by fields, vines and orchards. A quarter of a league away and immediately below is *Serrières*, a small village remarkable for its forges, iron drawing, copper foundries, paper mills and water mills. A river, which bears the same name and which emerges from a crag very high up, puts into motion a multitude of wheels in a very limited course, from a few paces from its source until it reaches the lake where it has its mouth.

From *Peseux* we go to *Corcelles*, a village not very far from the former, where there was a priory before the Reformation, and we arrive a few moments later at an elevated place where we can see, in addition to these two villages, those of *Cormondreche*, *Auvernier*, *Colombier*, *Bôle*, *Cortailode*, *Bevaix*, the small town of *Boudry*, the mouth of the river of *Reuze* and the plain of this name. We can also see the buildings of several printed calico factories which, with the view of the lake in which this plain advances like a headland two leagues wide, form a very pleasing and varied view. These villages are large and stone-paved for the most part. The houses, which are built of stone and covered with tiles, announce the comfort of their owners. Agriculture, trade in wines, fishing, industry, all seem to contribute to ensure the good being of the latter. For nearly 40 years printed calico manufacture has been established and has multiplied in the lower part of the Principality of Neuchâtel; we count ten today, all of them flourishing, where more than 80 thousand bolts of fine calico are manufactured annually and which employ 14 to 15 hundred people of both sexes. These manufactures certainly distribute considerable sums throughout the country, but agriculture suffers and the quantity of wood which they consume requires a redoubling of vigilance and economy, in the administration and the exploitation of the forests.

Beyond *Corcelles* the vineyards finish. We continue to go up gradually, and after going through a forest of fir trees for an hour, we arrive at the small village of *Rochefort*, the chief town of a mayoralty or jurisdiction, large enough that in the past it had the title of a barony. This place is nearly above *Boudry*. Its surroundings offer to the eyes only meadows, fields and undergrowth. It does not appear that the people attend to the regular irrigation of the meadows, though there is water in abundance. The great slope of the land makes it more difficult, but not impossible.

Close to *Rochefort* rise two mountains, *Tourne* on the right and *Boudry* on the left. Their respective ridges form a gorge in the bottom of which, at a considerable depth, is the bed of the *Reuse* and beside

1 A league is approximately 3 miles. As shown on the 1783 map, there were three different leagues, but Osterwald doesn't specify which he is using; presumably the Swiss league. The distances specified by Osterwald do not always agree with the map.

which is the road which leads to the *Val de Travers*. At the entrance to this gorge there are steep heights on both sides, of which the southern-most is a precipice which ends at the river. On the summit are the ruins of a castle in which lived the former barons of *Rochefort*. A tradition exists that they used its advantageous situation to hold to ransom the travellers obliged to pass their grounds, and that this castle was demolished by the inhabitants of the nearby villages who were perpetual victims of their tyranny. The highway always stays beside the river in the bottom of the small valley, in which there is a hamlet called *Champ du Moulin*, where gunpowder is manufactured. The road is continuously bordered by undergrowth and the wild aspect of these mountains forms a perfect contrast to that which we have just left.

The roadway which leads to the *Val de Travers* is solid and well made. A little distance from *Rochefort* is a place called *Roc coupé*, because the mountain was cut vertically to make enough width for the road. Soon after we discover on the right and on a height the hamlet of *Freitreules*. All along this road only forests of fir trees and beeches are seen. It is of first importance to the people that these are exploited with as much intelligence as economy. There are also meadows and some fields where mainly small grains (barley, oats, etc.) are sown, and in spite of the steep slope of the ground the inhabitants use it down to the bottom of the small valley.

After having gone a league from *Rochefort*, we arrive in the small village of *Brot*, surrounded by fields and orchards. The rocks of which this road is made are calcareous yellow stone. In it are found some fossilised marine bodies, but the grain is coarse and consequently the figures are badly formed. At some distance from *Brot*, we pass close to a very high crag which dominates and even advances onto the road. It is of a yellow stone divided into very thin layers which break up, and from which fragments fall rather frequently. The road, which is very narrow, extends from the foot of the crag to the edge of a dreadful chasm, at the bottom of which the *Reuze* flows through rocks. These two alarming features, extending for a distance of about two hundred paces, form a striking spectacle, and the presence of a double jeopardy that can only intimidate the traveller. However, although this road is much used there are no reports of accidents there. This place is named *Le Cluzette*. Opposite, on the left and beyond the chasm, part of the ridge of the parallel mountains swells and forms a half ring of vertical crags. Inside is a small valley in the middle of which rises an isolated hill. This place is called *Creux du vent* (hollow of the wind), because of a wind which blows there continuously. It is known for the many rare plants that are found there and by an echo which, when it is brought into play, imitates the noise of thunder perfectly.

After passing *Le Cluzette*, we arrive at a rather steep descent which leads to *Noiraigne*, which properly begins the *Val de Travers*, and less than half a league further on is the hamlet of *Rosières*, both lords' manors. *Noiraigne* is on a river which bears the same name and turns several water wheels before it flows into the *Reuse*. Here are various iron works; there are a great number of nail-smiths and coal-men. At this point the small valley, which separates the two ridges between which we travel, rises suddenly and the chasm, which for so long and so unpleasantly we have travelled beside, changes into a beautiful meadow through which *Reuse* runs. But we see with some displeasure that the land is mainly low and marshy, that there is no benefit in watering it from the river and that no-one has worked, as elsewhere, to drain the stagnant water. By tracing a bed in a straight line to the *Reuze*, which winds through this meadow, which would be neither difficult nor extremely expensive, I think both of these disadvantages could be cured. The village of *Travers*, half a league past *Rosières*, is also a lord's manor and the seat of a jurisdiction. It gives its name to the valley and it is from there that we first see it in all its extent. In this place there are 320 lace workers, just as many clock and watch makers, and manufacturers of stockings. There is also a hot press for printed calico, whose wheels are driven by the *Reuse*, which saves expensive labour by the action of a simple and clever mechanism.

*Couvet*, where we arrive next, is the same distance from *Travers*. This large village is well built and in a most pleasing situation. Its church is decorated by a recently built stone tower. The houses here and in other places in this small valley would not disfigure large cities. There is a printed calico factory which employs several workmen. *Couvet* produces horologists and architects skilful in their art. In particular it is the birthplace of the famous *Ferdinand Berthoud*, who is known by his distinguished talents in horology, on which he gave to the public an excellent treatise, and by the success of the marine clock that he invented for the determination of longitude. He normally resides in Paris and is member of the Royal



Society of London<sup>2</sup>. The land which surrounds this village produces excellent wheat, and very close is the hamlet of *Plancemont* where iron mines are found in abundance.

A quarter of a league further on is *Motiers*, which is the main and oldest village in this small valley.<sup>3</sup> It is the normal residence of the lord of the manor or head of the jurisdiction of the *Val de Travers*, which includes six communities; those of *Motiers*, *Boveresse*, *Couvet*, *Fleurier*, *Buttes* and *St Sulpy*. He is judge on the royal court of the states of the country and the company of the justices, and he chairs their assemblies in *Motiers*. This village has several well built houses. That belonging to Mr. *D'Yvernois*, Treasurer general and Counsellor of State, is easily distinguished and visitors should not neglect to see the apartments. The building, which is still named *Prieuré*, was used before the Reformation to house a prior and twelve friar canons having a very good income; their income was then joined together with that of the prince. Several inhabitants of *Motiers* devote themselves to clocks and watches; such are the Seigneurs *Jean Renaud*, brothers, and Seigneur *Clerc*.<sup>4</sup> One should not omit Seigneur *Rossel*, goldsmith and watch case maker, and very skilful in this art. The elder Seigneur *Jean Renaud* perfected the pumps used to extinguish fires in chimneys and apartments, he manufactures a very great number of them for export. Several old noble families, such as the *Terreaux* and *Baillods*, originate in *Motiers*.

A little distance south of this village is a castle located on a crag which is very steep on three sides. Its antiquity is such that the date of its construction cannot be determined; there is nothing there, or in the history of the country which sheds any light. Only that it was proposed, two centuries ago, to rebuild it because of its decay. The former barons of the *Val de Travers*, originally from the *Franche-Comté*, made it their residence. It contained, in addition to tenantable buildings, a chapel, prisons, a fountain in the court, and a cistern of which we still see vestiges. It was enclosed by walls 6 feet thick strengthened by round or square towers. Today most of this castle is in ruins or has been demolished. What remains is used as housing for a caretaker and a prison. The dungeons are underground and receive light only through one narrow opening in the higher part of the vault. One of the apartments which has been preserved has a large basin which appears to be a bath.

The mountains which limit the district of *Motiers* to the south contain several remarkable caves. The largest is one league long. Its opening is between two perpendicular crags which are more than 80 feet high. A torrent falls from the top of these crags and forms a beautiful cascade. In the eastern crag is a cave which begins as a large, arched hall, 31 feet high. Further in, the arch flattens until level with the ground, leaving a single opening which can only be penetrated while lying on one's belly. On the right-hand side is a broad slit in the higher rock through which one can also enter. Here candles are lit, which one must provide for oneself. Initially there is a vast, wide area, in the bottom of which there is usually water. We then go up quite easily and arrive on a level surface, covered by stones probably fallen from the overhead vault, which is 50 feet high at its greatest and 15 feet at the least, over a proportional width. At certain times of the year the sides of this cave are covered by large masses of *Lac Luna*, or very white *Lait de Lune* (moon milk). When you take it from the rock which produces it, it is extremely heavy and if you squeeze it water comes out. But if, after having detached it, you put it in a well glazed earthenware pot, seal it tightly and let it dry in the shade, the matter preserves all its whiteness, does not decrease in volume, becomes porous and light, without one being able to discover what became of all the moisture in which this milk was dissolved. Is it volatile, or does it become a solid, and in the latter case why does this matter lose weight? It is a question to put to physicists. While crossing the interior of this vast cave we find several basins filled with the water which continuously trickles from the vault. They are surrounded by a matter similar to marl<sup>5</sup>, the edges of which narrow as they rise and cover the water which they contain; so strong are they that a basin which is more than six feet in diameter at its base is less than three at its highest part. It is obvious that it is the water falling from the vault which produces this marl, since it is easy to

2 Ferdinand Berthoud applied for fellowship of the Royal Society in May 1763 while he was visiting England. He was accepted in February 1764.

3 On the 1783 map, *Motiers* is a little way off the highway and reached by a minor road, shown by a thin, continuous line. The many dotted lines on the map are the boundaries of districts, not roads. Only a few minor roads are shown.

4 *Seigneur* translates as *Lord*, or perhaps *Sir*, neither of which I feel are appropriate. I have kept the French word which I think should be interpreted rather vaguely as indicating more status than *Monsieur*.

5 A fine-grained mixture of clay, calcium carbonate (including shell fragments) and magnesium carbonate, forming a loam used as a fertiliser.

see the successive increases in height and thickness, and what is unique is that all the undulations which falling drops usually form on water are seen solidified on the surface of the edges of these basins. The differences in these undulations when the rock distils more abundantly can be seen, because the layers are then larger and the folds deeper. These basins are soft at their ends, but what has solidified previously is entirely petrified without having changed its external form. This cave has a great number of vents, even some on the sides which are rather large so that they can be entered for a long way. Everywhere one notices various bizarre figures in which the imagination sees resemblances, but which are only petrified *Lait de Lune* masses. There are other places where the higher rock distils an earthy substance, which has the colour of umber, on the stones of the floor. It is so fine and loose that on being reduced to a powder it becomes impalpable. Finally, the only animals which are found in this vast underground place are bats. At the end of a league the floor of the cave narrows and does not allow one to go any further.

The crag to the west of the cascade is entirely hollow and has several openings 30 feet above the level of the ground. Bubbling water spouts out and forms a brook which is called the *Sourde*. Inside the largest of these openings is another rather roomy cave which penetrates deep into the rock. But it cannot be traversed, because within 30 feet of the opening there is a well which occupies the whole width of it. If stones are thrown into it, one hears them fall, bouncing against the sides, for more than two minutes before they finally fall into water. The district of *Motiers* also contains several very wholesome mineral springs; the most remarkable is close to this village. By an analysis which was done, it is found to be hard, sulphurous and impregnated with a nitre salt. It used to suffer some deterioration caused by a torrent in the vicinity which was prone to overflow, but precautions were taken to make it safe from this disadvantage. Amateurs of natural history will find in this district quantities of marcassites, figured stones, large and small horns of Ammon, Echinites, Madrepores, very beautiful Dendrites, Boucades and Scallops of all species. We see how much the Principality of Neuchâtel and Valangin in general provides fossil shells and petrified sea plants.

*Boveresse*, a hamlet north of *Motiers*, has a sandstone quarry. In the cavities in the rock in the nearby mountain, there are natural refrigerators, deep enough to provide abundant ice, even during the hot days of summer. It appears by certain indications that vines were once cultivated around here. Several inhabitants are horologists or arms manufacturers, and there are famous architects such as the brothers *Raymond* and *Borel*. An explorer of mines discovered one above this hamlet whose matter is mixed with yellow stone. Judging by what we find on the surface of the ground, it must be genuine black amber. This mine was never worked.

Half a league from *Motiers* is *Fleurier*, a village located on flat and smooth land, and the inhabitants only have wells. A brook running from the nearby mountains crosses it and presents a peculiarity; it is that the fish species called *Voiron* cannot live there, although the *Reuze* and the other brooks of the *Val de Travers* are filled with it, and even though trout nourish themselves there like elsewhere. In this place all kinds of skilful horologists are found. Such as Seigneur Captain *Dupasquier*, Seigneur Lieutenant *Jequier*, Seigneur *Vaucher*, etc. There are also edge-tool makers, known for the quality of their work, and several traders.

*Buttes* is located at the western end of the valley and is a large parish. Clock and watch makers, such as the *Leuba* brothers and others, are found there, but the majority of its inhabitants are masons<sup>6</sup>. The small valley, in which *Buttes* is situated, is narrow and the mountains which limit it to the south are so high that part of the village does not see the sun for nearly three months in the year. However the surrounding soil is fertile and produces excellent small grains. Close to this place flows a torrent bearing the same name; it is impossible to contain it in a fixed bed and the land bordering it is often devastated. Initially it crosses a small valley one league long and so narrow that in many places it occupies the full width of it. Formerly there were furnaces for melting iron from the abundant mines, but this establishment was destroyed after exhausting all the nearby forests. Then a mill for grains and boards was built in the same place. The crags which surround this small valley are very high and very steep. There is a gorge which is only 7 to 8 feet wide and to the north is a cave called *Bauma*, whose opening has the shape of a second-rate carriage entrance. When the snows melt, or after prolonged rains, an extraordinary

6 *Masson*. The only references to this word that I have found are in the *Dictionnaire de l'Académie française*. It does not define the word, but it indicates that *masson* is a material, not an occupation, probably something like cement. So I assume it is an old spelling of *maçon*.

*Description of the Mountains and Valleys of Neuchatel and Valangin*

quantity of water leaves there. Sometimes during summer a mournful and alarming noise is heard inside this cave, and this noise is looked upon as a certain prediction of rainy weather of long duration. Half of a quarter of a league further on, while always going up, is another small valley through which a brook named *Longeaiguë* flows, and which ends in a gorge of rocks from where the water cascades. A mill known by the name of *Moulin des Enfers* (Mill of Hell), undoubtedly to express its dreadful position, was built in the depths of these rocks, which was made more dangerous by the falling stones which are often detached from the nearby rocks.

*St Sulpy*<sup>7</sup>, the last of the villages of the *Val de Travers*, is to the north-west and in a place surrounded and squeezed by a circle of crags, the land which they contain sloping on all sides. To reach this place one enters a gorge formed by two ridges and whose width is occupied by the bed of the *Reuze* and the main road. Formerly there were iron melting furnaces, that were abandoned because of the dearth of wood. All the inhabitants of this village, not having arable lands around their homes, devote themselves to arts and trades. There is a factory for chamois-leather in bronze and morocco colours, whose goods are mainly exported to Italy. There are also clock and watch makers, wood engravers for the printing of calico, founders, tanners, cutlers etc. A warehouse for these goods has been established there. Above *St Sulpy*, in a rough place of crags with a most wild aspect, is the source of the *Reuze*, remarkable for the beauty, limpidity and abundance of its water, which at a small distance turns the wheels of several paper mills, grain mills, forges, trip hammers, oil makers, threshers etc. In the north is another spouting spring called *Bena*, which leaves a crag, cascades down in gutters and drives a tanning mill. The top of this crag carries a signal intended to be lit when needed in times of war, according to the custom established throughout Switzerland. The surroundings provide fossils of various species. Curious people will not pass *St Sulpy* without seeing the beautiful collection of marine shells that Mr. *Theodore Meuron* has. There they will see the perfect resemblance of them to their fossil analogues, which abound in the nearby mountains.

But we should not omit from the description of the *Val de Travers* the *Asphalt* mines that are found there in various places. The first veins of this mineral were discovered towards the beginning of this century, in a garden of the village of *Buttes* by a German adventurer named *Jost* who, after having obtained permission from the Government, started to work the mine in liaison with *Jean François Guillaume*, of *Verrieres*, with whom he was associated. These two entrepreneurs built a furnace and pots, extracted oil from the *Asphalt* and made cement. But they realized at the end of a year that the mine was exhausted and they could not continue. The German, hoping for a great fortune, turned spendthrift and then disappeared, and his associate did not attempt any new enterprises of this kind. In 1712, a man named *D'Eiriny*, who said he was a Greek and who was erudite and a good physicist, came to the *Val de Travers*. He discovered abundant *Asphalt* mines in the manoralty of this name, which were apparently inexhaustible, mainly in the surrounds of *Bois de Croix*. Initially he solicited and obtained permission to work there in the capacity of primary tenant, with an agreement on behalf of the Prince. He wrote *Lois des mines* (the Laws of mines), which was printed in Besancon. He divided the fee into 400 shares, sold some to various private individuals and thus formed a company of entrepreneurs of which he was the head. The *Guillaumes*, who had worked in the mines at *Buttes* were of this number. They built a barracks and furnaces. They extracted from this mineral a great quantity of oil and cement. One of the associates was sent to Paris to get more sales and work continued for approximately 20 years. But then the charms of profit led to several robberies and cement was manufactured clandestinely. The owners were disgusted with the company, the *Guillaumes* were sent away, the barracks fell into ruin and *D'Eiriny* died. Since then activity has been restricted to extracting *Asphalt* from the mine and selling it unprocessed.

Such are the six villages which form the jurisdiction of the *Val de Travers*, and the most interesting things that can be seen there. The air there is known for its purity and healthiness. It is undoubtedly the primary cause of the singular cheerfulness which generally animates its inhabitants. They are for the most part enlightened and industrious. Their spirit is gay and freer than that which people of the countryside usually have. Placed on the highway and in the vicinity of France, they appear to want to imitate that nation by the warm reception which they give to the foreigners who pass by, or who very often remain with them, and especially in *Motiers*. There is not one who does not praise them for their courtesy, the gentleness of their manners, and their kindness and beneficial character. Only one foreigner, who claims

<sup>7</sup> *St. Sulpice* on the 1783 map.

to have been persecuted in all the places that he honoured with his presence, appears to have undertaken to destroy the opinion generally given in this respect. But being a man of paradoxes and being where all was very foreign to him, such a charge is contradicted by so many facts and witnesses that it must be considered as only one new paradox by which this famous writer enriches his collection. Those of the inhabitants of the *Val de Travers* who enjoy a degree of comfort, seek to increase their knowledge and form various societies for recreation. Several citizens of the capital are in the habit of spending the fine season in *Motiers* or *Couvet*. In addition to the various arts which these people cultivate in their homeland, a great number of them, masons or carpenters, leave each spring to work in Geneva and in the country of *Vaud*, and return to spend the winter in the bosom of their families. The women make laces with so much assiduity that these articles have become the subject of a very considerable trade.

In the census of inhabitants of the *Val de Travers* made in 1764 there were found 90 clock and watch makers, 28 traders, 136 masons, 736 lace makers and 3,847 souls in all. These pleasant people are not offended if one reproaches them for some neglect of agriculture and the rural economy. Their fields in truth are well cultivated, but they do not try to drain their low meadows. It would be easy to use the water of the *Reuze* to improve the others, as is practised in several valleys of the canton of Berne. Visitors can only be astonished that such a beautiful valley is almost entirely stripped of trees. By increasing and replanting their forests, they would be able to exploit the rich iron mines by which they are surrounded and to successfully establish forging mills. In the same way very beautiful plantations could be established on the highway, which is very bare, along other roads and around the villages, mainly in *Motiers*, where the valley is broadest. Aquatic plants would succeed very well in the low lands and along the *Reuze*, whose frequent overflows make the land marshy close to its bed. It could be said that this beautiful river, rich and invaluable for nature, from which one could obtain such an advantage, damages rather than profits the people, because they only make use of it to prosecute various arts and neglect to employ it for the most essential of all. One sees between *Motiers* and *Boveresse* five cut-stone bridges built over the various beds of the *Reuze*, which often changes course, overflows and covers the nearby meadows with sand and stones. It would be much better, I think, to dig a bed in a straight line at the foot of the mountains, *St Sulpy* to *Motiers* and *Motiers* to *Couvet*. Initially there would be some expense to the parish for implementing such a project, but if one takes into consideration the losses caused by frequent floods, the expenses necessary for maintenance of the bridges and roadways, the enlarging of the useful land area, the betterment of the meadows, and the draining of those which are marshy, one will easily see the advantages of this plan, even by estimating the profit and loss for only 50 years. Finally there are excellent salmon-trout in the *Reuze*, but they do not normally exceed two to three pounds in weight.

After having seen the *Val de Travers*, travellers usually take one or other of two routes; to continue to the western end of the country and then to head towards the east to arrive at *Brévine*, which is the gateway to the district properly called the *Mountains*; or to go directly to this village by crossing over the heights which separate it from *Motiers*. Both routes will be described successively. Supposing that the first is preferred and that we have arrived in *St. Sulpy*, immediately at the western end of this village there is a gorge as long as two gunshots, formed by two very high crags which are so close to each other that they leave only enough space for the highway. A long time ago a very strong chain, which gave its name to this passage, was attached to one these crags and was used to close it when needed. It would be easy for a few people to stop a large body of troops in this place. In times of war a guard corps is seen in a rock hollow, that nature seems to have intended for this purpose. There was once a wooden tower, built to better defend this gateway to the country. The remains of a covered way are still to be seen there. When in 1748 this part of the highway was widened, there were found the remains of a vault which had collapsed, iron arrowheads of great hardness, pieces of oak whose purpose is unknown, and some bronze medals.

On leaving this gorge, we see a depression formed by two hills joined together and which is called the *Combe à la Vuivra*, the name of a monstrous snake which had once lived in these rocks and afflicted the surroundings, so much so that the people were obliged to make a bypass for the main road to France at *Buttes*, where there is still a road called the *Vie Saunier* or the road for the salt which was conveyed that way. This fact is rather extraordinary, so we stop there a while and recall the main circumstances by examining the evidence on which it is based. It is related that towards the end of the 14th century a monstrous snake, which was given the name *Vuivra* (apparently a corruption of *Hydre*), was situated near the

tower of *St Sulpy*. It devoured people and animals, and had rendered the highway to France absolutely impassable. After having devastated this district with impunity for three years, a citizen of the village of *St Sulpy* named *Sulpy Raymond* undertook to deliver his homeland from this plague, and here is how he did it. He first discovered the cave where the monster had its lair and he then observed that it always sought its prey at same hour. To make use of this circumstance, he built a rather large box that he could fit in conveniently; it had holes, and the side facing the lair was sloped and the top part of it furnished with glass. He transported this box to a convenient place close to the cave and stayed there for several days in a row, provided with small stones to throw at the animal. It was initially irritated by this assault. However little by little it accustomed itself to this horse-play and to the sight of the box until it remained quietly in its lair and it was not long before it fell asleep. *Raymond* had noticed that the rays of the sun inconvenienced it and obliged it to coil itself up tightly. He thus picked a day when the sun glared down to try this perilous adventure. He was locked up in his box armed with a crossbow and a halberd. The snake returned from hunting, made its customary tour of the box, returned to its lair and, inconvenienced by the rays of the sun reflected from the glass, coiled itself up and entirely covered its head. *Raymond*, at this favourable moment, shot an arrow and the wounded animal thrashed about with great violence. Other arrows followed and *Raymond*, judging it was weakened enough by the quantity of blood that he saw it losing, left the box armed with his halberd and attacked it, trying to cut off its head. But the animal, while rolling about, lifted its tail and trapped him under it. Fortunately, after having struggled a long time, he was released. He again took his halberd and finally the monster expired under his blows. Exulted by so great a victory, he hastened to announce it to the people of *St Sulpy*.

We gather that everyone went to the place where the combat happened, found the animal dead and it was burned on the spot. This courageous man only just survived his triumph. He died two days later, from the venom mixed with the blood with which he had been covered, or by his wounds, which is more probable. Such are the principal circumstances that are generally considered as true. An old manuscript exists which fixes the date as the year 1273. A small printed book has been seen which contains the details that you have just read. The people did not fail, according to their custom, to add several fabulous features and to give to the snake as many heads as the *Hydre de Lerne*. In addition to the places close to the village of *St Sulpy* which bear the names of *Combe* and *Fontaine de la Vuivra*, above the ground where the tower was placed is a high crag which marks the frontier between this community and that of *Bayards*, and which is known since ancient times as the *Roche à la Vuivra*.

Such an essential service for the homeland deserved a great reward. As the same tradition tells it, Count *Louis*, under the reign of whom this event occurred, freed this brave *Raymond* and all his descendants by an inalienable estate, exempted their land from all manor taxes and tithes, granted to his house right to carry a standard and to sell wine without paying, like others, the tax called *Tavernage*. Finally he granted this house the right to give asylum for 24 hours to any criminal who took refuge there. Such glorious prerogatives, such considerable advantages, should still have their effect on the descendants of *Sulpy*, and nothing would better prove the truth of this history. But in addition to the ignorance which reigns, the *Raymond* family is numerous, the branch in question merged with others and relapsed to the same level. A few years ago an attempt was made to establish the particular genealogy of this family, and it was proposed to research the public records; if those of the 14th century have been preserved, there will probably be some success. Among the personal vassals who were freed by *Sulpy Raymond* was one who is called the *émine de la porte*, about whose name it is interesting to know the origin. Before the barony of the *Val de Travers* had been joined with the earldom of Neuchâtel, by the agreement with the house of *Vergy*, several families established in this district were obliged to form the guard for the gate of the Castle of *Motiers*. But after the union, the Prince exempted them on an annual payment, for each tenant's holding, of a *émine* of wheat<sup>8</sup> and two cartages during the vintage. Today, the wheat is paid in kind, the cartages are appreciated, and these people are called *Francs sergeants*.

Continuing to travel west, we enter the part of the ridges in the jurisdiction of *Verrieres*, which includes five communities. The first three are contiguous and form the parish of this name, and the other two that of *Bayards*. There is a third to the south which is called the *Côte aux Fées*. We will travel through them successively.

8 A measure of about 23 litres.

The village of *Verrieres* is large, well populated and the houses are separated from each other. It is located in a narrow valley, between two parallel ridges, and covered with forests. The bottom is marshy and provides peat. The remainder of the land, although stony, is fertile enough for grains and pastures. The inhabitants are in general active and industrious. Many devote themselves to trade, that their situation on the border favours, others follow occupations whose product is exported. There are approximately 30 traders established there, and a greater number who sell laces to the nearby people, as many clock and watch makers and 200 lace-makers, known for their skill. The horology industry in particular flowers there. The *Tatet* brothers are distinguished in this art and have a big business, having a house in Paris for this purpose. *David* and *Jean Pierre Guye* acquired a reputation for the excellent clocks which leave their hands and which they export to France and Italy. A factory for cotton fabrics has been established in *Verrieres* which employs several workmen, and another for playing cards. Also found there are arms manufacturers, metal workers, very skilful balance makers, manufacturers of stockings etc. Agriculture and the rural economy are not neglected. The inhabitants benefit a great deal from their excellent pastures, where more than 400 cows normally flourish; they make cheeses which are sold advantageously to the outside and produce considerable sums annually. One sees in the village of *Bayards*, which is east of *Verrieres*, the same arts cultivated and the same activity. A general emulation seems to animate the people and induces them to excel as much as possible, each one in the type of occupation to which he is suited.

The parish of *Côte aux Fées* is one league to the south of *Verrieres*. It is made up of ten separate hamlets and several isolated houses. The church is located in the largest. Though one finds various artists there, like elsewhere, the inhabitants are mainly devoted to agriculture and raise a great number of cows and horses which they trade. The cheeses from there are highly esteemed and the way in which this part of the rural economy is controlled deserves to be mentioned. All the inhabitants of a hamlet, who have cows, join together and rent a fruit-loft, sharing the common expenses. Each one takes his milk, well measured, to the place chosen for the cheese factory and draws his share of the whey, pressings and butter, proportional to the quantity of milk that he supplied. The season finished, they sell their cheeses wholesale, pay for the fruit-loft, pay those who provided accommodation and wood, and divide the remainder according to the ratio of the shares. The people of *Verrieres* and *Bayards* do the same. The pastures of the districts become richer by using marl, which abounds in these regions and which is used as manure. The places from which it is obtained are known for the marvellous quantity of fossilised marine bodies of all species that are found there. It is claimed that the *Côte aux Fées* was formerly a manory given by prerogative to a natural son of *Berchtold V*, Count of Neuchâtel, who built a castle there, of which one still sees the ruins on a small height. This manory must have remained until the time of a plague which carried off most of the inhabitants. The mountainous and uneven land that these hamlets occupy is pierced by various more or less vast caves. The principal one is the *Baume aux Chèvres*, at the top of the *Verrieres* mountain and which marks the frontier between the Franche-Comté and the State of Neuchâtel. A second one is in the middle of a plain filled with rubble and its entrance is quite large; when stones are dropped they are heard leaping from rock to rock for 6 to 7 minutes. It bears the name of an inhabitant of the *Côte aux Fées* who, wanting to get the reputation of a magician, descended into it, and on his return he described the alleged wonders which he had witnessed. Several years ago a person was assassinated close to this cave and the murderers threw his corpse into it. One of his shoes remained outside, was found and recognized. *Zacharie Jeannet* had the courage to be lowered into this deep cave suspended on ropes. He discovered the corpse on a rock ledge more than 200 feet down and both were fortunately pulled out.

But the most famous of these caves is that which bears the name of the *Temple des Fées* (temple of the fairies), from which the parish itself took its name and which is visited by a great number of the curious from various countries. Here is a description. This cave is a little distance from the hamlet called *Derriere le Crêt* and south of *St Olivier*. At first we cross a small plain which leads to an extremely steep descent and then to a kind of platform. From there we see a crag 200 feet high to the south, which dominates the *Longe aigue* of which we spoke, and at the foot of which is an opening in the shape of a flattened vault 6 to 7 feet wide. This is the gateway to this famous temple and it can only be entered by crawling on one's belly. But after a short distance the vault rises considerably and we enter a kind of hall surmounted by snow-white vaults, with a pillar which appears purposely made for their support. After which the cave is divided into three parallel alleys by decorated pilasters which rise from the bottom of the cave to the

*Description of the Mountains and Valleys of Neuchatel and Valangin*

vaults, and the two side ones are lower and narrower than the middle one. These pilasters were obviously formed by successive distillation of water from the overhead rock which petrified; also they are not plain but irregularly grooved and present various strange figures. The vaults are entirely encrusted with the same matter. The two alleys on the right and left are remarkable only for a fountain which is in the latter and a smattering of brine. The middle alley is approximately 200 feet long, 6 wide, varies in height, and has fine, hard sand on the floor. When we arrive at the other end there is an opening larger than that which is used to enter the cave. From there all of the *Val de Travers* can be seen at the foot of a precipice of at least 400 feet. Opposite this underground alley there is another longer and narrower one that has never been traversed for its full extent. Such is the interior of this cave, which common opinion would like us to believe is a monument of highest antiquity and the remains of paganism, but it is undoubtedly just the work of the nature, who was pleased to decorate it with stalactites laid out more regularly than we usually find in other caves of this kind. The ratio of the three alleys, with a nave and low sides, is probably what created the idea that this cave was a temple. Finally, one should not finish the description of the *Val de Travers* without adding that the mountains provide a great number of rare species of excellent medicinal plants whose botany is unique.

Travellers whose curiosity led them to *Verrieres* usually leave these districts only after having seen the *Joux* Castle which is one league to the west. It is a fort located on a very high point of the Jura and overlooks the passage, cut into the ridge of this mountain, which leads to the Franche-Comté. Nearby the sources of a small river called the *Venôge* can be seen, which, running roughly south, naturally divides its waters into two halves; one of which goes into Lake Geneva and then by the Rhone into the Mediterranean to the south, while the other enters Lake Neuchâtel from whence, by its connection with that of Bienne, the Aar and the Rhine, it fills the ocean in the north. This singular fact proves how much higher this part of the county of Neuchâtel is compared to the nearby lands. After having seen the *Joux* Castle we retrace our steps and, by going to the north-east through *Verrieres*, we reach *Bayards* and from there *Brévine*, by mountainous stony ways. It is intended to improve them and even build a highway crossing the *Vallons des Montagnes* to *Pontarlier* in the Evêché of Basle. It is hoped that this project, which would be of considerable advantage to the people of this part of the state and would facilitate the carriage of goods, will not remain undone.

Such is the first of the two routes about which I spoke. If travellers who are not interested in this itinerary decide to follow the second, which is shorter, they will not go to *St Sulpy*, but skirting *Motiers* they will go to the village of *Boveresse* and on leaving it they will go by a narrow, steep and stony track along a new ridge, covered with forests and with some fields at intervals. After having gone up rather laboriously for an hour, one finds on the right of the track a narrow gorge between two perpendicular and very high crags. There cascades a rather abundant brook whose water, running off the higher mountains and through marshy ground, is gathered in a pond built at the top. A citizen named *Henry Petitpierre* dared, approximately 35 years ago, to construct in this fissure, which is only 15 feet wide, by means of some notches cut in the rock on both sides, buildings for board and grain mills. These two buildings are placed vertically one above the other. The first, which is on the level of the higher ground and built partly in the rock, has a saw with which boards can be cut from the largest trees. From there one descends by a staircase of 66 steps whose last two are cut in the rock. Here a mill is sited which works with such speed that the building and staircase tremble when it is in motion. The small width of this fissure obliged the flour-maker to cut into the living rock to get enough space. At the side of this mill is a small chimney made in the same way to provide heat in winter. The wheels have pots, that of the mill has the ends of its axle encased in the rock. Finally, it should be observed that these buildings are placed in a dreadful chasm, that the crags exceed 200 feet in height on the right and left of the place where the saw is, and below the mill the water falls in cascades with great noise to a deep valley more than 400 feet below, from where, after several turnings, it flows into the river *Reuse* at *Couvet*. We cannot view without astonishment the execution of such a bold plan, which literally puts the fortune of the owner of these buildings in the air.

After two hours of a rather painful walk up and down ridges which rise continuously, one arrives at *Brévine*. All that the intervening country offers to the eyes is just mountains piled up one above the other, with small valleys and occasional houses. They are comfortable, built of stone and covered with shingles, as are all the houses of the villages in the *Mountains*. The heights which bound the *Val de Travers* in the

north and south for all its length, contain a great number of such houses, of which several are inhabited only during the summer. Then cattle are taken there to benefit from the pastures which surround them. A great quantity of cheese is made there, which is not much inferior to those of *Gruyeres*, and it is sold in the nearby countries and forms a considerable and lucrative trade.

*Brévine*, which has its own jurisdiction, is located in the middle of a small valley which is two leagues long. This village is large and the houses are mainly separate; the others in the center, where the church is, are joined together like a kind of borough. The same thing occurs in almost all the villages of these districts. In *Brévine* there are several traders and artists of various kinds, and a very great quantity of lace thread is made there and in the surroundings, which provides a very advantageous trade; since this was set up the price of the flax has doubled there. The inhabitants invented wheels with two reels, one of which spins and the other twists, and they are operated by only one crank.

Close to this village is a mineral spring, formerly celebrated and much attended, but almost entirely abandoned today. It was discovered in 1654 and produces a ferruginous ochre. It is very likely that if it was situated in a less harsh climate, this water, whose virtues are known by the great number of wonderful cures that it has caused, would still attract the same number of drinkers. It is undoubtedly a problem that one has to take it on the spot, as shown by the following experiment. In bottles which are filled at the source and tightly stopped, the water becomes white and muddy. If one then puts these bottles in a cool place during winter, they deposit a considerable amount of silt which, by agitating them once each day, dissolves entirely by the next spring. Then the water recovers its original limpidity, has the same taste and supports the same tests as when it was drawn from the fountain.

At the western end of the parish of *Brévine* there is a large pond which bears the name of *Lake Etalieres* and is half a league long from east to west. It is divided in two by marshes, and when the water is low it forms two lakes connected by a small brook. The smaller in the east has existed since time immemorial and it is so deep that its depth has not yet been determined. Most of the lake in the west was once a forest of fir and other trees, but the land sank and submerged it in the 14th century. The tradition is that when it was fished for the first time a stag was drawn out, in whose horns were tree branches. Today trout and excellent pikes are taken, some of which weigh up to 18 pounds. South of this lake are three mills and a thresher built on sloping ground. There are five cisterns made of cut stones placed at different depths, and each one contains a wheel. The water which moves these wheels flows through underground vaults with two successive falls, so that to lead it from one cistern to the next it was necessary to build three vaults and two arcades. The first to receive the water leaving the lake is 67 feet long, 4 wide and 5 high. It is divided in the middle by a lock made of stone and oak, to direct and save water at will. The first three cisterns are contiguous and supported on arcades to allow the water to pass from one to the other. Their diameter is approximately 13 feet and they are covered by the buildings which contain the mills. The fourth cistern which follows is of smaller capacity than the preceding ones and was used for a saw which has been demolished. All these wheels are of normal design and are about 12 feet in diameter, the axle which carries the upper millstone of the lower mill is 35 feet long. At the southernmost end of the first building mentioned above is an underground vault 30 feet long with a height of 24. It receives the water of the three higher mills and conducts it down a steep slope to the last cistern which is 40 feet deep and has a new mill that could not be built in such a place without a boldness and industry which deserves the attention of the curious. Finally, a last vault carries the water in pipes 100 feet under the ground and it drains away through cracks in the rocks. When the water rises in the lake there can be large overflows without resulting in any damage to the buildings and the mills because of the solidity with which they were built. This lake provides an almost inexhaustible supply; during the last seven years these mills lacked water for only a few days, although there were droughts in this time. Finally, it is claimed with some likelihood that the water of this lake flows by underground conduits to form the source of the *Reuze* about which we have spoken.

To the north-east of the village of *Brévine* is a large trembling bog which provides peat and where a great quantity of fir trees are found, buried at some depth in the ground. The inhabitants pull out pieces, dry them and burn them. In the north-west and half a league away is a mountain called *Châtelot*, from where one can see all the manory of *Mortau* which is part of the Franche-Comté. This mountain, that amateur natural historians do not fail to visit, is yellowish calcareous stone under which there are beds of



*Description of the Mountains and Valleys of Neuchatel and Valangin*

a hard, blue marl, lying almost perpendicularly on the French side. These layers of rock and earth contain an incredible multitude of fossilised marine bodies, *Coculites*, *Strombites*, *Ammonites*, *Tubulites*, *Boucardites*, *Ostracites*, *Musculites*, *Lythophytes* of several species, *Astroites* and *Entroques*, or articulations of sea insects. There is a description of all this richness in the work of Mr. *Bourguet* on fossils and in those of Mr. *Bertrand*, such as the structure of the earth, the use of mountains and the *Oryctologique* Dictionary.

It appears that in *Brévine*, as in several other places of these mountains, the taste of the inhabitants for the mechanical arts is stronger than for agriculture. There are no new plantations of trees to replace the wood that these same arts and daily needs consume. Not enough care has been taken for the conservation and the economy of the forests, the total destruction of which will some day make these regions uninhabitable. Can it be believed that in a country which was formerly entirely covered by forests, the current and ever increasing price of wood has reduced these people to use peat and to pull the roots of half-rotted fir trees from their marshes? It would also be advisable for them to consider flax, which in all likelihood they could successfully cultivate and from which they could obtain much profit. By digging ditches, they could drain their marshy meadows which produce only bad grass. All tell us, in a word, that these numerous people full of genius, do not pay enough attention to the various, significant things which are, however, the most solid and most inalienable riches of a country.

From *Brévine* we take the road to *Le Locle*, which is two leagues to the east, and we cross a rather flat land covered by a succession of isolated houses, on the right and the left of the highway. Each owner has his possessions around the house in which he lives and under his eyes. They are separated by dry-stone walls which are relatively low and which also border the roadway. All these houses make up one parish called *La Chaux du Milieu*. The church is about the same distance from the two ends. It is properly a succession of small valleys which extend from the south-west to the north-east. They form as many basins, and the water lying in the lowest parts escapes through cracks in the rocks or funnels which they have dug, and is lost in underground caves. It seems that a channel placed in the bottom of each of these small valleys to receive the water from them would produce a number of invaluable advantages for this district. It would facilitate evaporation and flow, would be used to drain a considerable portion of the ground and would contribute to make the air purer, by at least partly dissipating the fogs with which these small valleys are frequently covered. Also, by using an exact level one could find how to make some of this water run out into nearby valleys which are lower, which would further increase the surface of useful ground.

The mountain which rises on the left of the road that we follow is, just as the other parallel chain, covered at intervals with fir trees. It is the border of the Franche-Comté. By considering the striking difference between the inhabitants of that province and those of the mountains bordering on the principality of Neuchâtel, relative to character, genius, knowledge and well-being in general, we cannot be prevented from recognizing the natural and necessary effects of freedom, and the good nature and steadiness of the government. The latter people, exempt from charges and taxes, can hope to enjoy, continually in the bosom of peace, all the fruits of their work. There is no need for assistance to stimulate genius and to promote talents; education, experimentation and emulation improve them. Since the beginning of this century, the population and industry has made astonishing progress in these mountains. As the taste for arts and trade grew, the urge for these people to take up arms weakened. Young artists enter into marriages boldly, assured that they will find in their fatherland the means to usefully occupy their children of both two sexes from the cradle, so to speak.

“The prospects of advancement or fortune”, said a well-known writer, “the approval of society, the beauty of the climate, the courteous manners, the laws against emigration, are only weak bonds which attach, to his fatherland, a strong heart which feels all the dignity of his being. But what truly attaches him to it, is the peaceful possession of all the natural and civil rights, the certainty of living under the protection of the law, not knowing fear, the intimate conviction that the weak do not have to fear oppression by the powerful, because of the courts established to defend him or avenge him. Here are the great bonds of any human society, here are good truths, the deprivation of which turns the most beautiful regions into deserts and ruins, but whose happy and certain enjoyment protects the inhabitants the mountains and the rocks.”

It is unnecessary to say here that many people work on clocks, watches and laces in *La Chaux du Milieu*. One finds the same talents and the same competition there. It will be enough to observe that

two brothers of this parish manufacture musical instruments such as hautboys, flutes, bassoons, hunting horns etc.; they trade mainly with Germany. And another artist makes famous waffle-irons. These two workshops deserve to be seen. At the eastern end of the small valleys which we have crossed, and while turning a little to the north, is a forest of fir trees through which one enters the valley of *Le Locle*, which is lower down. Formerly the road was bad and the descent very rapid, but it has been effectively improved. One cannot praise enough the attention which has been generally given, for some time, to the improvement of the roads which lead to the various villages of the *Mountains*. The inequality of surface and the nature of the ground make this care essential. Foreigners, whom curiosity or trade attracts here, expect no less from a people in comfortable circumstances and who are too well informed to ignore their real interests.

The center of industry in the *Mountains* is in the villages of *Le Locle* and *La Chaux-de-Fond*, which form two separated jurisdictions. The first of these two parishes has a very large number of isolated houses; several are joined together to make small hamlets, and others grouped around the church make up a considerable and built well town. A quarter of a league from this town and to the west, is a district called *Les Roches*. A high rock is seen there, the lower part of which is hollow and forms a roomy and deep cave. At first this rock was only used as a natural funnel. Water from the valley had created a long passage and had used these underground cavities for their flow. A private individual of *Le Locle*, *Jonas Sandoz*, understanding the advantages which one could get from these circumstances, especially in a country which does not have running water, had the courage, ability and patience to build four mills and a thresher in these cavities, perpendicularly one above the other, which are used today for the needs of his compatriots. By the gleam of several lamps, curious foreigners are taken into these deep abodes to examine a wonder of nature and art; but they must be protected on account of the moisture and mud that is found there, and they will do well to accept the offer of the provisioner to cover their clothes for a few moments. Here is a description of this unique place. The interior is a cave, surrounded by rock, naturally dug out and improved by obstinate work. It has at ground level a chasm 117 feet deep and 37½ wide. Its entrance is 23 feet wide and 20 high. As soon as we enter, we find the two upper mills placed one beside the other. On the right and lower down a thresher was built whose shaft, which carries the wheel, stands perpendicularly and is 50 feet long to its wheel. The 3rd mill is 48 feet lower than the first two, and the 4th is 32 feet lower than the 3rd. The cave, which narrows appreciably, is only 24 feet wide and approximately 30 high at this depth; it continues to narrow down to the bottom, where the pits start in which water vanishes. Each of these four mills have a double wheel built and placed in the lower part of the cave. A channel 200 feet long, three broad and five high takes the necessary water to them; there are three more approximately 150 feet long which are intended to connect these mills and their wheels. The sites of the latter, like these channels, were cut in the living rock, which could not be done without an immense amount of work. We still see the marks of hammers and chisels everywhere in the cave, and the work was done rather cleanly. It was also necessary to prepare the space necessary for the staircases which lead to the various underground floors. With the two higher mills, the size of the wheels from top to bottom is 25 feet, with 3rd it is 30 feet and with 4th it is 60. Close to this last mill is a new cavity in the rock, large enough to serve as fertile building site. The disassembled wheels were lowered down, their parts put together, and then each wheel was transported to its proper place. 30 feet below this building site is the last cavity called the *Chaudiere*, where all water falls into an abyss and disappears.

Close to the mills which have just been described, are two very high rocks, joined together at their base by a layer of calcareous stone much lower than the rest. This layer forms a solid triangle whose base is 770 feet and the perpendicular height is approximately the same. Opposite, that is, towards the border with the *Franche-Comté*, is a deep valley lower and wider than that of *Le Locle*. Thus it would be quite easy to bore through this mass, and the success of such a company would gain advantages much higher than the expenses that it would cause. By doing this the water of these small valleys could be gathered, given an external exit, and a great number of water-wheels could be put on their course; the adjoining swamps, which occupy and make useless a great area, could be drained, always invaluable in a country so populated. By this a much shorter and more convenient communication would be opened with the nearby province. There is not one traveller who would not agreeably subject himself to paying a small tax, to save a great league and have one less mountain to cross; because such would be the difference between the cur-

*Description of the Mountains and Valleys of Neuchatel and Valangin*

rent road and that which could be opened between these two rocks. The people would also benefit from the immense quantity of wood which goes to waste on the other side of this now inaccessible mountain. What would be required from the travellers would eventually compensate at the very least the contractors, and the rising prices of the lands, drained and made fertile, would obviously be to the profit of the sovereign. It is surprising that so many significant advantages, taken together and with an active, industrious and opulent people, has not yet lead to some association to undertake a work which we see would be certain of success. Thus near *Geissvyl* in the valley of the *Sarne*, which is part of the canton of *Undervald*, an underground channel was opened to drain the land, by making the water run out into a lower, small valley. The Tyrolean's undertook this work at cost price and succeeded. On the height close to these rocks is the house of Mr. *Sandoz des Roches*, youngest son of him who built the mills of which we have spoken and who is today mayor of *Le Locle*. He has a natural history cabinet which he has the kindness to show to the curious and which is very skilfully displayed.

The small valley of *Le Locle* has the shape of a basin whose edges are escarpments. The name of this village seems to indicate that in the past this basin had a pond or small lake, whose water gradually ran out by a passage made through the rock where there are mills. Others were built along a small brook which runs east to west and provides them with the necessary water. After long rains this brook, which is called the *Bieds*, forms a type of pond. Some people claim that the fish disappeared from it after painted fabrics, which are manufactured in *Le Locle*, were washed in it. An experiment such as this would confirm the opinion of those who attribute the marked reduction in the quantity of fish in the Neuchâtel Lake on the washing of printed calico. But it is very likely that the true cause of this loss is the failure to police the size of the mesh of the nets and the times of fishing, together with the general quality of life which must increase the consumption of these delicate meats. If there remains some uncertainty in this respect, it would be a new reason to examine this point that is so interesting to the people. The church in *Le Locle* is vast and has lately been rebuilt. It has a large tower of cut stone with a peal of five bells. An inhabitant of this place was the architect of this building. There are several tombs with epitaphs there, in particular that of the daughter of an officer general who commanded the Swedes in the *Franche-Comté* under the reign of *Gustave Adolphe*.

At the last census there were 3,095 souls in this parish, 331 clock and watch makers, 726 silk-workers, 56 traders, 78 goldsmiths or case-makers and 15 manufacturers of stockings. Concerning the horology industry, which is the principal occupation of the inhabitants of this place<sup>9</sup>, some work in multiple branches of this art, others are restricted to buying what is produced by out-workers and to trading, while the third group manufacture all the various tools which the clock and watch makers need. They even invented several tools which contribute to perfection of the work and to saving time. But nothing can give a better idea of the talents of these people than a brief history of the establishment of the horology industry among them, compared to the astonishing speed of progress that it made in *Le Locle* and *La Chaux-de-Fond*. The founder of this art in the mountains was the Seigneur *Daniel Jean Richard*, known as *Bressel*, father of Mr. *Jean Jaques Richard*, about whom we will speak later and to whom we owe the following details. He was born in *Sagne* in 1665. In 1679 a horse dealer named *Peter*, on his return to his fatherland, brought with him a watch made in London, something completely unknown in the mountains. It had been deranged by the journey. When this person went to see the father of *Daniel Jean Richard*, he noticed various small works made by the son and considered him skilful enough to mend his watch, which he entrusted to him.

This young man decided to make something similar. First it was necessary to design and make all the required tools, well as the springs, the case and the other parts, without having any help to assist him. But by his genius and prolonged hard work, he managed by the end of a year to have enough tools to begin making his watch, which was completed six months later. This piece, together with several other necessary parts from his establishment, attracted to his place the most curious of his neighbours for whom he made watches. He worked with great activity and only interrupted this occupation to teach goldsmithing to two of his brothers. He also applied himself to engraving which he needed for watch making.

He made the first machine in Switzerland to split wheels without having ever seen one. A foreigner

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<sup>9</sup> The low number of clock and watch makers is probably because only *etablisseurs* were counted. These manufacturers employed many out-workers, people making parts in their own homes.

told him that there was one in Geneva, and he went there on purpose to examine it, but his trip was fruitless because it was kept a secret; but he saw split wheels and he understood that this operation was done by means of a small wheel and a plate marked with numbers to determine the number of teeth and to make the spaces between them perfectly equal. When he returned, he started work and finally managed to build this machine, which is so very necessary for the horology industry. After that he provided several of them to his fellow workers, until workmen appeared who dealt only with this type of work.

Supported by this fortunate discovery, the Seigneur *Richard* returned to his normal occupation and succeeded in making small repeater clocks, and even repeater watches, to suit the tastes of those times. For a few years he was the only clock and watch maker in the mountains, and had for his first fellow worker the Seigneur *Jacob Brandt*, known as *Gruyerin*, of *La Chaux-de-Fond*, who undertook an apprenticeship of a few months, under his direction, in horology, engraving and gilding. We should not be surprised that this man of genius was soon famous and that he started many workshops, so that he can be seen to be the first motivator of the talents of his compatriots. He finally left *Sagne* at the beginning of this century and set up in *Le Locle* where he died in 1741. It was there that he taught horology to his five sons, who were the only ones to follow this profession, until some young people curious to learn took up apprenticeships with him and became masters, who in their turn trained new artists.

Such were the first, weak beginnings of a factory which in a little time flourished.<sup>10</sup> To understand its current strength it is enough to say that, according to the moderate estimate of various people well educated on this point, at least 15,000 silver or gold watches are made each year in *Le Locle* and *La Chaux-de-Fond* collectively, without counting a very great number of simple and complicated clocks. All the workmen who are needed for the complete pieces are found in one or the other of these two parishes: Finishers, gilders, painters, enamellers, engravers, makers of all types of cases, even in multi-colour gold, makers of chains<sup>11</sup>, springs, dials, hands etc. The women assist the men in these occupations; they are gilders and polishers.

Also all the tools necessary for clock and watch making are made there; platforms<sup>12</sup>, machines to split wheels, *grammaires* to build them with all the possible accuracy, tools for the crown, contrate and repeater wheels, lathes to make fusees, machines to finish and round teeth, others to turn balances, compasses to improve the gearing, tools to replant, that is, to place all the parts of a watch exactly in the perpendicular direction, etc. Several of these machines, as we have said, were invented by people of this region, others were first obtained from Paris and London; today they manufacture all of them and even supply them to the most famous clock and watch makers of these two large cities.

So many of those in *Le Locle* and *La Chaux-de-Fond* are involved with the perfection of this art that only the names of the most distinguished are included in this description, such as we know them. Those whom we omit because of pure ignorance would have no less the right to form part of an enumeration. But considering their great number, we could not make it exact, by including all the rest, without necessarily making it excessively long. Seigneurs *Abraham Robert*, and *Daniel Perrelet*, are the principal workmen of *Le Locle* for the construction of tools. The first, a skilful horologist, invented the machine for the gearing of watches. The second is an excellent dial-work maker, and the tool to plant parts perpendicularly owes its discovery to him. His son *Abraham Louis* makes watches with a fusee and cylinder escapement. The Seigneur *Abraham Robert* was the first to think of the escapement at rest<sup>13</sup>. The Seigneur *Jonas Pierre Du Common* is one of most skilful clock makers, as the Seigneur *Jonas Perret Janneret* is for watches. The Seigneur *Daniel Othenin Girard* is a very expert founder of the copper and bronze ornaments which are placed on clock cases. Major *David Huguenin*, enameller, makes 18 inch dials; he sends some to *Warsaw* and *Constantinople*. Mr. *Dubois*, who is famous in London for his talents, is the best enamel painter. Mr. *Jean Jaques Richard* is a manufacturer and employs a great number of workmen. His kindness to foreigners, whose curiosity attracts them to the mountains, equals the deep knowledge which he has acquired of the work of this kind. He manufactures repeater watches whose case and dial are of crystal, and in which the wheels are placed so that all of the mechanism and the interior of the movement can be

10 Factory, in this context, does not mean workers collected together in a building, but an organised group of independent people making parts in their own homes.

11 Fusee chains.

12 Mandrels?

13 *échappement à repos*. An escapement without recoil, such as the cylinder escapement.

*Description of the Mountains and Valleys of Neuchatel and Valangin*

seen without opening them. The Seigneur *Jean Didey* is famous for the outer cases of pocket watches, in shagreen or imitating jasper and agate.

In addition to these artists of the clock and watch industry, *Le Locle* has several others in different fields. The Seigneur *Jonas Courvoisier Clement* makes balances for assaying money. He invented a machine driven by water which is used to separate, with all possible efficiency, the gold and silver contained in the waste of goldsmiths. He built a small balance which pivots on two rubies, whose arm is of gold and which can measure the 500th part of a grain. The *Perret* brothers are famous for the secret method which they have for the manufacture of *Guimpier* mills, necessary to the *tireurs d'or* and manufactures of *galons*.<sup>14</sup> The Seigneur *Houriet* has the highest reputation in the art of engraving, because of his taste and the admirable delicacy of his graver. Such is the celebrity of all these artists, that one seldom finds finished pieces in their various workshops. Those to which they put the last touches are sold and delivered immediately; they work only on commission and on behalf of the merchant horologists. In addition to those of this country, the trade continuously attracts people from the nearby countries.

Independently of this point, there is much trading in *Le Locle* in cattle and other things. A horse dealer, the Seigneur *Jacot Baron* provided 8,000 horses for the artillery, drawn from various places in Switzerland, and that for only one campaign of the last war, and without mentioning riding horses. One also sees a great number of shops in this borough, well stocked with silk fabrics, draperies, cloths, hardware etc.; the merchants obtain all locally and attend the most famous fairs.

Two interesting observations should not be omitted: First, that well-off private individuals established, by their voluntary and continuous contributions, a charitable institution in *Le Locle* which has a considerable income. A similar foundation was set up by the same means in *La Chaux-de-Fond*. The poor of these two parishes are assisted according to their different needs and are employed proportionally to their strength and their talents. The other observation is that there is a ferruginous mineral spring near the town, which is called the *Combe Girard*.

One small point to add is that, among the hills which surround *Le Locle* there is one which bears the name of *Cret vaillant*, in memory of a troop of soldiers from the Franche-Comté who set out to plunder this place. The women of *Le Locle* gathered, attacked them, beat them and even removed their flag which was hung up in the church, where it was preserved until the church was rebuilt. Each year there is a procession to *Bauvais* in which the women walk in front in recognition of their act of bravery.

Although the large town of *Le Locle* is two small leagues from *La Chaux-de-Fond*, these two parishes are contiguous. Some distance from the former and to the north-east is a considerable height called *Cret du Locle*, at the top of which there is a mountain maple of seasoned wood intended to be used as a signal in times of war. Leading to this place is a small valley called the *Verger* and the next small valley which we enter is called *Eplatures*. It is a league and a half long and presents a continuous, double row of detached houses, of an advantageous aspect; the architecture of them is very similar and in each one there is a workshop. It is through this pleasant prospect that we pass to arrive at the center of the village of *La Chaux-de-Fond*. The church is on a hill, and the houses which surround it show, by their exteriors, the well-being of the inhabitants. The last census showed that the whole parish contains 2,463 souls, of which there are 390 clock and watch makers, 597 lace makers, 36 traders and 20 goldsmiths or jewellers.

Most famous of all the artists in this town is Mr. *Jaquet Droz*, whose name is known throughout Europe and who seeks to perfect a science in which Mr. *Vocanson* made himself renowned. He has managed to include in the movements of his clocks all that his rare genius for mechanics can imagine. He makes carillons with bells and flutes which play, with the highest degree of accuracy, various airs for one or several voices. He invented an instrument which is used to mechanically punch the cylinders for carillons.

He sold to the late King of Spain, for 450 Louis, a clock which displays everything possible. It indicates the hours, minutes and seconds, chimes the hours and quarters, and repeats the hours, quarters and half-quarters. In the center of the dial there is the equation of time, the day of the month which agrees with the duration of each month<sup>15</sup>, the phases of the moon, the signs of the zodiac, which are shown at the moment when the Sun starts to traverse them, the four seasons of the year, and a sundial with an artificial shadow which marks the hours according to same irregularities as other sundials. At the top, in

<sup>14</sup> *Guimpier*, a manufacturer of gold thread. *Galons*, fabric bands used to trim dresses and other fabrics. *Tireur d'or*, a workman who draws gold or silver thread through a die.

<sup>15</sup> A perpetual calendar.

the center, there is the vault of the heavens, where the stars appear and disappear at the same time as in the sky. The courses of the sun and the moon are shown according to the system of Ptolemy. The declination of the sun changes with the seasons, the moon has its phases and, in spite of its various positions, it always appears lit on the side opposite to the sun. This same sky is overcast with artificial clouds in rainy weather, and they disappear when the sky again becomes clear. After the hour has sounded, there is a carillon of nine airs, part of which is played in an echo. A lady, seated on a balcony and holding a book in her hand, accompanies the beat of the tune being played by her movements; she looks at the book as her eyes follow the music, irregularly and several times she takes a pinch of snuff and she makes a graceful bow to the person who opens the glass of the clock. After the carillon, an artificial canary whistles eight airs with the natural movements of its beak, its crop and the whole of its body. It is perched on the fist of a lover who, by his gestures, seems to admire his bird. The playing of the last air being finished, a shepherd automat plays several airs on his flute, expressing the variations of style and cadences. While this is happening, the two lovers dance to the tune which the shepherd plays; though their movement is made circularly, their attitude is always upright, and to finish their play, one of them drops down to carry the other, and being turned to face the spectators, he shows his duty to his friend, making fun of her lightness.

At the same time, the flute-playing shepherd is feeding a sheep which has a natural bleat, and beside him is a dog who flatters his master by various movements. He keeps guard over a basket full of fruit; if somebody takes an apple from it, at once the dog barks and does not cease until the apple is put back. All the effects of this piece need not sound and all its parts can work separately without difficulty. Such is this famous clock, which gained the admiration of the court of Spain, in the presence of which Mr. *Jaquet Droz* made the clock perform all these various plays with greatest success. A rather singular circumstance of his voyage to that country is that he recognized, among the clocks in the cabinet of the King, the first clock which he had made in his life. After having passed through various hands, it had come to this Prince, who much esteemed it because of its accuracy.

Mr. *Jaquet Droz* built another clock in the style of that which we have just described. It has a set of flutes and sounds the hours by means of a negro, who repeats them with a simple command and without touching the clock. Finally we see at his place, in addition to several curiosities of this kind, a *longue ligne*<sup>16</sup> clock, with a corrective measure for dilation. It even winds itself and produces the same effects by the action of the surrounding air. Each day the fertile genius of this excellent artist adds a new degree of perfection to his works, and makes him invent useful or curious machines. The courtesy with which he receives foreigners that his celebrity attracts to him, gives, it seems, even more merit to extend that of his knowledge.

The horology industry in *La Chaux-de-Fond*, just as in *Le Locle*, had a slow beginning followed by very fast progress. Seigneur *Jacob Brandt*, a student of Seigneur *Daniel Jean Richard* and about whom we have spoken, was the first to work in this art, in association with his brother *Isac Brandt*. A person named *Du Commun*, who came from *Boudry* and lived in *La Chaux-de-Fond*, who made scythes for a living and was a man of genius, was tempted to get a clock, a very rare thing in these districts at that time; but finding the price too high, he decided to build one which had more features than any that had yet been seen. Indeed, he made a clock with weights, sounding hours and quarters, indicating hours and minutes with the same hand by a unique trick, and in addition showing the equation of time, the motion of the sun and the moon, the phases of the moon and the day of the month from one month to the next. Hussars, always appearing in the correct number, holding a hammer in the right hand and a bare sabre in the left, crossed a gallery, whose doors opened and closed at the right time, and sounded the quarters by striking a bell. An eagle carrying a hammer in one of its claws, appeared after the hussars and sounded the hours on a different and higher bell by opening its beak at each blow. This machine, fruit of the sole genius of its inventor, simple and solid in its construction, still exists today and still functions very well.

It should be added that several French refugees, who established themselves in these mountains after the revocation of the Edict of Nantes, brought the taste for work and trade with them. One of them initially set up to manufacture iron loops and pipes, then firearms and bayonets. The horology industry finally took the ascendancy, so much so that this factory, improved as it is, can go hand in hand with the largest in Europe.

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16 Seconds beating pendulum?

*Description of the Mountains and Valleys of Neuchatel and Valangin*

While in *La Chaux-de-Fond* we should not neglect to visit the workshop of Captain *Robert*, a very distinguished artist who has a great number of workmen under his control and who makes all kinds of curious clocks, supporting a very large trade. That of Mr. *Humbert Droz* is no less considerable and makes simple and repeater watches. The Seigneur *Daniel Courvoisier Clément*, who excels in various kinds of work, such as horology and engraving, is no less famous; he worked in the mint of the King of Sardinia; he built an air-rifle with two concentric barrels, which could pierce a double board at a distance of 50 paces; he is the inventor of the tool which is used for stamping or pressing out gold watch hands with a single blow. Today this tool is used throughout mountains. The Seigneur *Daniel Du Commun*, known as *Tinon*, is the most skilful maker of large iron clocks in Switzerland. Captain *Joseph Humbert Droz* without limiting himself to any particular art, excels in most of them, mainly in cutting glasses for clocks, and works with much delicacy in all that he undertakes. Seigneur *Abraham Robert*, previously a very skilful horologist, finding this art less lucrative than that of enamel painting, gave up the file to make dials, and he succeeded so well without the help of anybody, that he is today one of the most skilful enamellers in the mountains. Captain *Abraham Louis Du Commun*, son of the inventor of the clock about which we have spoken, is a skilful sword and weapon maker. He makes rifled barrels for rifles and pistols and does various other steel and iron work. Messrs. *David Frédéric* and *Abraham Frédéric Dubois*, brothers, are painters in miniature and do a lot of work for the horology industry. Seigneur *Jonas Montandon* of *Eplatures* invented a machine to grate 100 pounds of tobacco in one day, without decreasing the weight and quality. Seigneur *Jean Louis Petreman* is skilful carpenter, cabinet maker and sculptor; he mainly makes armchairs, chaises and cane stools in the fashion of Paris, and varnishes them himself. Seigneur *Moyse Oihenin Girard* is the only one who makes the wooden seats necessary for workmen, with screws so that they can be raised or lowered at will.

Among the great number of arts cultivated successfully in this same village, one should not omit that of the cabinet maker which is very well established, as much by the number who work there as by their works, whose beauty equals those which are made in Paris and London. Clock cases are made in marquetry, Indian wood<sup>17</sup>, mother of pearl and ivory. Some are also veneered with natural shell, in the colour of jasper with sheets of white and transparent horn which come from England, the whole covered by gilded bronze ornaments, natural flowers etc. It is astonishing to see such works leaving a place where this profession has been known for only fifteen years. The best who works there is Seigneur *Jonas Pierre Courvoisier* and the most skilful of his pupils is Seigneur *Daniel Jacot*, today his partner. One can also count amongst the best cabinet makers Seigneur *Felix Jacot* who, without any training, with only his natural talents and inspired by his visits to Paris and elsewhere, set up to manufacture the most beautiful works of this kind, in which he does a big business. He is also, in the parish of the *La Chaux-de-Fond*, the maker of files; loops of iron for buckles; pipes of iron, copper or steel bored with a drill, or in wood bound with brass; he casts buckles of copper, pinchbeck or tombac<sup>18</sup>, etc. We could go on for ever, if we wanted to cover all the professions that are advantageously undertaken here.

Close to the village of *La Chaux-de-Fond* is a spring called the *Fontaine ronde*, which forms a brook running from the south to the north, and after a quarter of a league it enters a pond built in 1665, and today lined by a good wall to preserve the water and to release it at will. The water then passes through a lock into a large basin dug in 1760, which is 32,768 square feet on the surface. The bottom is clay, the edges are firmly made and it is also used as a fish pond where carp and tench are found in abundance. Below this basin are channels with iron netting to prevent the fish from passing out. They are lined by walls and lead to wheels placed underground. The water, after being used twice, enters the rock through an opening 60 feet deep and turns back towards its source.

There have been several attempts to establish mills in this place over two centuries, but without success, not only because of ice which made them useless in winter, but also because a vapour came out of these deep pits which soon consumed the wheels. In 1749 Mr. *Moyse Perret Gentil*, a militia captain, acquired these mills and a few years later undertook to restore them. He started initially by building, in the place where the wheels used to be, a cistern 32 feet long, 12 wide and 28 deep, lined with a wall whose mortar was made out of quicklime. This cistern is covered by a strong vault 8 feet lower than the top of the

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<sup>17</sup> Probably mahogany.

<sup>18</sup> *Pinchbeck* and *tombac* are imitation gold.

wall which surrounds it and intended to contain the water vapour, to preserve it from frost and for placing the double wheels on the top. He then made two wheels 15 feet in diameter and 2 wide, which he placed on the cistern, one beside the other, and to put them in motion he used neither the force nor the fall of water, but only gravity, a new invention in these districts. To do this, he placed around the circumference of each wheel forty *bolets* or *sceaux*<sup>19</sup>, at equal distances, each one containing 16 pots, so that there are always 15 of them which are full and their weight is enough to turn the wheel. As the spring is not very abundant, water is saved by moving these wheels very slowly, though with a uniform speed. But in order not to slow the grinding stone, the turns are multiplied by a two-wheel train placed between the wheel and the stone, the axle of which drives the lower wheels, so that the slow movement of the wheels turn the grinding stones at the normal speed.

This first enterprise having succeeded, Mr. *Perret Gentil* noticed the cracks in the rock through which water was lost, and he conjectured that by following these cracks he could find a suitable site with enough fall to establish two new mills, using two wheels similar to the preceding ones. With this in view, he dug 150 feet into the rock over a width of 8 feet and found a sufficient flow. It was then necessary to enlarge this cavity at the bottom to be able to place the two wheels, one near the other, and as the rock overhead was 18 feet thick, he was obliged to bore two round holes through it, 5 feet in diameter and 8 feet apart, for the two axles of the wheels which are 34 feet long and drive the higher wheels. The cavity cut in the rock with hammers and with the help of explosives contains a space of 12,000 cubic feet, without counting that part which is occupied by the cistern, the double wheels, three tanks and the bins of the mills. A simple machine was used to remove the spoil out of this cavity, turned by two cranks and carrying two boxes which went up and down in opposite directions alternately through the holes which we have mentioned.

But despite these cavities which the establishment of the mills required, a considerable building whose foundations are 14 feet thick was built above. The hoppers of the four mills are fill the floor of a room which is 40 feet square. The frame forms the building. There is a machine by which a bag of wheat is removed and transported in one minute to the attic, which is two floors higher; the operation of a single crank is enough for that. At the time the old mills were demolished and the spoil removed, the depth of the cavity formed such an alarming chasm, that when Mr. *Perret Gentil* was obliged to put his new building 40 feet below the ground his enterprise was considered impractical and generally disapproved; but success fully justified it.

50 paces from the house is a small building containing a wheel which saws a board 17 feet long and 18 inches wide in 12 minutes. Its construction is unique in that the wheel is only 6 feet in diameter with 15 feet of fall, and there is a machine placed in front of the wheel which makes the necessary water pass from one to the other, after which it is lost in a pit.

In 1764 Mr. *Perret Gentil* undertook to build a mill able to saw several boards at the same time without slowing the movement of the wheel. He tested it in the presence of various people, four parallel saws cut as many boards in same time, but this machine was considered to be rather useless because the saw only works when the other mills, more necessary to the needs for the life, have excess water. We can judge, by just one observation, the advantage which they produced for the inhabitants of *La Chaux-de-Fond*. In 1763 there were only three mills, and it is calculated that during the previous year 28,000 measures of various kinds of grain were ground there. If this establishment had not been set up they would have been obliged to transport the greatest part over very difficult roads to the mills which are on the river of *Doux*<sup>20</sup>, two leagues from this village. Approximately 250 dozen boards are sawn each year. Finally, it should be noted that although such an enterprise was very dangerous, it was carried out without any accidents to the workmen who were employed there.

Undoubtedly there are many general observations to make on this unique country which forms part of this description. We will restrict ourselves to the most interesting. The climate can only be hard in these mountains. The winter usually lasts seven months, there is little spring and autumn to enjoy, and the summer is very hot. Snow often falls in great abundance; but this inconvenience does not harm trade because of the care which the inhabitants take to keep the highways open and passable at any time. The soil is poor, and only barley and oats are sown, but there are very good pastures from which the people

19 A *bolet* is a mushroom and a *sceau* is a seal (for documents); neither has a suitable alternative meaning that I can find. I presume the wheels had large disks in which the pots were placed.

20 The river *Doub* on the 1783 map.



*Description of the Mountains and Valleys of Neuchatel and Valangin*

benefit, and cheeses are also a source of trade. The small valleys are rough and stony. In the past, all this ground was covered with trees, but today they are only seen on the heights, clearly sown and at intervals. The rest is a naked surface whose uniform aspect would be unpleasant without the number of houses by which it is covered. We should be allowed to say that such a spectacle displays a lack of care on this essential subject which should characterise these enlightened and skilful people. Significant deterioration of their forests, the continual increase in the number of the inhabitants, the considerable quantity of wood that certain of the mechanical arts they follow necessarily consume, the progress of luxury, the inevitable improvement in living conditions which they enjoy, the attention which is given by the nearby states to this essential subject, all must urge them to deal seriously with the preservation of the current forests, for firewood and construction, by economy and even by new plantations for their future. Will it be necessary that, not having provided in advance for this part of their needs, they will be obliged to give up the practice of various useful arts, to lose their freedom and peace, and finally to be banished? Undoubtedly it would not be impossible to find some coal mines in these districts. Perhaps they have not pushed research in this matter far enough, nor developed with enough vigour what has been discovered. The first layer of these mines is usually bad and stony, but it can cover true coal and consequently a priceless treasure for the present and the future.

The inhabitants of the mountains, devoted only to the arts, for the most part give the care of cultivating their land to farmers. However, despite all the disadvantages of a position such as theirs, they lack absolutely nothing of those things necessary for their needs and even for their pleasure and convenience of life. Nearby provinces, the Franche-Comté, the Evêché of Basle and the lower part of the state compensate, for that which their nature denies and provide wheat, wine, vegetables, fruits and generally all that one finds in countries more pleasant and more fertile. The certainty of advantageously selling all kinds of necessary food products and even luxury goods to these places, which the arts and trade have enriched, makes everyone hasten to bring them there. Some of the inhabitants have made lucrative speculations in these various things. It is the same for all that is used for ornamenting the interiors of the houses and clothing. Foreigners are surprised to see apartments very well furnished and the people of both sexes clad with as much elegance and richness as those in the cities. We have said that the villages of *Le Locle* and *La Chaux-de-Fond* have large populations. One of the reasons which we can note, is that these two parishes have little ground and common land. They can even provide for the public offices by only using the annual contributions of private individuals. Thus any foreigner of manners and industry is freely granted the right to live there and even the right of citizenship. There certainly was a need in these mountains for assistance to develop skills; the freedom which the inhabitants enjoy, the clear air which they breathe, the need for supporting oneself with the little amount trade with foreigners, can also have influenced them.

Each private individual was formerly obliged to be a mason, carpenter, wheelwright, blacksmith etc. and to manufacture all his pieces of furniture himself. Those who had a taste for music made their own instruments. Moreover the nature of the demanding soil did not invite the owners to cultivate it, and they readily turned to the arts to provide for their subsistence and to dissipate the tediousness inseparable from the long winters that they endured. Today the education that they receive, the trade that they have with foreigners, the reading for which they have a decided taste, the fact that they travel, the rivalry to which they are infinitely susceptible, all is used to excite and develop these same talents, that we cannot miss, even if we visit their premises for only a moment. They have a natural, unique genius, a striking aptitude for all the mechanical arts, all the more extraordinary as we find absolutely nothing similar among the people who immediately surround them to the north and the south. One frequently sees in these mountains people who follow certain arts in which they had no training. At *La Chaux-de-Fond* a bad shoe-maker became a skilful enameller and a schoolmaster became an engraver. In *Le Locle* the son of a miller successfully manufactures watch and clock making tools. Here there are no controls and consequently no obstacles for genius to overcome. Each one chooses his profession and follows as he sees fit. If he does not succeed he only has to accept himself and is not long in turning his attention elsewhere. If he succeeds he earns a little reputation which ensures the flow of his works and his well-being.

When the clock and watch makers of these two parishes lack some types of workmen for their factory, they provide themselves with outsiders for common expenses. Thus they get sculptors for clock cases from Paris and soon the people of the place, educated at their school, put the clock and watch makers in a posi-

tion to do without this help. All these artists are in general spiritual, polished, attentive, full of kindness for the curious who visit them, and enlightened on many foreign things about their professions. They are happy to explain the general principles of their art, of which they also understand the theory and the practice, to show their works, to design their tools and to carry out experiments. They speak the French language rather purely, do not have an unpleasant accent and express themselves in strong clear terms.

It is readily understood that there must be, among the inhabitants of these mountains, several individuals who live in comfortable circumstances. But the change which it brought about in their manners, formerly so simple, and the taste that they appear to have for luxury whose consequences can be disastrous for them, added to which is the dearness of houses and of food, the too general dislike for necessary arts, which decreases the number of workmen of this kind, and finally requiring farmers to come from the outside to take care of their grounds and servants of both sexes to serve them; all these causes joined together mean that one does not see in this country as many large fortunes as industry and application to work would seem to promise.

Though *Le Locle* and *La Chaux-de-Fond* are the principal objects of interest for those who visit these mountains, the description of them would be incomplete if we did not give a general idea of their higher parts, placed between these two villages to the south and the river *Doux* in the north. It is there that we find two new parishes, *Les Brenets* and *Les Planchettes*. The first is one league from *Le Locle*, and though much smaller it has active and industrious inhabitants. We find there 105 lace-makers, 26 manufacturers of stockings and 27 clock and watch makers. Among the latter, the Seigneur *Jean Pierre Giroud* is characterised by his skill, and he manufactures various pieces of fantasy, in fact watches, and in his moments of leisure he collects fossils which the surrounding land provides in abundance. The Seigneur *Abram Sagne* of the same place, a cabinet-maker, made a table which shows in marquetry the village of *Les Brenets* and several nearby places. The ground which this parish occupies forms a gradual slope which finishes at the edge of the *Doux*, where we can see part of the Franche-Comté. Nearby to the east is a cave called the *Tossiere* in which nature seems to have prepared a table and seats of stone for the convenience of the foreigners who are taken there, and for those who, in summer, take pleasure in going there for a picnic. This cave has a very loud echo.

The village of *Les Planchettes* is one league to the east of *Les Brenets*. Here we also see workmen of various kinds. The Seigneur *Daniel Savoye*, originating from here, manufactures very large winnowing machines of an advantageous design. Internally they have wings and a hopper, like ordinary mills, and are operated by a crank; some are also made in *La Chaux-de-Fond*. But the inhabitants stick mainly to agriculture, to benefit from their excellent pastures. A great number of oxen are fattened here, which supply the butchers of Geneva and Basle. Various qualities of cheeses are also made, and those which are called *Fromages de femmes* are well known and esteemed. All the land which surrounds these two villages is strewn with arable fields and forests of fir trees; its surface is very uneven. Close to *Les Planchettes* is a high mountain which is called *Le Pouillerel*, from which a vast expanse can be seen. It is remarkable for its quagmires, of which there are 140 more or less large, by the russet-red stone quarries found there and a marsh situated on the summit.

But more interesting in this region, and deserving detailed attention, are the banks of the river *Doux* which, as we have said, for part of its course separates the Franche-Comté from the Principality of Neuchâtel. The boundary is the stream which along this part also shares the fishing rights equally or unequally according to whether it approaches nearer to one edge or the other. This river, whose source is in the Franche-Comté, initially runs west to east and crosses the town of Pontarlier in this direction; it then forms an elbow close to the Priory of St Ursanne, in the Evêché of Basle, takes the opposite direction and passes by Besançon while running east to west.<sup>21</sup> The part of its course which runs along the mountains is full of fish. Gilded trout and salmon, pikes, *ombres* (freshwater grayling), eels and an extraordinary quantity of crayfish are caught there. All these fish have an exquisite taste. The *Doux* starts to be navigable near *Les Brenets* but one league lower there is a cataract called the *Saut du Doux* which is 200 feet high, close to which are built several mills making use of the locks and channels. Some distance from the village of *Les Planchettes* is a place which is called the *Creux du Mouron* whose appearance is singularly

21 The source of the *Doux* (the *Doub*) is to the south-west of Pontarlier. The river flows south-west to north-east past Neuchatel before turning and flowing back on an almost parallel course further north.

*Description of the Mountains and Valleys of Neuchatel and Valangin*

dreadful and wild. This hollow forms a kind of oval basin, surrounded by rocks, of which some are perpendicular and others rise as in an amphitheatre, in steps. This basin is divided in two by the river. On left bank there is a mountain peak called the *Chatelard*. This place and all the surroundings are covered with trees which are floated down river for the use of the glass-makers below, where they retained by a raft held skew across the river. At the bottom of this hollow is a mill, which for six months of the year does not receive the rays of the sun because of the chain of high rocks which limit it at midday. There are also two forging mills with trip hammers which manufacture forgings, spring leaves and other work of that kind that are sold to foreigners.

Further down is a torrent which leaves the foot of a rock where there is a quarry of tuff that is sawed into blocks, left in a heap to dry and which is excellent for the construction of vaults and chimneys. We then discover a body of guards in a very high place on the *Les Planchettes* road. From here and for approximately two leagues, the bed of the river is bordered of a chain of perpendicular rocks, some of which are more than 1000 feet high. Their different positions give rise to multiple echoes which have a surprising effect. There the *Doux* runs at an extraordinary speed.

On the other side in the Franche-Comté we see three mills with a trip hammer; but they are of little value because of the poor roads, which in certain places require the use of ladders. On the right bank and half a league below there are four mills, a saw, a forging mill with trip hammers, two threshers and an oil mill. All these buildings belong to Mr. *Moyse Perret Gentil*, of whom we have spoken, and who rebuilt them after a fire destroyed them in 1734. We see there new examples of his inventive genius and his talents for mechanics. He established a *Renardière*<sup>22</sup> to melt old iron with which he forges anvils of all sizes, and pieces of iron and steel of all types. His forging mills, currently three, do not have bellows and the coal is ignited by a current of air which is produced only by the fall of water in a tank skilfully designed for this purpose. A very great number of planks are also sawn here. These buildings are supplied by a dam built in a rocky region and 20 feet high. The road which goes to these mills being inconvenient and difficult, Mr. *Perret Gentil* undertook to build another with the help of his two brothers, half a league long on the side of the escarpment of the mountain, which ends at the river and passes through several chasms. It was necessary, to successfully build it, to cut the rock in one place to a height of more than 30 feet and to build up several terraces to give a sufficient width to the road. We can hardly understand how three individuals could carry out such a bold and expensive enterprise.

Opposite the mills which we mentioned, on other side of the river, there are two parallel rows of rocks of unequal height and as if in stages, which form a pleasant view point. At the top of the highest of both, and beside the *Doux* is a plateau 150 feet square where we find a spring and the ruins of a hermitage which was formerly placed there.

It is in these rocks that a famous cave called the *Caverne des greniers* is found. Its opening, formerly strengthened by a wooden gallery, is more than 60 feet above the river bank, so steep that it can only be reached by using a ladder placed successively in notches cut into the rock. Tradition has it that at the time of the uprising of the Swedes in the Franche-Comté, during the glorious campaigns of Gustave Adolphe, several inhabitants of that province took refuge in this cave with their wives, children and better effects. They had been equipped with food and ammunition for war. A detachment of the Swedish army tried to force them from there, but they lasted through a rather long siege and forced the enemy to withdraw with losses. An old gold coin with a scythe, which bore the date of 1634, was found at the foot of this rock. It is claimed that since then this cave was used as warehouse for the trade in grains from France while it was defended, and the partitions which we see inside it, similar to those in granaries, seem to strengthen this conjecture. But if this is true, the cave becomes useless for such a purpose since the edict, conforming to the true principles of policy, and also wise and advantageous to the people, allowed the free export of this invaluable food product.

Continuing to follow the river downstream, we find on the right bank a torrent, which in the rainy seasons carries a great quantity of water and which, at certain times of the year, regularly enlarges each day at three hours after midday, a phenomenon that is observed elsewhere and for which physicists have a likely reason. Finally, in the eastern part of the course of the *Doux* and above *La Chaux-de-Fond* is the

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22 *Arenardière* is a foundry which used an old method to produce steel: small pieces of iron ore were dissolved with charcoal in a high-temperature fire heated by bellows. This created a product called *Renard*.

*Maison Monsieur*, which belongs to the sovereign; this place is on a main route and a farm is established there. We also find there a glass-maker and the part of the *Doux* which we have just described; the abundance of wood with which this country is endowed is why it was placed there. In this same district lives the Seigneur *Jonas Du Commun*, known as *l'Allemand*, a skilful steel drawer who makes pinions for watches and clocks.

After having seen the higher parts of the *Mountains* and the course of the *Doux* by following this river from *Les Brenets* to *Maison Monsieur*, we return to *La Chaux-de-Fond*, from where it is usual to go to *Ferrière*, which is two small leagues away to the north.<sup>23</sup> This place is on the western border of *Erguel* and depends on the Evêché of Basle. The road which goes there was very bad, but they have succeeded in making it more practicable. This district, which is extensive and goes from the *Doux* to the north-west, contains some hamlets with a great number of separate houses; it belonged to the jurisdiction and the parish of *La Chaux-de-Fond* as far as the end of the country. The ground there is uneven; it is used, as elsewhere, for pastures, arable lands and some forests. We note among the inhabitants the same talents and the same taste for work as those which we have just left. There are several individuals, simple artists who, inspired by their genius and their reading, for relaxation apply themselves to various branches of experimental physics and succeed in an amazing way. The names of the most distinguished deserve to be included in this description.

The Seigneur *Alexandre Perret*, watch maker and finisher, is today absolutely dedicated to making movements in white<sup>24</sup> until he is able to make four of them per week, having the verge of the balance pivoted and polished, all the pivots finished and the crown-wheel mounted on its arbor. His leisure hours were initially occupied with pyrotechnics; he became familiar with all known fireworks, he invented others and in particular he made stars which imitate the colour and the brilliance of the fixed stars. He replaced this art by experimental physics and he concentrated mainly on electricity. After having made the carillon with five matched bells for Mr. *Jalabert*, and after making the experiment of Leyde<sup>25</sup> and a great number of others, he discovered two new ones, unknown before him. He named the first the *Meteore figure*; it consists of a ribbon of fire a ligne and a half wide, which takes various regular shapes, stars, compartments, chevrons, comets etc. The second, to which he gave the name *Lame étincelante*, represents a small thunder. The electric matter is put into bursts of motion by a blow similar to that of a whip and sparks of the diameter of a large pea, which form a rather natural lightning. Lastly, this same artist applied himself to dioptrics; he built a *postiche* microscope whose body is only 2 1/2 inches long and 15 lignes in diameter and is composed of 150 parts used to vary the experiments. It has its illuminating lamp with a lens and so is useful for opaque objects as well as for transparencies. The Seigneur *Perret* also knows about the construction of reflecting telescopes, solar and night microscopes, the camera obscura, and optical mirrors; he mixes all kinds of varnish; in a word he succeeds in all the different kinds of occupation which he undertakes. His pupil, the Seigneur *Abraham Louis Nicolet*, seems to want to compete with him in inventive genius. From the age of 15 years he excelled in his turn, and made in this respect master-pieces of an almost incredible exactness and smallness. For recreation he builds telescopes and microscopes of any type with accessories of which he is the inventor, so that the object can be observed in full day with the light of a candle. With his natural talents and without the help of others, he makes his own lenses of the greatest clarity. The Seigneur *Jean Pierre Vuille*, formerly a shoe-maker and at present a watch maker, is distinguished by a watch of his invention. It is made up of five wheels as in ordinary watches, but he substituted for the barrel, mainspring, chain and fusee, a simple spring which produces the same effects and does not have their disadvantages. Without needing a key, it is wound by simply pressing a finger on a push rod similar to those of repeater watches. He made another watch whose escapement is without recoil and whose large pinion for the canon pinion, which carries the minute hand, turns in one hour while the opposite end turns in 60, thus it also indicates the seconds. *David Vuille*, brother of this artist and a tailor<sup>26</sup> by profession, gilds the movements. Most skilful of the clock makers of this district is the Seigneur *Jean Pierre Droz*, horologist to S. A. the Prince of the Evêque of Basle and the Court. He makes clocks with carillons which show true time and mean time, the movement of the

23 Shown on the 1783 map as *Derriere*.

24 *En blanc*. Movements assembled before gilding.

25 Presumably the Leyden jar.

26 *Tailleur*. Ambiguous; it may mean "cutter" and relate to watch work.

*Description of the Mountains and Valleys of Neuchatel and Valangin*

stars etc., and even one representing a hunting scene. He made two pedometers in a very clever way. The Seigneur *Samuel Berguier* makes bells for carillons. Lastly, a great number of useful arts are followed in the region about which we speak, with a success which can only astonish those who compare it with the position of the same artists and the climate in which they live. We will also notice a trip hammer with four hammers working by the help of a horse which turns around an axle placed vertically and which stops when the master sounds a small bell. There is another at *La Chaux d'Abel*, some distance from *Ferrière* on the plateau<sup>27</sup>, which is a large circle made up of inclined timbers, and which turns backwards under the horse's feet while the horse always remains in the same place at its crib.

But what *Ferrière* is mainly celebrated for and which attracts a great number of curious people, is the natural history cabinet of Messrs. *Gagnebin*, which was established there long ago. These two brothers, one of whom practices medicine and the other surgery, have a garden of medicinal plants and cultivate the plants of China and Canada on the top of these mountains. The elder brother excels especially in botany; he knows the names and the characteristics of more than 8000 plants and has created a very large living herbarium. The second brother, who is a major in the Militia of *Erguel*, has distinguished talents for experimental physics and mechanics. He invented a machine designed to prick with great accuracy the cylinders or rollers necessary for musical clocks. He makes artificial magnets, knows the phenomena of electricity from his experiments and is mainly interested in optics, having built telescopes, microscopes and various metallic mirrors of all forms, cylindrical, conical and pyramidal; in addition one convex mirror made of glass which he silvered himself. In his moments of leisure he makes various pieces by turning and joinery. Of the three sons of the elder, two are engravers of hollow-ware, in copper-plate and in gold of various colours; the third is a skilful finisher. We see in the cabinet of these men a very interesting and very abundant collection of fossils, crystals, marbles, agates, minerals, fish, crustaceans, testaceans, insects etc. There is in addition a cabinet of large, medium and small bronze medals and many silver medals, embalmed birds and some unique works of art. Since someone proposed to buy their cabinet, they have worked to draw up a catalogue of it, which must be bulky because of the quantity of pieces that this collection contains. Found in it there is a horn of Ammon which weighs 45 pounds, a whole *Astroite madreporé coralloide* with small branches weighing 113 pounds, another with large branches or pipes of 27 pounds, and a matrix or assembly of Strombites or Turbinites weighing 172 pounds.

The most precious piece in this cabinet is a fossilised *Etoile marine* (marine star), which is absolutely unique; all the others which are found elsewhere are only copies made from it by impression and in plaster. Here is an exact description. The *Etoile Marine esculente*, called by various authors the *Soleil* or *Lune de mer* or *Etoile à rayons en queue de Lezard*, is a marine insect of the type of friable crustaceans with five almost cylindrical rays, resting in a white or marble-like stone, a little larger than one new ecu, roughly flat, united to its surface, being half an inch in its greatest width, sharp towards its ends and having the form of an irregular oval. There is a representation of it in figure 438 of the 9th plate of the treatise on fossils by Mr. *Bourguet*. The weight of the stone including the star fish is approximately an ounce and a half; one adheres perfectly to the other and in relief. The three longer of its rays are 7 lignes, the 4th is 6 lignes and the 5th is 4 lignes. The diameter of the disc of its body, which is round and as if drawn by a compass, is 5 lignes, the mouth or sucker occupies the center as with other starfishes. This fossil, the only one known of its species, was found in *Ferrière* in 1733 in a field which had been marled. The description of the insect itself and the observations of Mr. de Réaumur on its progressive movement, will be found in the *Memoires* of the Academy of Science of 1712 and in various authors who have written about it. We will not say more on the many rarities which the cabinet of Messrs Gagnebin contains, what has been said is enough to make known its worth and to excite curiosity. We will only add that we are indebted to their kindness in providing these details of a land that they have illustrated, that foreigners always get a favourable and courteous reception in their house, and that by seeing these men one remembers with pleasure the family of the *Pinçons* and *Valdayons*, of which the Marquis *de Mirabeau* and *Socrate Rustique* speak.

From *Ferrière*, which marks the eastern end of the *Mountains* and the border of the Principality of Neuchâtel on this side, we return the way we came and take the road which leads to the capital. First we cross some small valleys by a stony and uneven road, but always well made, along which are some isolated houses. The first place we come to is called *La Loge*. From there we can see most of the *Val de St*

<sup>27</sup> *Ferrière d'Arguel* on the 1783 map?

*Imier* which forms part of the Evêché of *Basle*, and a little distance away is the source of the river *Suze* which flows through this small valley. Then one arrives at *Boinod*.<sup>28</sup> If the travellers continue to follow the highway, after a rather steep climb they will arrive at the top of a very high place called *Les Loges*, from where there is one of the most beautiful sights that can be comprehended, since we see to the south the *Val de Ruz*, the *Neuchâtel* and *Morat* lakes, parts of the cantons of *Berne* and *Fribourg*, the mountains of *Vallais* and the *Alps*, which majestically limit the horizon, and in the north parts of Evêché of *Basle* and the *Franche-Comté* as far as the mountains of *Lorraine*. The jurisdiction of *La Chaux-de-Fond* and part of that of *Le Locle*, which can also be seen, form a unique spectacle because of the astonishing number of isolated dwellings which cover this country. But now all these valleys are nearly stripped of trees, and almost the only forests to be seen are on the peaks of the mountains. It is the same culture everywhere. While descending from *Les Loges* we come to *Hauts Genèveys*, a hamlet located on a height where the *Val de Ruz* starts.

But if we want to visit all the *Mountains* completely, it is necessary, when arriving in *Boinod*, to leave the highway and enter the small valley of *Sagne*, which is to the west and which deserves the attention of the curious no less than the others. This small valley is four leagues long and runs parallel to those of *Le Locle* and *La Chaux-de-Fond*, in an uninterrupted and fairly level plain. It includes two parishes, those of *Sagne* and *Les Ponts*, both considerable and numerous since there are 1,239 people there. There are 316 lace makers, 30 clock and watch makers and a great number of other artists of various kinds. The first has a charitable institution founded on the same principles and on same footing as those about which we have spoken. It is the only one in the state which annually divides up the income from certain pools money which it has between the private individuals who make it up. These two united parishes form a jurisdiction. When entering this small valley from the east, first one finds a line of houses quite near each other and which border the road to the north. There we can visit the workshops of several artists who provide machines to the clock and watch makers, with the help of which the hand-work is surer and the work less arduous. Further on is a quarry whose stone approaches the quality of that known by the name of *Pierre du Levant*. Arriving at a small hamlet which is called *Cret de la Sagne*, a new line of houses spaced like the previous ones starts at the south and does not end until the western limit of the parish. These double parallel lines on the right and left of the road make a very agreeable sight where the small valley widens, and the mountains, while moving apart, flatten gradually and their double chain contains a great number of detached houses which form, with those below, a double amphitheatre and consequently a unique view.

While traversing this beautiful small valley we should not neglect to visit the various artists whose works make them celebrities. Here are the names of some of those who are most characterized by their genius and their mechanical talents. The first houses on the south of the road are inhabited by the brothers *Vuille*, skilful turners<sup>29</sup>, who by use of a fine sewing-needle make the most delicate work of this kind. The Seigneur *Louis Benoit* of *Sagne* has been known for a long time by the watch dials which leave his hands, he makes up to 80 in one week. The best black that there is, is that which he prepares and which he provides to the enamellers of *Geneva*, *Le Locle* and *La Chaux-de-Fond*; he also paints snuffboxes. The Seigneur *Jean Henri Mairet*, large clock maker living in *Les Ponts*, is not limited to his profession. He invented and manufactured pistols which fire seven shots each. At the instant that they are cocked one of the guns pours the starter into the percussion cap which is then closed by a similar mechanism. But what gained him the most fame, was the invention of a machine to cut the parts of watch chains. A single crank makes it operate and the work is carried out with as much speed as accuracy. For some time this artist left his fatherland; his genius making him worthy to appear on a larger stage, he left to ply his skills in foreign countries. A third, the Seigneur *David Perrenod*, can be put amongst the most skilful of gold case makers. He was engaged to leave *Les Ponts* and to set up in *Le Locle* to be more closely connected with the watch merchants who knew his talents and who benefited from them. At the western end of the small valley live Seigneurs *Charles Perrenod* and *Jean Frédéric Robert*, who make lace cushions which are very convenient for lace workers and who cannot satisfy all the commissions that they get from abroad. One of them sold 400 in one year. Some of these cushions have a caster in the middle and others have two

28 *Borquain* on the 1783 map?

29 *Tourneur*. Presumably a person who makes threads and rope.

*Description of the Mountains and Valleys of Neuchatel and Valangin*

squares which placed successively lift up the lace without one having to remove the pins.

Lastly, there is in *Les Ponts* an artist, Seigneur *Moyse Perrenod*, whose talents can be considered as universal to some extent, as he carries out several types of surprising works to the greatest perfection without having had any kind of training. His first profession is that of arms manufacturer; he straightens rifles with all possible accuracy and is the only one who can build rapid gun-lock plates without shake<sup>30</sup>. In addition to that he makes various musical instruments, such as trumpets and hunting horns; he works as clock and watch maker; and in spite of his taste for the arts he does not neglect his plough when the season requires it. He even manufactures his own tools, finding others less than perfect; he draws split steel of any gauge; he invented a machine to equalize springs; he gave his children tools also of his own invention which are used to make watch chains without noise and force and of which they are the only owners; he provides clock and watch makers with brilliant pillars, inlaid with silver and in steel<sup>31</sup>. At present he forges watch springs of all sizes and succeeds with them as with all the other work which he undertakes.

But the description of the arts which the inhabitants of this small valley follow should not cause us to neglect the natural curiosities that are found there. The chain of mountains which limits it to the north contains many fossilised species. Those which amateurs collect the most are *Dendrites* and *Echinites à mammelons* large and small. We also find there fossilised mosses of various types with which cabinets of natural history can be agreeably carpeted. The part of this chain which is opposite the church of *Les Ponts* presents a unique cluster of small rocks joined together by a natural cement of such a great strength that this mass is supported although the top is larger than the base and the lower part has several holes in the shape of funnels. Above this rock and in the surroundings are four *vacheries*, partly covered with beautiful forests, where more than 200 horned animals can be nourished; they are called *Les Joux* and belong to the town of *Neuchâtel*. The bottom of the valley of *Les Ponts* is marshy and strewn with small fir trees; the inhabitants draw some of very good quality from the peat. There are two mineral springs close to one another; the first is ferruginous and the second sulphurous. They have been little known until now and deserve more attention. It is a medicinal remedy that nature has intentionally provided the inhabitants of this small valley and of which they could probably make some beneficial use for the skin diseases that the sharpness of the air sometimes causes in these mountains.

Nearby is a quite abundant brook whose water, after having turned the wheels of a mill, is lost underground in the cavities of a rock. The flour-miller has to clean out this opening every two years. He had the curiosity to penetrate these underground places, and for fifteen minutes he went through the rocks which give passage to the water while having the marsh above his head. It is believed that this brook joins other water from the small valley, all of which enters funnels in the ground, and forms the river *Noiraigue* about which we have spoken. The small valley of *Les Ponts* gradually rises on the western side, and we see at this end a country house, whose situation is very pleasing, belonging to the one of the richest individuals of the capital. We can see the whole of this small valley in perspective to the east, a little further away the *Val de Travers* to the west, and if we travel to the south, we are at the top of the *Cluzette* mountain, having at its feet a double chasm of immense depth and opposite the *Creux du vent*, which forms a most extraordinary view point.

As we have said, the inhabitants of the village of *Les Ponts*, just as those of the hamlets of *Brot dessus* and *Plamboz* which are nearby, each year take a great quantity of peat from the marsh. They are obliged to do so to compensate for the shortage of wood caused by the devastation of the forests which approach them to the south. This country was formerly entirely covered by trees. The individuals of these communities, lacking precaution and sacrificing the future to the present, voluntarily deprived themselves of a resource that wise economy would have made inexhaustible, and they suffer today more than anybody. But as the re-establishment of these forests is an object of great interest for all the people of the state we cannot be too serious in trying to achieve it. We are surprised not to see in the marsh of *Les Ponts* nor in those of *Verrières* and of *Brévine* the shelters, that we see elsewhere, to dry peat and to prepare it one year in advance. By this precaution it burns better and would have less odour. This same marsh, which seems to disfigure the small valley during the summer, provides an extremely pleasant entertainment to

30 Obscure: *platines promptes et sans secousses*.

31 Obscure: *piliers brillantes, incrustés en argent et en acier*.

the inhabitants of the nearby villages in winter. As soon as snow covers it, they hasten there to hunt the wolves which gather there, and do not fail to kill several of them. The courage which they show towards the dangers and tiredness inseparable from such an exercise, proves that this noble disposition of the heart is not incompatible with the taste for peaceful arts which are their normal occupation.

But it is time to leave the *Mountains* and to approach the capital. Only one small valley still remains to be visited, the *Val de Ruz*. To go there from *Les Ponts*, we cross all the marshes on a road going towards the south-east and we arrive at the top of the *Tourne* mountain about which we have spoken. Beyond it, we go down by a road which was formerly very difficult, but which has been made safe and convenient. It is the main work of the architect Seigneur *Bovet*. The inside of this mountain is bored with several caves in which we see crystallizations and stalactites of the greatest beauty. We then arrive at the hamlet of *Montmollin*<sup>32</sup>, where we leave the road which goes to the capital and, heading north-east, we arrive at *Coffrane*, the main village in the *Val de Ruz*. We can, if we wish to see all of it, make the whole tour by starting with the northern part and finishing with the southern which will lead travellers to *Valengin*. This small valley, one of the most beautiful and most populated in Switzerland, extends from the north-east to the south-west. It is 4 leagues long, and three-quarters of a league at its greatest width. One counts 24 villages or hamlets in this not very large area. Most of the main ones are large and well built. Almost all are placed at the foot of the double chain of mountains which limits this small valley and which finishes in an oval in the north-east. There we see a very high mountain which is called the *Chasseralle*, and we see another in the west called *Tete de Rang*, which is round and is entirely stripped of trees. Above *St Martin*, one of the villages in the *Val de Ruz*, is a defile called *Pertuis*, a road cut in the rock and bordered by two high escarpments; in spring snow-slides are frequent and dangerous there. Near this place is a vast, deep cave whose entrance has the shape of the mouth of a furnace, and where one finds *Lait de Lune* (Moon Milk) in abundance. Inside is an abyss which prevents us going further; the stones that are dropped into it roll for a few minutes, bouncing on shelves of rocks and producing an alarming noise that the multiplying echoes increase further. To the east of *Pertuis* is *Joux de Plane*, a mountain remarkable for its excellent pastures, the rare medicinal plants that it produces and the fossilised marine bodies that are found there.

The *Val de Ruz* has several brooks which successively join the largest, that is called the *Seyon*. Fish are not caught there, but on the other hand it provides excellent crayfish. Agriculture mainly occupies the people who live this small valley, those who follow some profession look at it only as an aid to their situation. The difference that there is, between them and the inhabitants of the *Mountains*, whom we have just left, comparing the genius, inclinations and way of life, is clear and striking. Everything here reminds us of the ideal of a completely pastoral life. We see at first glance some well irrigated plantations of fruit and other trees, and carefully cultivated fields. The inhabitants endeavour to use naturally fertile grounds, without however neglecting the application of certain necessary arts. For some time they have established artificial meadows with the help of the rich marl-pits, that are close to the village of *Coffrane* in the west and the lower part of *Dombresson* in the north. If the probes of the Marquis de *Turbilly* were used, which can discover the nature and quality of the ground to a considerable depth, it is very probable that more of them will be discovered in the back of the chain of mountains which limit this small valley to the south.

We will add to the description of the *Val de Ruz* some general observations on the means of improving agriculture there. The soil of this small valley is good and there are few marshes. We first notice a great extent of pastures, but from which little benefit is drawn because, being jointly shared by all the inhabitants of a village, no-one takes care of them. The closed meadows which have their individual owners are quite different. There are forests which provide construction timber and firewood; one cannot take too much care in maintaining them, nor too much economy in exploiting them. The amount of arable land is too large for the current number of farmers. This number decreases every day because of the preference which the inhabitants of both sexes have for less arduous and more lucrative work that is offered to them in the printed calico factories, and this preference will be greatly strengthened when they see one of them established in the centre of their small valley. This consideration, together with the reduction in the price of grains since the free import of them from the *Franche-Comté* and the increasing dearness of labour, will

32 *Montecillon* on the 1783 map.



*Description of the Mountains and Valleys of Neuchatel and Valengin*

metamorphose most of the arable lands into meadows which do not require cultivation. Thus this part of the rural economy will change its direction and the people will be able to get a great advantage from the land, which will no longer be ploughed, if many plantations of fir trees and beeches are established and if the artificial meadows are multiplied. But in consequence of following this change, these people must apply themselves, even more than they presently do, to the regular irrigation of their meadows, and to the channels and locks to draw more water from the *Seyon* and the other brooks which surround their lands. For this they could examine the land and consult with some of the peasants in *Emmenthal* or *Argeu* where the meadows are very well watered. The *Wiger* and the *Sour* very much resemble the *Seyon*, so why couldn't the latter produce the same advantage? The rules of such a useful art can be found in the excellent treatise of Pastor *Bertrand* on the irrigation of meadows. By practising it carefully, the quantity of fodder and consequently that of manure would increase. The remainder of the fields would be restored and would become more fertile, and the number of cattle would be multiplied and would be the subject of a very lucrative trade. And if the inhabitants of this beautiful small valley being more content could preserve luxury by preserving the simplicity of their manners, they would enjoy a life which the opulent townsman would desire. But farming does not prevent these people from applying themselves successfully to certain arts. In addition to those which are necessary for the needs of life, several of their young people have trained in clock making in the *Mountains*, so that for a long time there have been many workmen among them who build wooden clocks, with a bell and an alarm of high accuracy and which they sell to foreigners. We also find a number of *boisseliers*, who make all the things relating to their profession from fir trees<sup>33</sup>; there are some carpenters, stockings makers, tanners etc.; the hemp and wools of the country are used to manufacture calico and coarse cloth; and several mills for grains and boards have been set up on the *Seyon*. We would not expect to find an establishment for the sciences in this country, but this is no longer true and it is too important for us to omit it. One of the principal families of the *Val de Ruz*, from the village of *Savagnier* and who it is unnecessary to name, has established a common fund whose income is devoted to those of its members who dedicate themselves to study, especially of medicine and surgery. We wish that such a wonderful example would be imitated in other districts of the *Mountains*, where the remoteness of the places and the roughness of the roads often make such most necessary help late and useless.

The tour of the *Val de Ruz*, carried out in the manner that has been described, finishes in *Valengin*, capital of the county of that name. It is a borough located on the *Seyon* and in an estate, surrounded by heights and forests which form a gorge through which passes the highway. We see there an old castle, partly demolished, where the lords of this place had their residence before this county was joined together with that of *Neuchâtel*. As soon as we pass through this borough we cross the mountain which was the boundary between them. At the highest point and close to the road is a rock which contains an extraordinary cluster of Strombites hanging from a crystallized marl. The ground around *Pierre a Bot*, where we next arrive and which belongs to the town of *Neuchâtel*, is covered with forests, fields and pastures; there are marl-pits from which people benefit. From there we can see the whole extent of the *Neuchâtel* lake and all the fertile and cultivated land which surrounds it. This cheerful and diversified aspect is all the more pleasant as we have been deprived of it during almost all the voyage we have made in the *Mountains*. The vineyards start a quarter of league from the capital at the place which is called *Le Plan* from where the descent to the doors of the city is very quick.

The *Seyon*, along the edge of which we walk for some time, has its source in the *Val de Ruz* near *Villiers* above *Dombresson*. This brook, which becomes a dangerous torrent because of the water which it receives from all of the small valley and which it carries through the land, runs from *Valengin* in a deep bed, restricted and surrounded by chasms. It has more than one time created terror in the town of *Neuchâtel*, through which it passes, and the floods that it caused there in 1579 and in 1750 will be remembered for a long time. It would be useless to add a description of the capital to that which we have just given; it is well enough known and appears elsewhere. We will be satisfied to say that foreigners who have made the tour of the *Mountains* rest agreeably at *Neuchâtel* to recover from the tiredness of which such voyage cannot be absolutely free.

END

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33 *Boisselier*: Maker of small objects from wood, such as buckets, bushels (for measuring), and wheelbarrows.