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By the same mail which takes this hurried communication (as I leave to-morrow on my second voyage) I send newspapers and a pamphlet containing articles on the river, which I trust may be found of interest.

Since my return, the Legislative Council of this colony have awarded to me a "*gold medal*" for opening up and showing the capabilities of the river, and have also voted me 4000*l.* as a bonus, to place two steamers on the upper rivers. Next flood I look forward to having five steamers on the river, and a boat to go outside. These steamers, with a sufficient number of barges, will be amply sufficient for all goods and passenger traffic. Indeed, the Governments of all the colonies, as well as the settlers on the river, have given me every inducement to prosecute the enterprise.

When the new steamers are on the river I look forward to reaching the *Mitta Mitta* by the *Home*; *Scymour*, about 40 miles from Melbourne, by the *Goldburn*, between *Yass* and *Gundagai* on the *Murrumbidgee*, and *Wangaratta* on the *Ovens*: as to the *Darling*, I am afraid to hazard an opinion.

I did myself the honour of addressing you by letter, dated "Lady Augusta, 5th Oct., 1853," proffering my services to leave any stores on the Murray or Darling, which might possibly be required for the "Exploring Expedition" which, under your auspices, is to be started for the interior. I can now only repeat what I said then.

My time, since my return to Adelaide from the Murray, has necessarily been much occupied in carrying out affairs connected with a navigation of such recognised importance, which I trust will serve as an excuse for the hurried manner in which these remarks have been thrown together; and, looking forward some day to be of substantial use to your learned body,

I have the honour to be, Sir,

Your obedient servant,

THOMAS CADELL.

XI.—*Notes on the Passage of Hannibal across the Alps; and on the Valley of Beaufort, in Upper Savoy.* By Professor PAUL CHAIX, of Geneva, Corresp. F.R.G.S.

Read, May 24, 1855.

THAT "*vexata quæstio*," the passage of Hannibal, has recently undergone fresh investigation in a work by Mr. Schaub, of Geneva. The author begins with a brief summary of opinions of certain previous writers. Many of the views that have been advocated

appear to have been suggested by a desire to identify the line of march with the neighbourhood in which the inquirers resided, or by similar circumstances of an accidental nature. Mr. Schaub regards the theory of Whittaker, followed by Simler and Grosley, which leads Hannibal over the Great St. Bernard, as the most paradoxical.

Deluc and Melville produced the most remarkable work on the subject, in three editions, the first of which appeared in 1818. It was ably supported by Wickham and Cramer in 1820, who increased its importance by a few additions and modifications. These authors adopt Roquemaure as the point where Hannibal crossed the Rhone, and Vienne as the northern extremity of his march up the left bank of the river. The triangular interval between the Rhone and the Isère in Dauphiny, compared by Polybius to the Egyptian Delta, answers to the *Insula Allobrogum*. The Carthaginian General entered Savoy at St. Genix d'Aosta, and crossed the hilly country at Mont du Chat (*Mons Thuates*), where his first encounter took place with the mountaineers, who kept watch during the day only. From thence Hannibal advanced through the fine plain of Chambéry, and along the wide and fertile valley watered by the Isère, to Bourg St. Maurice, crossing the Alps at the pass of the Lesser St. Bernard, where he fought his last battle with the mountaineers, and then halted on its level plateau for two days, waiting for stragglers.

M. Deluc attached too much importance perhaps to the discovery of a great white rock and of large bones upon the Lesser St. Bernard, and of a silver shield which was found by a farmer in 1714, and deposited in one of the Parisian museums. The shield was dug out of the ground on the estate *Du Passage*, between *La Tour-du-Pin* and *Abrets*, half a mile from the road between Vienne and Chambéry. It was ornamented with Punic intaglios and bas-reliefs, and considered to have been a votive offering. The best arguments of Deluc, Melville, Wickham, and Cramer were based on the concordance of their itinerary with the distances, the number of days, and the geographical data mentioned by Polybius; also on the adoption of that text, almost exclusively, as the only faithful guide; and further, on the coincidence of that itinerary with a choice of locality and season such as would be made by a man of common sense, and particularly by a general commanding an army. A different opinion was maintained by the Marquis of Saint Simon, who attempted to prove that the Carthaginians marched along the river *Ubaye* to *Mount Viso*. This route leaves nine days to be accounted for. The author supposes that the army was misled by the guides, and that the time was spent in ascending the mountain. This theory affords the author

an opportunity of finding a pulpit, at a height of 13,000 feet above the sea, for the celebrated speech reported by Livy! Apparently for the sake of that result, he does not hesitate to trace the route of an army over a lofty mountain, instead of through passes 6000 or 7000 feet lower. But these guides had been chosen to meet Hannibal by the Insubres, a nation in frequent intercourse with Transalpine Gaul, their original country. The Insubres had found their way to Carthago Nova, in Spain, and the guides they had selected were not likely to mistake the safest road to Italy. Hannibal was in alliance with the Allobroges, as well as with the Insubres, and a prince of the Cisalpine Gauls was with the guides. That road was undoubtedly the safest for him which joined the territories of those nations.

In 1851 M. Replat, a barrister of Annecy, published a work entitled 'A Note on Hannibal's Passage,' supporting a theory originated by M. Blanc of Beaufort, and Count Vignet. M. Replat leads Hannibal from the Rhone on reaching the Isère, not only below Vienne, but without entering the territory of the Allobroges, in opposition to the positive evidence of Polybius and Livy. He places the Insula Allobrogum between the Isère and the Drôme, although the high and very bold mountains of Royans, Trièves, and Vercors give that tract no resemblance to the Egyptian Delta. The "Insula" lies so evidently north of the Isère, that another commentator, M. Latronne, makes the Carthaginians turn back and recross the Isère in favour of his theory, which continues the line of march along the rivers Drac and Durance to the Pass of Mont Genève.

M. Replat, however, follows the *left* bank of the Isère to Pontcharra, near Fort Barraux, where he places the site of the first battle with the mountaineers, who left the passage defenceless at night. He then crosses to the opposite bank, and reaches Albertville and Conflans. From the last-named place MM. Vignet, Blanc, and Replat advocate the claims of a new route, never before suggested. Turning from the great valley of the Isère because it appears to be "too crooked," they endeavour to trace the African General's march along the hitherto unheeded valley of Beaufort and through a labyrinth of defiles to the pass of La Seigne and the Allée Blanche, at the southern base of Mont Blanc. This route is chosen by M. Replat as the shortest way across the great ridge of the Alps by an Eastern pass.

Valley of Beaufort.—The Valley of Beaufort lies N.E. of Albertville, between that town and Chamounix. There are four routes between it and the Chapieu, which forms the approach to the western foot of the Col de la Seigne:—1st. The Pass of La Sauce, which is so forbidding that it would be madness to think of

it. 2nd. The Pass of Cormet, or Platte, or Croix de Biollay, which presents an accessible tract of pasture-ground, after an elevation has been attained of 6441 feet, almost the height of the Lesser St. Bernard. 3rd. The Col du Mont Joly, which I found to be higher. 4th. The Col de la Fenêtre, still higher. The 3rd and 4th do not lead directly to the Col de la Seigne, but into the Vale of Montjoie, and then over another pass, the Col du Bonhomme, to the Chapieu, where all these routes converge, leaving the Pass of la Seigne still in advance.

M. Replat prefers the 2nd route through the Pass of Cormet, or Platte; but he thinks it not altogether improbable that Hannibal, "mised by his guides," ascended in succession the Col du Mont Joly, the Bonhomme, and lastly the Col de la Seigne; three difficult passes, in preference to the single and easy Pass of the Lesser St. Bernard.

M. Replat's 'Note' has been answered in the work by Mr. Schaub, mentioned at the beginning of this paper. Mr. Schaub is intimately acquainted by foot journeys with all the passes in the Alps. His thorough knowledge of Greek has made him familiar with the chief authority in the original. He follows the names, distances, and times given by Polybius; he does not dispute the competency of the guides, and he concludes that the Carthaginian General, in choosing his road, kept in view the sustenance and safety of his army, as well as the rapidity of his march.

At Pontcharra, the position selected by M. Replat for the first encounter with the mountaineers, Mr. Schaub shows that there is not in the whole neighbourhood any mountain pass answering to the historian's description; and the distances from the Isère to Pontcharra are also quite inconsistent with Polybius.

The Valley of Beaufort is easy of access at its entrance only; but it soon merges into narrow defiles, with stupendous ridges and precipices, leading to a chaos of mountain passes, at a great elevation. On the other hand, the Valley of the Isère is wide and open throughout, from Albertville to the foot of the Lesser St. Bernard. It is almost level, fertile, and now occupied by numerous wealthy villages and towns. M. Replat's supposition that it was marshy and overflowed is quite groundless.

The Lesser St. Bernard is one of the easiest passes in the Alps, and lies at the southern base of the Cramont, a mountain identified with the Cremonis Jugum, mentioned by Cælius Antipater as the locality of Hannibal's passage. There is also a table-land on the top of the pass, 6 miles long, and 900 feet lower than the Col de la Seigne, sufficient, it is presumed, for the encampment of Hannibal's army while waiting two days for stragglers. Three days more were spent in the valley below, owing to the passage being

obstructed by snow. The Col de la Seigne, on the other hand, passes the northern base of the Cramont. There is only a narrow ridge on its summit, and there is no flat spot lower down, as M. Replat gratuitously imagines. It is also 900 feet higher than the level plateau of the Lesser St. Bernard. The distance from Albertville to the Italian valley of Aosta, along the Isère and over the Lesser St. Bernard, is 50 miles, measured along the road, which is flat for 34 miles, and the pass is easily crossed in the remaining 16 miles.

Following M. Replat's itinerary through the Valley of Beaufort, the distance between the same points is 42 miles, scarcely 8 of which may be termed easy, while the remainder includes two and even three very high mountain passes, in a very rugged, uncultivated, and inhospitable country. It is also well known that these passes are impracticable at the end of October, when Hannibal's passage occurred; and as each pass would be a day's march for an army, the saving of 8 miles on level ground appears to be an insufficient reason for encountering such obstacles.*

As the Valley of Beaufort is very little known, a sketch of its present state may be useful to tourists, and perhaps afford some additional material for Mr. Murray's excellent Guides.

The situation of the valley has been already described in a previous page of this paper. It includes within its branches, and the surrounding ridges and passes, an area of 165 square miles within a circumference of 48 miles. The chief town, St. Maxime de Beaufort, is 12 miles N.E. by E. of Albertville, and it is situated at the junction of five valleys, which form together the Beaufort country. The Vale of Hauteluze is on the N.E.; the Vale of La Gîte is on the E.; Pontcellamot, or Poncelamont, is on the S.; Trecols and Roselein are on the S.E.; and the Valley of Beaufort, in which these unite, is on the W.

Each valley feeds a stream. The Doron flows from La Gîte, and receives the Argentine from Pontcellamot; the Dorinet, or lesser Doron, from Hauteluze; and the Trecol and the Roselein from the valleys of the same names. The Doron then pursues its course for 10 miles below Beaufort, till it unites with the Arly, a tributary of the Isère, at Conflans.

An indifferent road ascends from Albertville, along the banks of the Doron, to St. Maxime de Beaufort. In other directions

* The Dissertation by Count de Fortia d'Urban contains a list of many works on Hannibal's Passage. In 1854, "a Treatise," by Robert Ellis, B.D., was printed at the University Press, Cambridge, and answered in "a Criticism," by W. J. Law, A.M., London, 1855. Mr. Law notices the announcement of M. Chaix's Paper in a postscript, the remarks in which appear to be based on an erroneous assumption of M. Chaix's views.—[See also a work on the same by H. L. Long, 1831.—Ed.]

the country is only accessible through a dozen cols or mountain paths, practicable only for mules and pedestrians. These passes are, on an average, about 6500 feet above the sea, and the following are the most remarkable :—On the S.W., La Bâtia, leading from Arèche to La Bâtia, in the valley of the Isère. On the S., the Louse (? Luce) and Grand Cornet, crossing from the head of the Vale of Pontcellamot to the Isère in Tarentaise. On the N.W., the Col de la Leizette passes between Hauteluce and Flumet, through Notre Dame de Bellecombe. On the N.E., the pass of La Fenêtre and the Col Joly lead to Chamounix, through the Vale of Montjoie. On the E., the pass of La Platte, or Croix de Biollay, leads from La Gîte, and that of La Sauce from Roselein to the valley of the Chapieu in Tarentaise. A few other passes form internal communications from one valley to another such as the Char de Montagne, or Col de Boudin, between Arèche and Trecols, and the Plan de l'Estace, between La Gîte and the upper part of Hauteluce. La Sauce is perhaps the most difficult, especially at the narrow part called Gorge des Cavés, but none of these paths is dangerous at a proper season.

The time required to reach Moutiers on the Isère from St. Maxime de Beaufort, either through the Grand Cornet or the Col de la Luce, is equal to a day's march. It is 4 hours from Beaufort to the Chapieu over the Col de la Platte; and half a day from the upper part of Hauteluce to La Gîte through the Plan de l'Estace. A difficult march of $1\frac{1}{2}$ hour is required to reach the crest of Mont Joly from the Col Joly, and the descent to Notre Dame de la Gorge occupies the same time; from thence it is $2\frac{1}{2}$ hours to Contamines. The distance from Flumet to the Col de la Leizette is equal to $4\frac{1}{2}$ hours, and the road lies through cultivated land and swampy pastures. Thence to Hauteluce is 1 hour more.

None of the mountains in the Beaufort country is of a great height; but their majestic summits are capped with snow before the autumn begins, especially the Needle of the Grand Fond and the Crest du Rey (King's Summit). Mont Joly, the Point of Arotte, and Rousselette, to the E., rise in front of Mont Blanc.

The Rocks of Enclaves are perhaps the most curious feature in the orography of this district. They form a group of mountains in its centre, between the Doron and the Dorinet. An oval, solitary basin is hollowed out in their midst, and surrounded on all sides by granitic ridges so completely that its waters can only be discharged through subterranean channels, and over numerous and magnificent falls, into the wild valley of La Gîte. A cluster of châteaux, named Outray, occupies the centre of this secluded basin. I found there plenty of rock-crystals and samples of copper and iron ore, besides anthracite coal and talcose schists.

The following is a List of Measured Altitudes, with the Names of the Observers.

Positions.	French Mètres.	English Feet.	Observers.
Albertville	315·7	1033·8	A. Beaumont.
„ „ „ „ „ „	338·0	1099·3	Billiet.
Aixme	758·0	2463·5	Beaumont.
„ „ „ „ „ „	711·0	2310·7	Billiet and Gravier.
Lesser St. Bernard, Pass	2206·0	7169·5	Escher.
„ „ Hospital	2151·0	6990·7	Billiet.
„ „ „ „ „ „	2172·0	7059·0	Billiet and Gravier.
Chapieu	1549·0	5034·2	Studer.
„ „ „ „ „ „	1546·0	5024·5	Favre.
St. Maxime de Beaufort	799·1	2617·0	Beaumont.
„ „ „ „ „ „	797·0	2590·2	Beaumont.
„ „ „ „ „ „	754·0	2450·5	Favre.
„ „ „ „ at the Inn, 3 } observations	744·1	2436·9	Chaix.
St. Maxime de Beaufort at the Church, } on a hill	749·8	2455·5	Chaix.
Pass of La Platte, or Croix de Biollay	1967·0	6392·7	Studer.
„ „ „ „ „ „	1975·0	6418·9	Favre.
Pass of La Luce	2138·0	6946·0	Favre.
Grand Mont, north of La Luce	2720·0	8840·0	Favre.
Pass of the Grand Cormet	2139·6	7007·0	Favre.
Pontcellamont, chapel of St. Guérin	1523·3	4950·7	Favre.
„ „ „ „ „ „	1529·0	4969·2	Favre.
Char de Montagne, or Col de Boudin	1730·0	5622·5	Favre.
Roselein, or Roselen	1481·0	4813·2	Favre.
„ „ „ „ „ „	1464·0	4758·0	Favre.
Praz, village S. of Beaufort	999·8	2694·3	Chaix.
Arèche, church	1027·7	3323·3	Chaix.
Fontaine, hamlet E. of Beaufort	1033·4	3358·5	Chaix.
La Gîte, at Cyril Freyzon's Cot	1658·6	5390·4	Chaix.
Pass of Plan de l'Estace, above La } Gîte	2286·9	7432·4	Chaix.
Lake of La Girotta	1712·9	5566·9	Chaix.
Pass of Mont Joly	1975·5	6420·3	Chaix.
„ „ „ „ „ „	2028·0	6590·0	Favre.
„ „ „ „ at Châlet Avocat	1632·4	4470·9	Chaix.
Annuit, in vale of Hauteluze	1233·7	4009·5	Chaix.
Hauteluze	1141·7	3710·5	Chaix.
„ „ (better observations)	1158·7	3765·7	Chaix.
La Leizette, pass above Hauteluze	1775·7	5770·0	Chaix.
„ „ (inferior observations)	1782·8	5794·1	Chaix.
Bellecombe, Notre Dame de	1118·1	3633·9	Chaix.
„ „ „ „ „ „	1115·3	3624·7	Chaix.
Flumet, on a slope	897·0	2915·2	Chaix.
„ „ in another part	922·5	2998·1	Chaix.
Col de la Seigne	2519·0	8186·5	Chaix.
Oratoire du Glacier	1774·0	5765·5	Chaix.
Col des Tours	2661·0	8648·3	Chaix.
„ „ „ „ „ „	2682·0	8716·5	Favre.

The geological structure of the Beaufort country offers the following indications:—Mica-slate forms the slope of the moun-

tains from Flumet up to La Leizette; but the crest of the pass is clay slate, dipping to the S.E., and it is also seen along all the crests as far E. as the Col Joly. It is found again at the Cornet, dipping N.; but on the southern slope of that pass it dips S. Clay-slate rises in immense masses between Arèche, Petit Cœur, and Cevins, where abundant quarries are worked, yielding very large fine-grained and shining slabs. Mines of anthracite coal are worked near Petit Cœur, and others have been recently opened at Arèche in the Vale of Pontcellamot. Mountains of granitic slate form the eastern slope of Pontcellamot, and occur again in the vale of Trécols and on the southern slope of the Cornet. The Doron flows for miles in the vale of La Gîte, through a narrow and deep cleft in talcose schist, dipping to the S. and E.

Each of the smaller valleys has peculiar features. The vale of La Gîte is without doubt the finest. At its head a waterfall, issuing from the wild gorge called Les Cavés, in the pass of La Sauce, unites with another stream in a flat meadow to form the torrent of Doron. From thence the Doron plunges into a deep ravine, extending westward between vertical walls of rock, and becomes an uninterrupted cascade for many miles, increased by numerous streams which descend in foaming sheets from the rocks of Enclaves on its right bank, while the left bank is shaded by tall and dark pines. Scenery equally wild and magnificent forms the entrance from this valley into Roselein.

The vale of Pontcellamot in its lower part is more open, and the forests which crown its sides surround a basin of cultivated land and slopes of smiling pastures. The number of hamlets bespeak a larger and more wealthy population scattered around the larger village of Arèche. A pretty fall is formed by the river Argentine at Arèche. A winding path ascends to the second terrace of this valley, where the forests encroach farther down upon the cultivated land, and the river is broken by numerous falls, adorned with tall spruces, rearing their heads on the verges of precipices. On the third and uppermost terrace are extensive pastures, interspersed with châteaux, but without any permanent dwellings. The solitary chapel of St. Guérin is raised on a knoll in the midst of the surrounding circus, and the paths over the Col of La Luce and the Cornet diverge from it across meadows and crumbling slate soaked with water. From the pass of the Grand Cornet there is a most splendid view of the snowy mountains of the Maurienne and Tarentaise, with extensive glaciers, and the fertile and broad valley watered by the Isère, and dotted with fine villages. The path descends to Aixme, where several Latin inscriptions have been discovered which suggest its identity with Forum Claudii or Axima.

The vale of Hauteluçe is the broadest and least wild in the

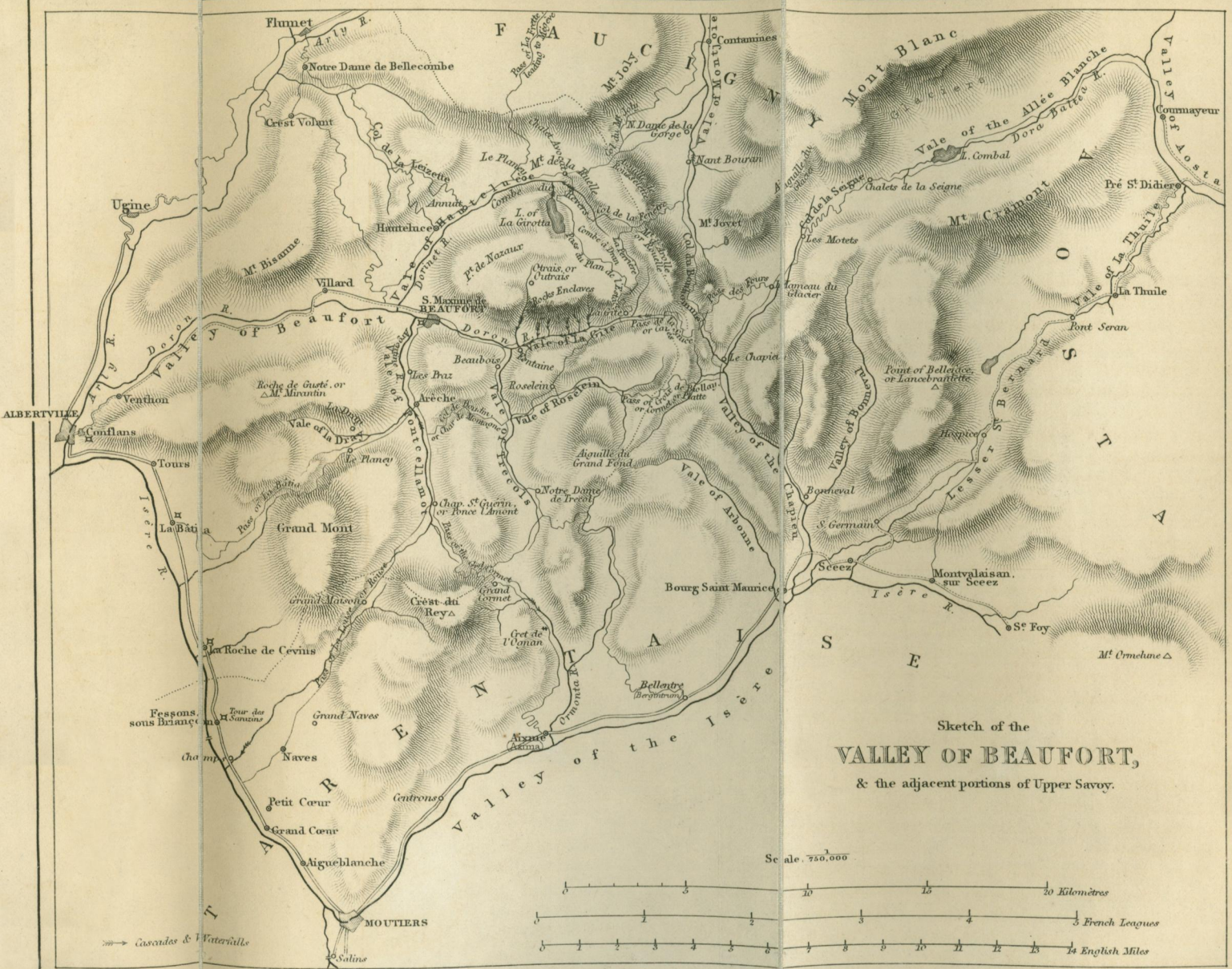
Beaufort country. It is fertile, and productive of wheat and hemp, while the forests merely crown the summits of the cultivated slopes. The cows are small but pretty, and the sheep yield a good fleece.

E. of Hauteluze, the right slope of the valley is named *Montagne de la Ruelle*, and the left slope *Combe du Revers*. The small river *Dorinet* is formed in the *Combe à Dran*, a barren gorge at the feet of the *Aiguille Rousellette*, the *Fenêtre*, and the *Plan de l'Estace*. It forms a waterfall where it leaves the *Combe* to enter the valley of *Hauteluze*, and it receives at the same place, through a more beautiful fall, the waters from the lake of *La Girotta*. I surveyed the lake. It is very picturesque, nearly surrounded by sloping pastures, with a few *châlets*, partly inclosed by dark, rocky cliffs, which give its clear waters dark-green, violet, and even black hues, according to the nature and depth of the bottom. I found the lake to be 1713 mètres above sea; the temperature of the waters 56° Fahr., that of the air being 50°, on the 15th Sept. 1853, at half-past 10 A.M.

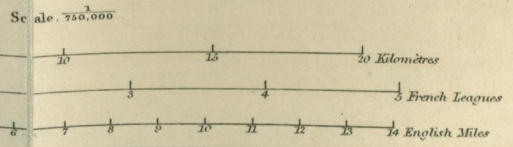
The only vestige of feudal times in these valleys is the ruins of a few towers on a hill N.W. of *St. Maxime*. According to the oldest memorials, the *Beaufort* country was a dependency of the archbishops of the *Tarentaise*. The feudal homage was due to them, when the princes of the *House of Geneva* acquired several tenures there; and a deed dated July 31, 1220, recites that the *Count of Geneva* bound himself to render the yearly tribute of two large trout. There were, however, at the same time *Lords of Beaufort*, who, on the calends of April, 1271, sold most of their rights to *Beatrice*, the last *Baroness of Faucigny*. She erected the country into a *Barony*, which she united to her own, and both have since partaken of the same fortunes. In 1355 they were ceded to the *Count of Savoy, Amadeus VI.*, by *Charles*, then *Dauphin*, and afterwards *King Charles V. of France*. When *Henry IV.* invaded *Savoy*, he came to *St. Maxime de Beaufort* with a body of troops on the 10th of October, and quartered in the castle. On the 11th he marched up to the pass of *Cormet*, to prevent *Duke Charles Emmanuel of Savoy* from entering the country from *Piedmont* over the *Lesser St. Bernard*; but he returned on seeing that all the passes were impracticable, being already blocked up with snow, and he left *Beaufort* on the 12th.

Agriculture affords but a limited resource to the inhabitants of these valleys. *Saw-mills* are numerous, especially at *St. Maxime*. The breeding of cattle and fine mules is the chief occupation. *Cheese* is also made on a large scale, and either sold to *Piedmontese* or bartered for rice and salt.

The inhabitants are healthy, active, hard-working, and abstemious. Their features bespeak intelligence. The women are not



Sketch of the
VALLEY OF BEAUFORT,
 & the adjacent portions of Upper Savoy.



destitute of beauty, and they are remarkable for an elegant head-dress.

The preservation of their roads demands their constant exertion, owing to frequent floods; but they are never in a satisfactory state.

There is a tolerable inn kept by Henry Martin at St. Maxime; those at Arèche and Hauteluce are very indifferent. The cot of Cyril Freyzon, at La Gîte, can shelter the traveller bent on crossing the passes of La Perrière, La Sauce, and the Plan de l'Estace; but Lavocat's chalet should be avoided.

XII.—*On the Volcanic Mountains of Hawaii, Sandwich Islands.*

By J. G. SAWKINS, Esq.

Communicated by SIR ROD. I. MURCHISON.

Read, June 25, 1855.

THERE are four volcanic mountains in the island of Hawaii, viz., Kohala, Muna Kea, Hualalai, and Muna Loa. The decomposed state of the rock being greater on Kohala than on any other, and the total absence of black lava, lead me to believe that it is the oldest of the four. I also think that Muna Kea is next in age, and that Hualalai and Muna Loa are the most recent and of the same period.

The height of these mountains above the sea is estimated as follows:—

Kohala	about	9,800 feet.
Muna Kea	„	13,842 „
Hualalai	„	11,020 „
Muna Loa	„	13,651 „

I landed on the western side of the island at a place called Kawaihai, and crossed over to the eastern coast. This gave me an excellent opportunity of seeing the decomposing effects of the moist atmosphere on the old lavas of the more northern and older volcanoes, which are no doubt co-existent with the formation of the island.

The most remarkable features on the N.E. portion of the island are the immense cliffs of compact lava, separated by ravines, varying in depth from 200 to 2000 feet, over the sides of which a series of cascades fall between Niulii and Hilo (or Byron's Bay). To the S. of that bay the lava assumes quite a different appearance; the colour is black, and its structure like the slag of a furnace, having no definite form, though its cleavage is vertical.

This black or recent lava extends itself into the ocean, forming a shelf, as though it had spread out horizontally from the coast.