May

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Ottawa

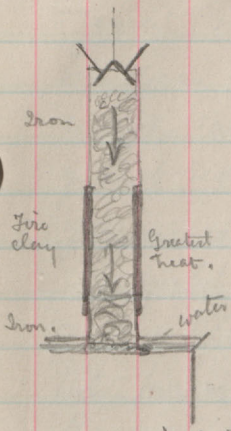
May. 1882.

Notes on Paraffin & oil works &c.

Edinburgh. May 24. 1882.

Now about 20 of them works in all, of which young's probably the largest. Intended visiting young's but found ourselves by mistake at Oak Bank, about 2 m. from Mid Calder Station. Seam of shale here worked from 2 to 4 feet thick. Cost 5s a ton. at some works only 3/6. The good quality of shale cards in brown shavings when cut. Yields about 30 gals. oil per ton. If mined & refined to air & rain deteriorates. Perhaps after long exposure only 25 gals. The shale broken by toothed wheels revolving in opposite directions to pieces not over about 5 inches in diameter. Retorts arranged in double series forming large brickwork structures. Shale raised by tops in buckets & fed into retorts at each side. Retorts closed above by caps & cone like blast furnaces. Upper part of each retort (newest pattern)

of iron. Lower of fire clay. Opens into pan with water below. Shale descends. Is spent raked out below. Heat in fire clay portion of retort strongly urged. The degree which heat now raised, (enough to expel last of ammonia) prevents retort of iron throughout as formerly. Steam introduced near bottom of retort passes up through & out by pipe near top helping to carry away products of distillation. Products condensed in condensers resembling those of gas works. Gas containing ammonia finally led away into tanks holding sulphuric acid. Sulphate of ammonia solution evaps. by steam pipes, cryst, & product dried & bagged. Worth about £22 per ton. Yield more than doubled by adoption of these new retorts, & much of narrow margin

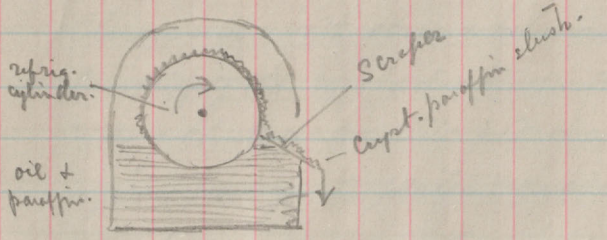


of profit yielded by sale of ammonia salt.
Another process by which shale not raised
to cognat heat. Not Crypt in water below,
but goes down into fire containing
enough carbon or to turn a yield wat
of heat required for distillation. Much
of ammonia lost thus however. Yet so soon
Combustible gases led away after
condensation goes or complete & turned
into furnaces, aiding combustion.
Condensed oils &c next subjected to
successive fractional distillations.
Tarry decanted residum forms
bright, light, coke in retorts, which
large, composed of semispherical
bottom, cylindrical mid piece, &
Cap. Result gasoline & naphtha,
burning oil, & denser lubricating
oils thick with crypt, paraffin when
cold. Paraffin strained out through

cloths. Oil then run into tanks in which cylinders cooled by gasoline which constantly pumped from cylinders as vapour, condensed & returned as liquid. Temperature of oil then reduced to about 25° F. Further quantity of paraffin crystd. out on surface of revolving cylinder, from which removed by scrapers as pasty mass, pumped into other closed tanks across which cloths stretched. Paraffin filtered out & oils run through. This paraffin flower melting point than the first, & paraffins of still lower melting point, but inferior value might be extracted by still further lowering the temperature. The lubricating & burning oils purified by agitation with certain "Chemicals" & finally bleached & cleared still further by exposure to light in shallow tanks. Paraffin paste pressed in cloths by hydraulic pressure, the hydraulic

machinery being charged with oil instead of water as this proved to wear packing less. Paraffin still oily & yellow. Lost goods recovered in one of three ways. Dissolved (washed) out by Naphtha, treated with sulphuric acid which decomp. the oils but not the paraffine, or —
First process used at these works.
Naphtha then pressed out by hydraulic in same way as before. Paraffin melted & run out into shallow tanks, floating on stream of cold water, which, with air on surface, soon solidifies the mass. Cut into Cakes & packed in hogsheads. The hardest & most perfectly refined white paraffin packed in boxes. The paraffin & Sulphate of Ammonia the most valuable products, the oils ranking last, owing to the

low price of American well oils.
A considerable quantity of tarry
products containing the paraffin imported
from America & treated at some of
these works with perfect machinery.
These works & others of some kind
should by law be surrounded by
drains & tanks to receive all
drainage which if it passed into
the streams would destroy the fish.
The drainage disposed of as best can.
Much here evaporated in the water
tanks below the retorts.

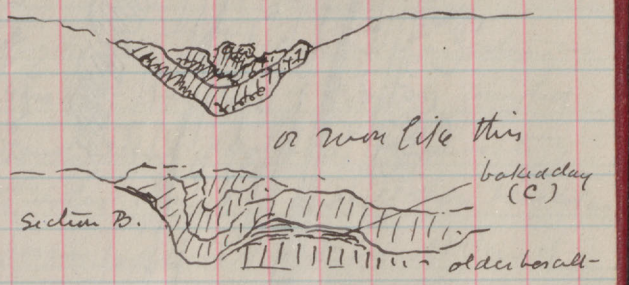


Royat nr Clermont-Ferrand, Auvergne
June 23. 82.

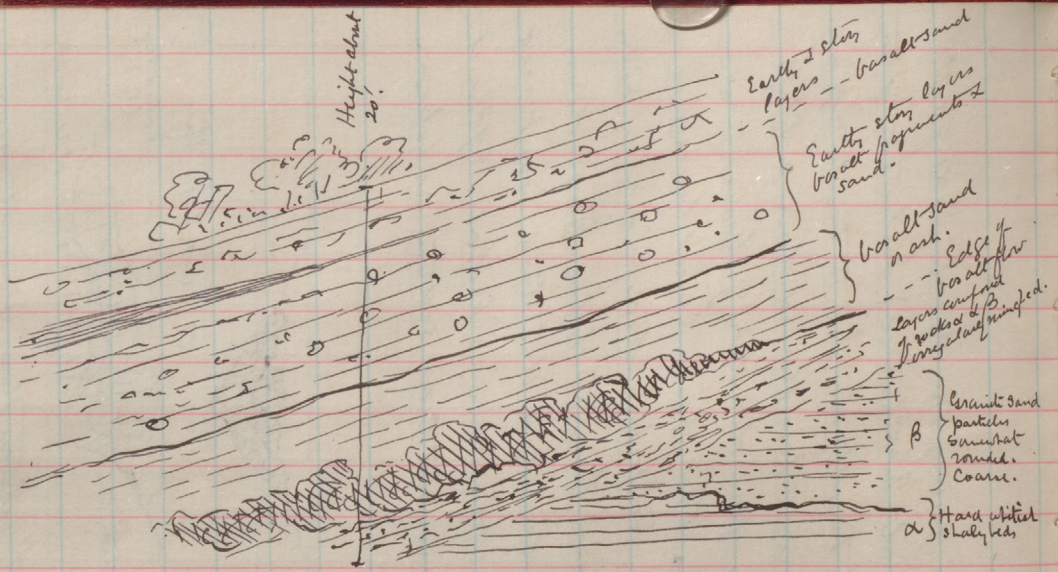
Rocks about Royat very interesting on left or E. side of valley above town in quarry near summit of hill called Puy de Chatrix. decomposed granite, but still sufficiently hard to form a building stone. At the same place a material which either a recomposed granite or a trachyte adhering on & enveloping the granite mass. Relations a little obscure, but probably former from the resemblance of the doubtful rock to that seen on the main road to Clermont both above & below the crossing of the ry. viaduct. On the East side of Chatrix granite not decomposed, & forms part of the plateau on which volcanoes have been developed. The decomposition of the granite likely in part due to heated vapours or during volcanic

period, but must also have occurred extensively sub-aerially before, from the great beds of granitic sand forming layers in the sub-volcanic formation, as I take it. (A. Argiles sablonnes et grès, of the map).
The bottom of the valley filled with basalt said to have come from Grove-noir (but on E. side) but which also (according to map) connects bottom with great mass about Puy de Dome. Basalt narrow in bottom of valley, but spreads out on plain below. Often compact generally black & like cast iron. No columnar structure. Many superposed & irregular flows rough & agglomeritic on both upper & lower surfaces. Caves & hollows perhaps in some cases original but often from weathering out of softer rubbly portions. Some said to give off CO_2 may act springs &c.

In a quarry on opposite side of valley (opposite Mt Chateix) I obtained sections of the basalt &c. In the centre of quarry appears to have flowed down a steep ravine from direction of Grave-noir. Seems to have been several successive flows. First has solidified along sides of ravine, lining V-shaped trough down which second & third have passed. And at least seems probable explanation. Diagrammatic cross section as below –



At C. between flows of basalt occurs a hardened, baked & reddened clay with streaks & irregular layers of sand



Section at E. side of Quarry on S. side of valley at Royat. Nr. Clermont.

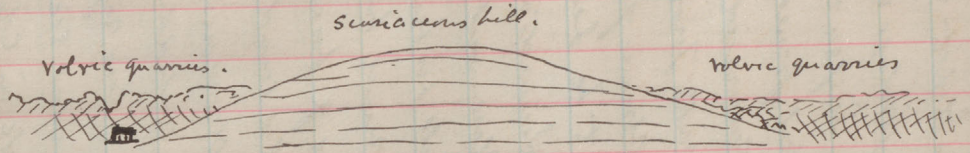
(slightly diagrammatic)

through it. The whole evidently kneaded together. Slickensided, & like half mixed brick making material. On the other side (at B.) occurs the remarkable section shown on the opposite page. The edge of the basalt, very irregular, has been overlapped the eroded edges of a nearly horizontal formation of coarse sand all granitic detritus, with the exception of a few pieces of an underlying & apparently unconformable fine hard shaly rock. Between the eroded edges of these two series of beds & the bottom of the basalt a layer with the same indications the basalt composed of roughly rounded granitic sand & angular fragments of the shales. Mass of basalt here vesicular, & passes upward into basaltic sand. This followed by considerable thickness of earthy material, also following the slope of the hill, & containing much

comminuted basalt, & large fragments irregularly distributed. The whole roughly stratified. This followed by another dark colored layer of basalt ash, which fades out toward top of section, & thus by a repetition of the earthy & stony layers which fades upward imperceptibly into the soil above.

June 24. Quarries of Volvic have been worked for centuries (see guide) & supply stone very good for building, but rather uniform and dark in colors, for all the surrounding country. Quarries extensive but irregular in one of the most recent great lava flows. The surface state a mass of rough rock supporting scrubby growth of bushes & not scarcely any soil. This broken mass or less forms & extensively forested crust of the flow has an average depth of probably more than 70 feet. Blocks &

masses crumbling it leaves layer below, & at certain depth rock becomes solid. No regular jointage & absence of columnar structure. Surface removed & face of 20 or 30 feet proved in solid rock, which then quarried away irregularly. Rock rather porous as a whole & not very hard. Absence of texture. Appears generally to be burnt into slope on the spot. Immediately beyond the station (from Clermont) the foot of a rounded hill has been cut through by the railway & used ballast taken for the line. Composed of basaltic & scoriaceous gravel & sand, glassy with grains of olivine. Occasional small pieces of granite imbedded. The whole stratified more or less regularly & evidently the proximal ejecta of a volcanic vent. Dark in colour, nearly black, but becoming rusty toward surface &


Scuriacens hill.
volvic quarries.
volvic quarries
Railway station
(Volvic)

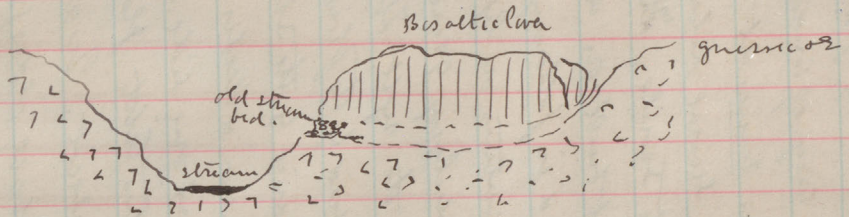
gradually into soil above. A little further along the line the lava stream, composed often of irregular superposed flows, such surrounded above & below by tuff & scoriaceous & pyroxenitic material. The lava flow has evidently been subsequent to the ash deposit just described. Section of line somewhat as shown opposite.

Lead-silver works at Pontgibaud.

Concentrates are smelted in blast furnace with coal & limestone from Gannat (Lacustrine) fumes condensed by spray run out into tanks & allowed to settle. slime fritted in furnace, broken to pyroxenite & treated in the blast furnace. Lead desilverized by adding percentage of zinc. Triple amalgam formed floats to surface & solidifies first when pot allowed to cool. Crust broken up & skimmed off. Zinc,

(with much of lead) oxidized, & when thus got rid of pure silver-lead cupelled. Many minor details in saving by-products, & works evidently very carefully conducted.

Lead ore chiefly from mines at Barbecot & Pranel, several kilometres down the valley of the Sicile. The village of Portgibaut built on a rather recent lava flow, & in following down the valley the flow continues on left bank of stream, the underlying gneissic & schistose rocks on the right. The old valley bottom occupied by the flow has been abandoned since by the stream which has cut a new & deeper channel into the old rocks at one side. Pass round the end of this little flow before reaching Barbecot. Near Pranel a second flow, probably older (see map) The stream has behaved in exactly the same way here. Interesting section near the


Basaltic lava
gneiss
old stream bed.
stream

mine showing the gravel of the old stream bed forms a thick layer below the basalt probably 40 or 50 feet above the level of the present stream. (See appendix) The basalt here shows signs of prismatic (columnar) structure, small columns forming irregular radiating groups from lower surface.

The mineral veins follow the same general N-S direction with the main volcanic peaks of the district; the linear arrangement of which Scrope draws attention to as indicating fissure. No doubt due to parallel cracking at one of active periods. Great quantities of Carbonic acid in mines rendering energetic ventilation by fans necessary. Everywhere in this district Carbonated waters, & elsewhere (as in connection with the grottoes of lava flow at Royat) escape of CO_2. Doubtless the

last traces of volcanic activity.

June 25. Ascended Puy de Dome. The road from Clermont passes over one of the lava flows which marked as belonging to old series on the map. Very distinctly columnar. Does this show necessarily that flow has occurred under water? Puy de Dome was of trachyte (domite.) varying somewhat in texture & colour.

27. June. Ascended from Royat to the foot of the newly planted pine woods near summit of Gravenoire to see one of the scoriaceous mountains as which this is coloured on the map. The path which is direct, begins immediately to the right of the Grand Hotel, & numerous quarries & holes along it enable structure to be seen. Sandy & shaly light coloured lacustrine formations

eroded & covered with fine scoriaceous material above, first seen. Then numerous deformes of scoriaceous material, generally more or less perfectly stratified & covering & including old lava flows. The scoriaceous material is the same called basalt sand or gravel elsewhere. Generally more or less vesicular, hard, sometimes sand, sometimes larger half rounded fragments, & often layers of quite large stones. Occasional fragments form small volcanic bombs or tears, supposed to be incontestable signs of subaerial eruption. This is the same material seen near Volvic station & described above. Dark coloured & blackish except at surface where reddened by oxidation. Sectency good but no appearance of water action in way of formation of beaches of rolled stones &c. Sub-aerial

denudation only seems to have affected the mass since its formation.

Rem. visited Port du Chateau where some fossils in thin section. Found at base what appears to be a mixture of calcareous & pale volcanic material more or less impregnated with small quantities of bitumen in the cracks & generally throughout certain layers. This material is sometimes pretty coarse with fragments (?) as large as beans, sometimes very fine & of several pale greenish colours. Considerably indurated so that it can be used as a building stone for rough purposes. Above this a similar material but finer & heavily charged with bitumen which softens so as to flow slowly in the sun. The bitumen fills small cavities & crevices & is disseminated throughout the rock also. Fossil shells occasionally

filled with it. This layer is worked, & appears to be sufficiently bituminous for that purpose for a thickness of 6 to 10 feet. A large tunnel driven into the side of the hill, & branches in various directions. Did not go beyond the mouth, as the stratification could be thus seen, & abundant samples obtained. Horses drawing or dragging large carts into the mine. Above this a great thickness, (probably 60 or so feet seen) of pale & whitish-yellow hard marly beds. Appear to be sandy clay with calcareous matter, or possibly in places nearly pure limestone. Moderately indurated, but layers vary considerably in this respect. The question of the origin of the bitumen a curious one. None or very little in the upper beds just described.

The works near the mine & at the end of the Railway Bridge. Supplied with

material not dug from the mine, but from a mine or quarry near Clermont & on other locality. Probably all on the same bed or nearly. The bitumen works ground up between toothed rollers & by successive grindings & siftings reduced to very fine powder. This then melted together in retorts or pans & while I did not see the precise construction, & immense moulds made in two pieces which together complete an annulus. The material thus cast into cheese-shaped cakes about 18" across & 6 inches thick. These exported, & used for asphalting streets, floors &c, like the Val de Travers material. Oil is also produced by distillation, but this part of the work on very small scale & not now in operation.

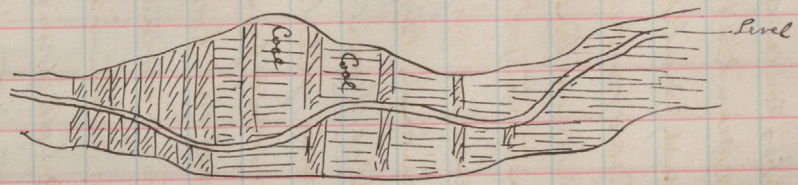
If the material in the beds at Pont du Chalain really volcanic, the

volcanic activity of the Auvergne centres must have continued for an immense length of time, at intervals, with great denudation &c between. Is this which material ash from the oldest trachytic (domite) volcanoes?

General on Le Puy Tert. & Volcanic Basin.
This like that of Auvergne proper, surrounded by gneissic schistose & granitic rocks, the state of metamorphism of which sufficient to make them Laurentian or anything. These crossed at upper end of basin by Ry. at Fix & vicinity. At Lower, reached at Perdeyre. Lowest deposits coarse granitic debris & sandstone, which used for building. Then succession of clays, calc. clays, lacustrine limestones with Lymnaeas gypseous beds &c. Do not know the precise succession. (See Scrope & the Mss. given me by Aymard) A deep lacustrine

basin, requiring immense time to fill.
Then the volcanic period. Did not see here so much evidence of several distinct periods as at Clermont &c. Mostly recent looking lava flows. Volcanic deposits, particularly the latter fine breccia which forms the peculiar fluted rocks, seem to show evidence of deposit in water. (Columnar basalts same?) but form them irregularly as to height & have would argue highly accidented surface of lacustrine formations. ? of denudation (subaerial) before volcanic. The breccia generally dark brownish-grey colour, forms a good & compact building stone. Thought at first that the breccia flecked with of Pay marked volcanic vents, but probably not. Strat. too regular in many cases. Thickness of breccia deposit doubtless very irregular, & true may merely mark thicker parts. The rest. pointing to flow seen in breccias & conglom., largely developed, accord

for peculiar weathering. In any case a modern valley of great size has been excavated in the volcanic & strat. deposits since. The degree of excav. has evidently depended on the cutting down of granite & gneiss barrier to N. The Loire for many miles below Pierdeyre in comparatively narrow rocky gorges. Beyond rim of basin to N. Isolated mts of volcanic material & traces too apparently of sedimentary. ? if originally belonged to the Puy basin. Aymard says no. Origin of volcanic action now generally attrib. to fracture of strat rocks, having undergone metamorphism. Here apparently only old cryst. rocks to work on. Would these under any circumstances of plutonic treatment cause volcanic intumescence? Cannot suppose traces of Coal formation to have been folded in at just these places, & to have been entirely crowded up.



Supposed diagrammatic. Irrig. section of seam on one of levels.

Coal run down to lower level by slope and automatic arrangement. Being drawn in trains by horses along the galleries, which roomy, & where permanent, arched in brick.

A very thick rough breccia at base of St Etienne Coal basin. May be seen resting on the Cryst. rocks at La Fouloose near St Etienne. Varies up to a metre size. Roughly disposed. Strat. often scarcely perceptible. Much resembles in many ways a palaeozoic boulder clay, but bears from a more like an ordinary conglomerate above. The highest parts of the Coal basin, near St Etienne by some geologists supposed to approach the Permian. Beds all much disturbed & folded & many faults, rendering working of Coal beds often difficult. Seem to be about 30 workable seams of 1 metre in thickness, with a total workable thickness of 25 to 40 metres. Thickness of individual seams often very great. Thick seam at mine La Béraudière which visited sometimes 20 metres, & very inclined at about 45° cross cutting 40 metres in vertical plane. Very irregular however. Seems often been

more or less plastic & squeezed about during folding. This also shows by fact that coal not broken or melted even when making very sharp turns. At sharp turns, burnt, apt to be cross faults. The pattern of the workings worked at this mine supposed to be bodily overturned. Seams sometimes vertical. Method of working the thick seam. Levels long 33 metres. Run out in seam, but crooked so as to prevent being intercepted. Cross cuts made at both sides to walls of seam. 3 metres high. Approach varying in width according to quality of roof. When punched timber taken from each cross cut, (or Chantier) & the whole piled in cut stone brought from surface. The whole of the coal thus extracted, cartes being taken to leave some in the "remblayage" for fear of fire. Pit-bottom 250 metres deep. Ventilation natural, & good. Very little gas. Not very much water. Output reaches average of 1000 tons per

drain in winter. New pits for extraction put down in June. Circular in section & separated by several metres. Winding machinery between the two pits. Drum worked by vert. engine placed in compartment below. The movement & crumbling of the soil may to sinking puts the machinery after up the plants, but easily rectified any to vertical arrangement. Houses & chimneys also constantly settling irregularly. Fine accurate plans of the mine. Good machinery, & everything very well ordered.

At Luchon Pyrenees. Rocks chiefly schists, generally argillaceous & dark, nearly black probably often of nophitic. But some also silicy. Limestones included. Offer black marbles. No fossils have been found. (Silurian or Cambrian?) near Lac d'Oo schists become distinctly micaceous, silicy. Often holding chiastolite. Large fragments of

coarsely porph. white granite in moraines from higher parts of Chain.
Glacial evidences everywhere. Near L d'Oo many glaciated surfaces. Large moraines cut through by road between Luchon & valley of L d'Oo. The lake a true rock basin. Completely enclosed by rock & lying in a perfect Cirque with magnificent Cascade at upper end. (For depth &c see guide)
Bagnères de Bigorre. Not Bédat, only town. Chiefly limestone, steeply tilted. Much altered. Generally a true marble. Said to be a mica ophite, but did not see it. The limestone in places completely brecciated & recemented. Extensive old irregular ruins or grottoes said to follow the junction of the ophite & limestone (see guide) The ophite is doubtless intrusive & the brecciated limestone surrounding it as at Médous (see below) Age said to be jurassic.
At Médous near Bigorre. Small quarry in brecciated marble, which polishes well & makes a handsome stone.

a mass, probably a dyke, of ophite occurs in the middle. It is tolerably solid in the centre, but toward junction with marble becomes brecciated also; & more or less intermingled with the marble. Serpentine throughout, but especially about junction with the marble breccia. Would seem that intrusion accompanied by violent movement or explosions has occurred. Limestone completely shattered, while the agency - eg. metamorphic of some of the minerals of the intruded rock in contact with limestone has produced serpentine.

Biarritz. Rocks of nummulitic Tertiary, dipping seaward at low angles opposite the town. To the South, at the begining of the long straight beach known as the Côte des Basques the rocks in the cliffs highly inclined. Greyish in colour. Appear to belong to same formation, but hold much larger flat nummulites (?). North of the lighthouse a short distance, the rocks are said

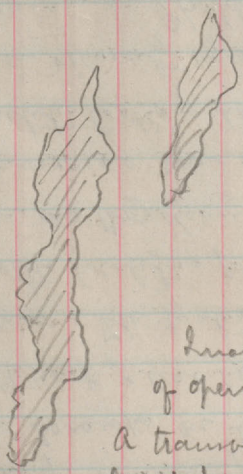
to become quite flat, & this is regarded as the limit in this direction of the Pyrenees disturbance. Rocks generally might be called soft yellowish sandstones, but often calcareous & full of nummulites. In places compact mass of nummulites. These bands hardened, often more or less nodular & stand out as ribs on weathered surfaces.

Aug. 14. Stopped at St. Antonin station on Rly. from Montauban to Scos. York Correspondence' to Caylus, 12 Kil. off to Saward, to examine 'phosphate' deposits there, met Mr J.L. Wills who is at present in charge for an English Company endeavouring to buy up mining properties &c. Mr W. Kindly accompanied me & visited several of the openings. These on high plateau of Jurassic limestone considerably altered but bedding horizontal. The Ry. follows the valley of the — which cuts through this plateau, showing in valley numerous cliffs, long slopes of talus. Grottos & caves,

one of the famous prefistoric of Bimiqued
near station of same name on line. The
phosphate deposits occur in water crooked
fissures & irregular cavities generally more
or less linear & following jointage lines in
limestone. These filled with red phosphatic earth
abounding in nodules of phosphatized pebbles
of limestone, & sometimes holding bones.
The filling appears usually arranged in
more or less horizontal manner, & in depth
becomes harded, & often forms irregular
chalcedonic-looking concretionary hard
material, cream colored grey or reddish,
& more or less cavernous. This the richest
& sometimes contains + 80 % of phosphate.
The fissures as above remarked, very irregular
often several yards in width. When found at
the surface they are emptied by simple means
as far as they are found to pay. The
softer & more earthy material is screened
The nodules & any bones going as good
quality, the remainder of poorer quality

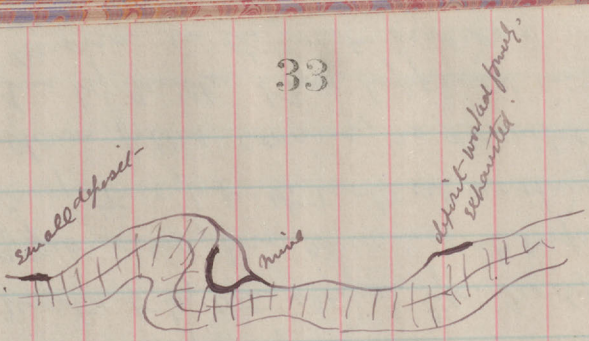
& holding much more iron, may be ground & flour in the mill existing at St Antonin, & used locally. Not converted to superphosphate. Deposits have only been worked 10 or 12 years as yet, & probably many more to be discovered. Appliances used in extracting quite primitive. No regular mining, deposits character rendering this unnecessary. Similar deposits occur at Bache & Escamps nr Lalbougue dept of Lot, to the north, & are said to hold even more bones. The material from these & perhaps other localities goes to Bordeaux & known as Bordeaux phosphate. Seen at Carcassonne saw in museum specimen of stalactitic looking phosphate from some quarry in vicinity again quite similar in appearance. Phosphate is also worked about 20 kil. from Avignon, probably same character.

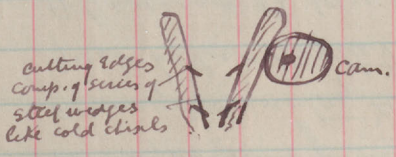
The deposits have evidently been formed by the washing down mechanically of in



Imaginary horiz. view of opening of one of deposits.
A transverse rat's skeleton might have much the same appearance.

solution of phosphatic matter, guano or (birds bones food) into fissures pre-existing, or in process of formation simultaneously. The phosphoric acid may have been fixed in replacing CO_2 of limestone (must have done so in case of phosphatized limestone pebbles). So not know to what period of tertiary the organic remains belong, but pretty evident that the range of fossiliferous limestones indicated by above deposits must have formed islands in sea, or borders of lakes in which the ordinary sedimentary sent. deposits of the great hollow N. of the Pyrenees, & the lakes of Auvergne, &c were being laid down. Natural traps for the small terrestrial animals. Very likely in some cases caverns inhabited by them alive in life. No deposit of guano may have remained at surface at any time, but the natural washing down filled caverns, as described to me by Miller to have happened in Mona in the West Indies.


small deposit
mine
deposit worked finally exhausted.


cutting edges
comp. of series of
steel wedges
like cold chisels
cam.

Asphalt mines
Val de Travers. Switzerland
II

The mine about 3/4 m. from Travers Station: Jurassic limestones of. Strike with Travers valley, which is main nearly E-W, cutting Jura transversely. Cross section of valley according to diagram shown me by Mr Walsh, manager of mine, something as above. The 'asphalt-bed' is a layer of porous limestone, which when free from asphalt resembles bog sugar in consistency. Thickness from 3 to 12 feet or more, pretty constant, & almost always completely saturated with asphalt. Even an excess of asphalt, for often crevices and sometimes full of nearly liquid bitumen. The beds below the asphalt bed of harder compact yellowish limestone. Much fractured & broken. Traversed by pretty planes in all directions, but according to Mr W. no asphalt found, even in the crevices. Above asphalt bed 'marnes' or clays quite impervious, but with layers of sand, which when broken up with some clays & become pasty & let under

water into the mine, which at best of times wet, & requires heavy pumping machinery, known 200 years or more, & used by distillation for production of heavy oil which employed for greasing carts &c. Opened along crops, but about 12 years ago regular mining by present company. A spacious adit-mine is on hand. Hoped to follow dips, but roof proved pitching too rapidly. Adit then run up in long zig-zag to right, (or west) & then to east. Pumping drift - carried right down the dip. Steam generated at surface carried down & force pumps at bottom in trough of sawdust as non-conductor. Material drawn out by horses, the ways being roomy. Mine now very extensive. Material so tough that specially slow black powder which rends rather than breaks, has to be employed to get good result. Most of asphalt shipped in trough as comes from the mine

Much also, however, in state of powder, & considerable quantity in octagonal cakes. In factory a Centrifugal machine with double set grinding bars working 600 revol. per minute. Employed. The material, however first reduced to small size by cutting or shearing jaws somewhat on principle of Blake's Crusher. What not sufficiently fine by first Centrifugal machine returned from screens & passed through again. Clogging of screens & machine troublesome. Cleaned out every 24 hours. Powder then spread on floor above fires between melting pans to get rid gas much water as possible. Then shovelled into melting pans, which long circular in section in bottom, provided with mechanical stirrers. Coated below externally with fire clay to prevent burning & unequal heating. Charge begun by putting in a small quantity of bitumen (Trinidad bitumen imported for purpose) Powder then shovelled in gradually & whole partly worked

kneaded by the stirrers. For rapid
heat or prolonged heating leads to formation
of dry & less incoherent product. When
quite homogeneous & plastic & so that a pole
run into mass comes out clean & without
attached asphalt, ready. Moulded into the
hexagonal blocks above mentioned in annealed
iron moulds. This ready for use in paving.
As it comes from mine worth about
£1 per ton. After full treatment about £3.
The company held concession of mines from
Swiss govt. for 30 years. Pay royalty of
about £600 lbs. Have also had to buy land
from private owners. In large cities as
Berlin &c. Co. erect works for treatment
of crude material. Coal being very dear
at Travers. London & English right
generally held by company who have the
monopoly & agree to take 1/2 mined fees &c.
from the Travers Co. Paris similar arrangement.
Theory of asphalt paving. The asphalt
to be regarded merely as a carpeting on surface

of roadway already made. If soft below soon bucks up, says a foreman. The remedy against slipping of mules on asphalt, absolute Chaulmoogra.

Deposit would seem to be an altered petroleum, & may probably have origin same as that of petroleum in limestones & shales. Its chief worst here, its absolute uniformity in quality & the peculiar state or composition of the bituminous substance.

Sept 16. Near Singen (N. of L. Constance)

Several volcanic protrusions, said to be basaltic, producing remarkable prominent isolated hills. One not a mile from Singen station. Remarkable particular volcanic action all over central Europe at intervals, according to maps. From Singen to some jurassic apparently chiefly limestones, gray plateau with wide valleys. Open cracks in many of limestones, some filled with soft redish material. Then Jurassic, well characterised

& reddish, apparently chiefly sandstones. Then granites, very partly broad belt parallel to Upper Rhine. Much broken by faults &c & in places reddened & weathered. Much decomposed from surface in many places. No traces of glacial removal of weathered rock, so far as seen of boulder clay, transported boulders &c, in the Black Forest region. The country much higher & hilly to sub-mountainous when the granite rocks reached, as in middle of France &c. Did not see any of gneiss & schistose rocks indicated on maps as W. of granites proper.

Volcanic of Eifel near Andernach on Rhine.

On leaving Andernach by road toward Neidermendig see continual sections in road side cuttings of volcanic detritus, chiefly pumice, sometimes in rather large pieces several inches in diameter but generally smaller & often finely comminuted. Also small basalt-slag & blackish scoriaceous fragments intermixed, & many fragments of the underlying devonian slaty rocks. All well stratified, & evidently ~~bedded in~~ deposited in water in successive strata, or perhaps partly washed down from higher ground into a lake. Pass on left. A hill with evidently good sections. Dark basaltic rocks forming nucleus, overlain by whitish, similar to those described, apparently sloping

down on all sides. Well seen in extensive quarries of Ot Heidermendig very extensive & in part ancient basalt quarries. Surface appears to consist of deposits perhaps similar to those described. Quarries at least chiefly subterranean. Large open shafts of vast great depth. Rock raised by horse whims & such contrivances, & generally then hewn to shape required on spot. The basalt more or less vesicular & very hard. Rings under hammer. According to specimens in Bonn museum, the rock a nephaline & leucite-basalt. Building stones, paving stones & many mill-stones. Curious point the great number of included fragments, (what often several inches in diam.) of the underlying slaty & granitic or rocks. There in different stages of

solution in the basalt. Often certain contiguous & fragments residents caused & gases evolved & action of basalt on them. Temperature of basalt mines very low. Said to be masses of ice visible in places all summer. Abandoned quarries used as extensive beer cellars, on account of uniform low temp.
Niedermendig to Laacher see a few roadside sections. Neighbourhood of Laacher see evidently interesting & explore in detail.
In descending into Brohl Valley numerous good & very interesting sections, of volcanic ash, similar to that first described, but little or no pumice. Tuff, & few of glomerate. Many included fragments of underlying rocks included throughout. In many places the volcanic ash can be seen

in actual contact with the weathered & broken surface of the upturned Devonian rocks. This surface has been rough & hilly on a small scale. The ash deposits can be traced down from the plateau about the Laacher See into the bottom of the Brühl Valley on the road followed, almost or quite continuously. Stratification distinct, though perhaps here only subaërial, & seems to slope down from direction of Laacher See into the valley. In the volcanic ash occasional tree trunks. (Specimens in Bonn museum) In lower part of Brühl Valley, approaching Rhine. Ash beds only in bottom of valley, both sides of Devonian slaty rocks, which show pigment rippled surfaces. The upper part of the ash deposits

last mentioned may in places be washed down in successive layers by recent action, but the bars evidently contemp. with that above described, & with the eruption. Lower layers of the ash much consolidated & can be used as a building stone. Upper softer. Very extensive quarries all along valley. Ash ground up & mixed with lime to make 'Traas' or hydraulic cement, for which admirably suited.

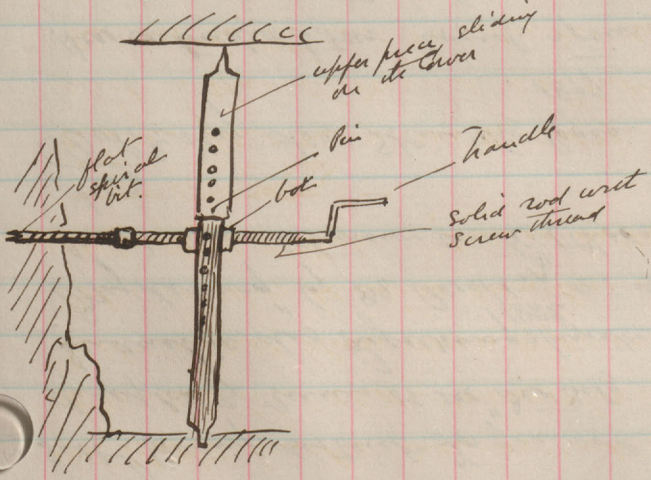
In main features Leacher see appears to be a crater lake & centre at least the ash deposits. Several surrounding hills ~~[illegible]~~ are designated as craters but Leacher see seems to be the central, the others subsidiary to it. The Brutl valley evidently cut out until in present form before the volcanic period.

Prof H. Credner of Leipzic showed me, the means by which he has demonstrated the passage of a glacier or segment of a glacier in direct line from radiant point in Sweden. About Leipzic in the Lille find specimens of all the rocks of this part of Sweden. Prof C. sent collection to Swedish Geol Soc. & obtained localities for most of them. Not only this but each formation or peculiar rock found in this direct line can be identified by fragments in drift of Leipzic, & Silurian graywacke which found near Leipzic immediately to the South becomes a constituent of the drift, & more & more glacial polished fragments found the further they are from the point of origin.

Stassfurt.

Oct. 6. Visited the salt mines here. Shaft Heydt, in the town of Stassfurt, & one of the most extensive mines in this salt-bearing district. For general description of mines see "Die Salz-Industrie des Regierungsbezirkes Magdeburg" by Dr Precht, 1882, or a much more extensive work Ochsenius, die Bildung der Steinsalzlager etc 1877

Here intended to jot down a few additional notes from personal observation. Mine well appointed. Shafts, five winding engines, cages with guides carrying trucks like those of coal mine. Work in the mines small, & almost altogether from the layers above the salt deposits, which dip at considerable angle. In pillars some fully worked galleries extending wide & high, cross


upper piece sliding on the cover
Pin
Handle
Flat spindle bit.
bolt
Solid rod with screw thread

heads at right angles. Pillars left, but no timber or supports in mine except in the immediate vicinity of the shafts. Trucks run on rails in the mine. Propelled by men or boys. Salt generally blown down by powder. Holes bored by peculiar machine. Bit of this shape, formed on the

end of a flat bar of iron, the rest of which is spirally twisted, & the butt end set in the end of a solid bar, on the surface of which a very slow screw thread cut. This passes through a box, secured by screw clamps, & the whole is attached to an upright which has points above & below & can be wedged between the roof & the floor. The other end of the solid rod provided with a handle, which worked by two men. The rod moves slowly forward through

the box, & the bit-cuts safely & steadily into the salt, the spiral pins of the following part of the rood clearing the dust out of the hole. Away from the shafts, when there is some dripping, & the formation of salt stalactites & crusts of salt on timber &c the mine perfectly dry & dusty. The salt when partly broken in the walls or in heaps beautifully crystalline & appears nearly pure white. In the older galleries grimy with powder smoke, smoke of lamps &c. Temperature not high & air good though fine salt dust affects the eyes a little. Brought to the surface the salt, (or some portion of it) the Carnallite & Kainite are ground in a machine exactly resembling a coffee mill on a large scale. Product of first grinding carried up in smaller buckets & sifted in the

ordinary manner. Coarse returned to grinders. The Carnallite & Kainite, (which seem by far the most valuable portion of the product) then I believe treated as follows for the separation of the K & Na salts. – Dissolved. Solution boiled breaking up the combination. Salts thus separated & stripped by successive crystallizations.

The deposit occurs in the Trias, lying below the Bunter Sandstones of the district. It is known to be immensely thick, & the bottom has not yet been reached. The whole lower portion is pure rock salt with little ~~rock~~ foreign matter of any kind, & this chiefly gypsum which occurs in thin layers, often at pretty regularly recurring intervals separated by a few inches. Above this comes the "Polyhalite region" & next the "Kieserit region" then the

"Carnallite region" These salts do not occur however in quite pure masses like the Na Cl below, but are more or less banded with Na Cl, & also hold thin gypsum layers. What is very remarkable also, is, that on both sides of the anticlinal at Stassfurt, the portions of the Carnallite beds nearest the outcrops are composed of Kainite instead of Carnallite. In the Carnallite & Kainite the Boracite occurs in nodules, sometimes a few inches across, or in thin irregular streaks. Above the whole is a thick layer of anhydrite, greyish & rather blue grained. Then the Hunter Sandstones &c.

The deposit has doubtless been formed by the evaporation of sea water, & Prof. Hauchecorne assures me that he has this summer seen nearly all the

minerals in the natural-evaporation
salt works near Marseilles. It has
not however been proved of the recurrent
evap. of quantities of sea water, carried
to depths in such case, for the
accumulation of all the mother liquor
salts at the top implies this. It can
scarcely be supposed that a sea of salt water
sufficient to contain all this wealth in
solution was continually evaporated
on the spot. Either a lake or sea of
water, covering an extensive area
was gradually dried, the salts
accumulating in the central hollow
till they formed a concentrated brine,
& then finally evap. carried to
complete dessication ~~&~~ on this spot,
or a basin filled periodically
before complete dessication, leading
to the gradual accumulation of great
mass of salts. May suppose e.g.

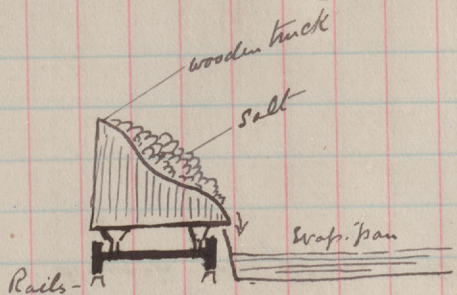
a great abnormally depressed region like the Dead sea basin, which filled with sea water from time to time, but could not run out. This filling repeated many times, but at length ceased. Drops often carried away, & the whole accumulated mother liquor dried, the salts coming down in order of solubility. The absence of sediments also requires that no rivers entered the lake, or that the region now explored was far from their entering points. Also that the successive fillings took place tranquilly, or that we have not proved for any part of the basin near the entrance from the sea water.

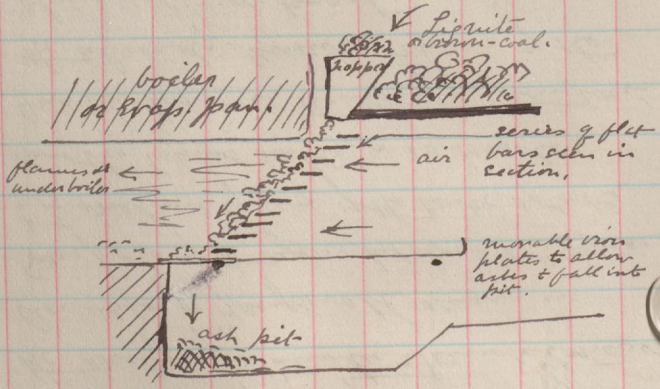
In any case the deposit, & particularly the deposition of the salts of the mother liquor require a climate of <u>exceeding dryness</u>. A great depressed basin formed on the Peruvian coast might

fulfill these conditions. An area depressed below the sea level, & finally completely & rapidly flooded would also serve to account for the sufficiently rapid sealing up of the whole by the overlying Bunter Sandstones.

An upper or "younger salt" occurs in some parts of the region, but does not appear to be overlaid by any of the more soluble worthy liquor salts, & is besides much less in thickness, than even the already known mass of the older salt deposit.

Do any organic remains whatever occur in any part of the salt deposits?





N.B. The series of flat grate bars are drawn as giving too steep a slope. The stoker cleans the bars from time to time & sets the fuel in motion toward the ash plate by introducing a pointed iron. Any clinker forming is thus also easily removed.

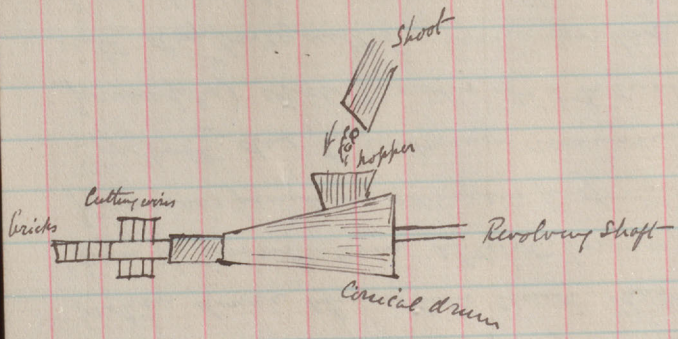
Halle

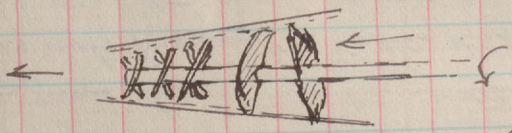
Oct. 7. Visited salt evaporation works here. Formerly govt. & situated in the centre of town near Market Place. Now private, & moved to distance of 1/4 m. across river. Brine pumped from wells on original site through pipes. Brine cleaned by settling & filtration, then run into large boiler plate pans, perhaps 30' long 15' broad 2' 6" deep. Heated by flues below. Large wooden hoods above to carry off steam. When evap. carried sufficiently far salt gathered to one side by large hoes, & shovelled into draining trucks, which run on rails along both sides of evap. pans. Often drawn to drying floors, & finally bagged.

The furnaces for heating pans, with those at Stassfurt salt works for heating boilers & generally through the district burn brown coal as it comes from mines. Earthy, crumbling, much fine

dust & also more or less damp, besides large proportion of hygro. & combined water. Construction of furnace quite peculiar, as per diagram last page.

Oct. 7. Visited brown-coal works about 5 m. from Halle. (Dellbrück Mine bei Dieskau). Two seams worked in mine. Lowest said to be at depth of 450 metres (?) seam 7½ metres thick. Upper at 28 metres 2¼ metres thick. Coal as extracted brown crumbling earthy material saturated with water like a sponge, & when broken down almost like mud. That from the lowest seam at least, however, possesses peculiar adhesive property (probably due to contained resinous principles) which enables it to be made into dry "briquettes". Mine worked by shafts with winding machinery like that of a small coal mine. 100 cubic





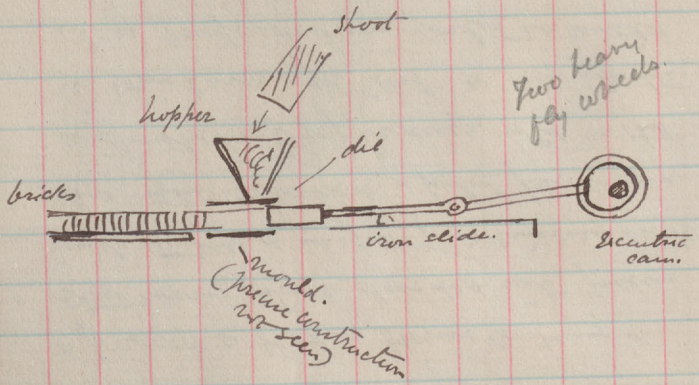
The mixer & pressure internally somewhat like this. half cones of steel iron fixed to the shaft, the three smaller in pairs, & all arranged so as to form part of spiral plane, forcing the material steadily forward in turning.

Bricks made by wet process worth 50 pf. per centner.

Wet process

feet (German) of water pumped out per minute. Considerable settlement of ground in vicinity

Both the dry & wet processes of treatment of brown coal seen here. Wet process is much like brick making. Material mixed & broken in machine like brick-clay machine. Fed into hopper & descends into mixing & pressing machine, which placed horizontally. Pressed & mixed material pushed out in long continuous bar against which a boy pushes backward & forward a sliding frame containing 4 steel wires which divides into pieces much the size & shape of ordinary bricks, which then removed & piled for drying under sheds. Prof Credner told me that in some cases, at least, a few plastic clay suspended in water is mixed with the lignite much to give it sufficient cohesive property, but did not see this here. Construction of machine

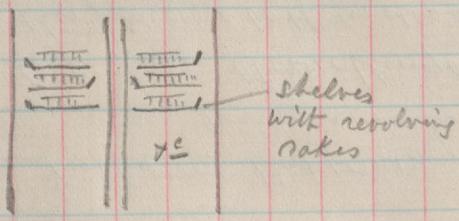

shoot
hopper
die
bricks
two heavy fly wheels.
iron slide.
Excentric cam.
mould.
(screw contraction not seen)

dry process

diagrammatically, as shown opposite. For the dry briquettes the wet coal is introduced into large square drying furnaces, in which it descends from shelf to shelf against ascending current of hot air. Comes out as a light to lumpy brown powder with many fragments as large as beans. Put while still warm into hopper feeding pressing machine, which acts directly, the pressing die pushed forward on guides by a cam bar attached to revolving shaft. At the time of visit from 50 to 60 bricks made per minute. These are pushed out in a continuous row along wooden guides placed at the aperture of the machine, & at first sight resemble a short rod. The briquettes so produced said to contain less than 12% of water. Worth 12 marks a ton. The knuckle joint principle would appear particularly applicable to give the required pressure

to the bricks, but the length of thrust required, owing to the incoherent nature of the material when first introduced into the mould, probably too great.
In this process all depends on the peculiar phys. character of the brown coal, but by addition of small quantity of gas tar or other adherent material, might probably be applied to any coal.

Oct. 9. Visited the Kupferhammer & — mines & works of Brown Coal near Oberröblingen west of this place, & both under one management. Had introduction to Manager Meyer from Herr Bergrath Hecker, & saw everything very fully. The Kupferhammer a great open waste, with three slopes going down from it into the ~~[illegible]~~ brown-coal bed, following the dip. The brown coal


Shelves
with revolving
racks
etc

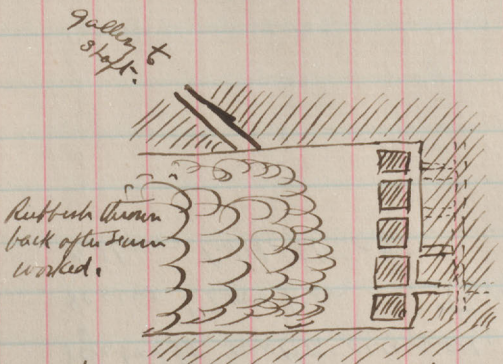
here forms a basin, section yesterday shows that it thins out considerably toward the edges. The deposit in mine extremely thick. Upper part of bed 15 metres. Then 6 metres inferior. Then 5 metres best coal, used for paraffine distillation. The upper bed made into "brickettes". The cover over the coal chiefly drift & alluvium, but some clayey beds, & beds of white sand also seen. Mine well appointed in all respects. Two endless chains for drawing up cars, & a wire rope overhead railway for the more distant part of the mine. Electric light used at night in the open work. 30 cubic metres water per minute taken out by 5 steam pumps.
150,000 centners coal extracted & treated weekly.
The coal all made into briequettes here by the dry process. Machines scarcely

same as those before described. Observe that the thrust is about 3 times the width of the resulting briquette, so that the compression of the loose material is carried to 1/4 its original bulk. The drying ovens are arranged with a series of eighteen shelves, each with a revolving rake as shown opposite. Could not see the precise arrangement for heating the drying chambers. The washing rake at rate of 60 briquettes per minute. 600 centners of briquettes per machine per day. 6 machines here in operation. Briquettes contain 13 to 15% water. Temperature in drying chambers & that at which the material enters pressing machines 80° Reaumur. The briquette machines (also the wet process machines described before) cost about 19,000 marks each at factory.

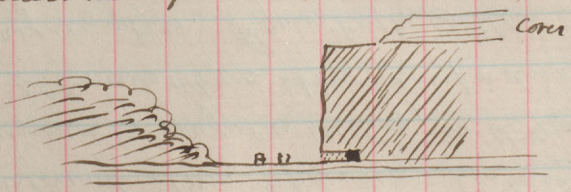
The best brown coal of this district gives 3188.5 Calories heating effect per Centner, the worst 2345. (= worst fermentation) By effect in heating boilers.

Only certain brown coals of district fit for paraffine & oil manufacture, but new retorts now in course of erection will soon be 102 in operation here. 35 Centners per week treated in each retort. Resemble those already described at works near Edinburgh, but the coke here resulting at completion of process worth 20 pfennigs per centner, & not like the exhausted oil shales, valueless. Modification accordingly. Bottoms of retorts do not dip into water, but conical, with valve below. Condensation, & extraction of paraffine much as in Scottish works. Paraffin however not here refined, but sent to other works.

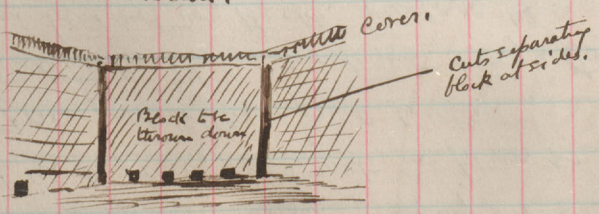
In the second mine (———) the coal differs a little in quality from that in the first. Partly it so form as to form good steam fuel without treatment. The rest made into briquettes. Coal here not so thick. Surface when uncovered shows depressions probably caused by irregular settling, as the gravels & alluvium above show corresponding irregularities. Remarkable problem how such great accumulations of vegetable matter occurred. Material seems to have been very thoroughly rotted & shows little structure.



horizontal section at base showing galleries & pillars under face to be detached.



vert section.

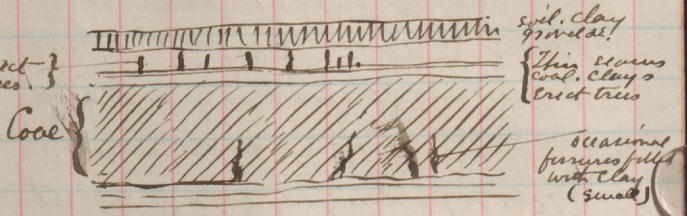


End view of quarry.

Brown Coals. Teplitz & Duk

Bohemia.

Visited Richard-Hartmann mine Ladowitz Nr. Duk. Bed here 25 metres thick solid Coal, with say 8 m. cover soil clays or partly useful for brick & tile working which extensively carried on in district. Open works. Two great quarries, connected by adits, & in communication by adit with two shafts which have small winding engines or lift Coal mine. Also pumping shaft. The machinery shafts & connecting adits permanent. Coal formerly worked in imperfect mode, now wide galleries driven at right angles in base of seam. Pillars breakered & Wors detached at ends. Blasts put in pillars & the whole face thrown down. Broken up. Carried away in trucks, hoisted, screened


Erect trees
Coal
Sil. clay gravel
Thin seams coal, clays & erect trees
occasional fissures filled with clay (small)

& separated into different sizes &
loaded direct into railway trucks.
Diagram will explain mode. Much
trouble from short Comb. of slack &
rubbish, which also has occurred in
some old workings on seam which have
had to be walled off. Great destruction
of surface of Country for though reg. soil is
preserved & endeavour to reinstate
surface, workings so deep & mass of
loose stuff so great that external
settlings occur.
Briquettes are not made in
Bohemia. The coal much harder than
that seen near Halle &c & does not
seem to possess the necessary adhesive
property. Also price so small,
averaging 3/- a ton at pit, that
not worth while. Also told that Briquetts
when made do not burn well. Coal
here does not either serve for the

manufacture of Paraffin. Greater hardening due probably to greater pressure, but also probably connected with the contorts & subsequent volcan. phenom. of the district. Hough stated that little wood in comp. of Coal find that at this mine, & in all the Specimens of the Coal I have seen this a mistake. Cross fracture shows numerous flat or lenticular bright streaks, which often make up 1/3 of whole. Each of these when split open shows distinct woody structure as found in western lignites. Several feet of seam in office of Rich. Hart. Mine shows something as opposite. Thence unworkable Coals & erect Carbonized trees above it. In one place near bottom of seam saw also several feet of large tree root roots, flattened.

Visited also the Barbara Zeche Mine a few miles from Teplitz. Here as in all Teplitz mines the whole work underground. Regular mining after the fashion of coal mines, but wood & extreme thickness of seam. Shafts so to 700 m. deep. From them wide galleries & ways (levels, & automatic slopes) galleries square in section & the coal so solid that it stands form with flat walls & roof without any props.

Modes of working with statistics, analyses, &c. &c. fully given in Annales des Mines 3rd Serie 1884 Les Lignites dans le Nord de la Bohême par M. Charles Lallemand. See also Morgan's work on geol of Bohemia. Unnecessary to give further details here

Tour in
Europe
1882

Tour in Europe

May 4th to Dec 5th

May 4. 1882. Embarked at Portland in Str. Sarmatian for Liverpool, about 1 P.m.

May. 5. Arrived in Halifax about 5 P.m.

" 6. Sailed, having taken on board mails & passengers at 1 P.m.

May 16. Tuesday. Landed at Liverpool about noon.

17. In Liverpool. Went over to Rock Ferry with Mr Rudolf & stayed the night.

18. To Chester with Robbie Rudolf. Eng. dined with Phillips

19 Morning train to Carlisle. P.m. Examining Carlisle &c.

20. Morning train to Edinburgh. Put up at Cockburn Hotel.

23. Moved to 41 Silmore Place

24. With W. Rumps at Oak Banks Oil works nr. Mid Calder Station.

25. 10.30 train to South, arriving in Sheffield about 5 P.m. Weather since landing fine till today, which showery & dull. Put up at Midland Station Hotel.

26. At Sheffield most of yesterday. Looked up Huxley at Vickers's River don works. Took pm train to London & put up at Charing Cross Hotel. Saw Tekumpsen Life.

Saturday 27. Writing letters & in city about business of various kinds.

28. Monday. Whit-Monday & Lord Mayor's General holiday. Went out by train to Finchley to see Ella Kemp, who staying at Sills'. There. Dinner & dum in Rm. Wq. return to hotel.

29. In city & worked down Holborn & Oxford St. looking after various letter matters. Saw Romeo & Juliet at Lyceum Theatre.

31 met Ella & went to R. Academy. Lunch there. Rm. to Crystal palace. Dinner there & back about 11 Rm. after seeing the Electrical exhibition.

June 1. Met Ella & to exhibition of water colours at S.A. Pall Mall. Lunch. Ella return to Mr Sills' office in City. I go to Woolwich & see

2.

through the Arsenal there.

3 To City about bank business. Called at Temple Gardens. Saw Mrs Whitford but not Mrs Redpath. At Jermyn St. Saw Rendler, Geikie & Newton. Met Prof. Huxley & Mr Bateman. Called on Howards (Caledonians) at Alexandra Hotel. Called at Porter's stayed for tea & spent evg. there.

Saturday 4. In City. Called on Mrs Whitford & intended going in Pm. to Chiltern St. to see Mrs Redpath, but lost too much time. Called on Mrs & Miss Redpath & Miss Fleet (at Moffat's) Dined at S. Kensington Museum, & then to Mr Phillips'. stayed late 11.

Sunday 5 June. Went to Mrs Redpath's lodging & to Church with them. Dined with Mrs & Miss R. walk in Park. To Huxley's for tea. Prof. ill in bed with cold. Left Bryce & Pm. & rode back to Charing X on omnibus. writing letters.

~~Tuesday June 6~~ Tuesday June 7. Calling on Etheridge, Woodward &c at B. Museum S. Kensington, & on R. Smith Laboratory. Lunch at Museum. Bus to Mus. of Pract Geology & reading up Auvergne. ~~Evening to theatre~~. Dined with Mr S. Moffatt.

~~Tuesday June 7~~ Wednesday June 6. Met Mrs & Miss Redpath. Went to Tower & Guildhall with them. Evening at theatre.

Wednesday. Went with Mrs & Miss R. to Chelsea. Lunched with Mr & Mrs O Redpath & saw over their place. Got back to town in time to attend ~~meeting~~ dinner of Geol. Society club. In meeting in evening.

Thursday. June 8. Met Mrs Selwyn visiting in hotel. Took 10 a.m. train for France. Down at Rom. Nearly lost Mrs Curry. Arrived at Amiens ~~[illegible]~~ 6 P.M. ~~To~~ Hotel de France & D'Angleterre. Dined at rather solemn Table d'Hote. Elaborate dinner. Soup. Boiled beef with tom at sauce. Salmon! Jelly. Beef, veal chicken, salad &c &c rin conclus. A fine passage on the whole but as soon

as left Dover each passenger began to apply his or her fomentation received per screwdrivers, flasks, medicine bottles &c appearing. Seemed in most cases the efficacious enough. Packages when opened in the Customs.

June 9. Visiting Cathedral & looking about Amiens. Leave by 3.15 P.M. train for Paris, arriving at about 6 P.M. Put up at Hotel de Lille et d'Albion R. St Honore. To Theatre Francais in the evening.

June 10 Hair cut. Lunch. To S side of Seine to look up some geological books. To Gobelin tapestry manufactory. To office of Galignani & ordered Scrope's Auvergne Volcanoes. To Vaudeville Theatre.

June 11. To St Roque & afterwards to the Madelaine to see procession on Fete Dieu. Morning service service & splendid music at Madelaine. To Salon, at Palais de l'Industrie. Immense collection of pictures but being a free day, very much crowded. Evening to a Cafe. Weather has been rather chilly & changeable since arrival in Paris.

12. Went to Cooks Office & afterwards to Office of Chemin de Fer du Nord in R. St Lazare for information about Chemique trains. Lunch. Walked completely round the Boulevards to the Place de la Bastile, then crossed the Seine & went to Hartnadt's, 1 R. Bonaparte, about microscope. Returned to hotel. Day chilly & very heavy rain in Afn. rendering walking very unpleasant. Wet & cold in evening. Stayed at hotel.

13. Examined a chef plan of France on exhib. in Tuileries gardens. To Place de l'Opera to take circular note. To Prefecture of Seine to obtain permission to visit sewers. Referred to Chief Engineer & found all tickets disposed of. Lunch. To Bourse, extraordinary scene. Bib. National. Halles Centrales. Ascended Tour St Jacques. Eve. at Opera Comique.

14

Spent much of day at Louvre. To Concert in Palais Royal
Eve. at L'Horloge.

15. At Conservatoire des arts & Metiers Museum. Great collection of models of machinery, Lunch. To Buttes des Chaumont, & Pere Lachaise. Completed purchase of micro. for Lord & paid for instrument. To be sent off tomorrow. At Th. du Palais Royal. Letter from home tonight.

16. At Louvre. Lunch. To. Ecole des Beaux Arts. Saw very little. Returned for order to visit Mus. Cluny to 3 R. Volois. Bus to St Germain des Pres. To Cluny Museum.

17. To sewers by tramway. Visit porcelain factory. Lunch. Steamer to Bois de Boulogne. At Jardin d'Acclimatation. Evening at Vaudeville Theatre.

18. To Musee Grevin, resembling Tussauds. Lunch. To Museum of artillery at Invalides. Fine collection & remarkable specimens of military costumes. To Panorama of Reichofen very poor compared to that of Siege of Paris. Heavy rain about 6 P.m. Eve. at outdoor concert, but too cold to stay long.

19. To Isle de Venus, but museum not open today. Picked up things. Evening to Gd. Opera. Saw Aïda an Egyptian play. Music by Verdi.

20 Left Paris by 11.53 train for Nevers, arriving about 7 Pm. A rainy & dreary day throughout. Evening wrote letter. Put up at Hotel de France.

21. Exploring Nevers. A very quaint mediaeval little place. Narrow crooked paved streets undulating & hilly. Fine stone bridge on Loire. Market & collection of Canaries County women in the Square. Fine picturesque gate of the old wall & pole pedestrians in lower part of town. Made rough sketch of it. Cathedral fine town, see guide book. Curious dial cut on the pavement written indicating height of sun in various months. Partly destroyed during restoration of Church. Lot in Guide book. Second old Ch. St Etienne somewhat resembles Chapel of St John in Tower London. Semi-tortured in many streets full of fossils (Fias?) Comes from quarry about 3 m off. Picked up several specimens on heaps of macadam. Left by

2.15 Express for Clermont. Reaching at 6.40. To Hotel de Portes. A fine day & warm at last. Wrote Selwyn this eve. Posted letters home this eve.

23 To pelletapiy (cclc) spring of St Alayre. To museum antiquities & pictures. To public library where consulted Scrope's book. To mineralogical, geological & museum of Lecocq. Sat some time in gardens listening to band. Orientating myself generally. Day very warm but with passing showers & thunder in Rts.

24. A dull wet morning very unpromising. Went in search of a collector who sells sets of specimens from the neighbouring county, & after some difficulty found his place up stairs in a very narrow street. (Rue Beaumigard) Saw what he had & promised to return. Visited the Cathedral. Not much to see. A crowd marched in the Place de Jaude today & great collection of curious looking peasants. Women generally dried & brown wore white caps. Men in blue blouses. Some cases of goitre. Hair almost always coal black. People generally small

& a large proportion in the town were crippled or deformed. Flowers marked in place near Cathedral. After dejeuner day opposite letter, took omnibus to Royat, which really almost connected with this town. Many large hotels, a casino, gardens. Establishments of baths. Mineral springs. Situated very picturesqly in a rocky little valley. Enclosed quarries & wandered over the hills, Rhu. very hot. Came down to Coffee of Casino with a lood gsloves in bag & had coffee. Band. Crowds of well dressed people, staying either in the hotels or furnished apartments. All apparently French. A great sewer root. Roman baths excavated & on view in one of gardens. The old town crowded together & dirty straggles up the ravine. The brook runs down through it turning mills & filling basins for clothes washing &c

24. Leave by 6.50 train for Volvic. Visit the extensive quarries there, but have much more time than enough have a couple of hours to wait for the next train to Pont Gibaud. At Pontgibaud get lunch at Hot. du Commerce. Then to Lead Silver works. Found a Cambridge Mine as chemist, & he took

permission of the manager sent me off, after having viewed the ~~[illegible]~~ smelting works, to the mines several miles distant. Saw the concentrating processes & what was to be seen of mines at surface. Back in carriage by another route. Got 6.58 train to Clermont, arriving near 9 P.m. very hungry & tired owing to excursion. Hôt. Pourquier a most picturesque hamlet. Valley in which it is situated, (that of the Sioule) narrow & verdant, but becoming ever narrower & more rocky at Barbecot & Pranal where the mines are. Women & boys working at concentration or clean & good looking. Drive through most romantic narrow belt leaves fringed with bracken which often meet overhead & sweep the carriage in passing. Stone crosses & old fondams in the stream thatched or tile roofed hamlets through which pass. Driver exceedingly polite, talkative, cracking his whip vigorously over the horse & shouting ou-e in the manner of the country.

25. Made arrangements with a German (Holland) gentleman & wife to go with them in carriage to Puy de Dôme if weather fine. Did

not understand, however, that intended to get off before 10 P.m., & rising rather late had to hurry away with a cup of coffee & half a roll. Day rather cloudy but pleasantly cool. Delightful drive to base of cone. Then engaged a small two wheeled carriage with two horses tandem & had to lead, for the ascent by exceedingly steep zig-zags of the culminating dome. An hour in getting up. Top rather clouded, but fine glimpses. Observatory, & so called restaurant, but so dirty that we taste nothing. Ruins of Roman temple by recent excavations very well exposed. Extensive. Round tower for observatory, with a couple of men in charge. Considerable excitement at time your visit: among the people who were holiday-making in numbers on the mountain, caused by a man falling down a rocky declivity. Found quite dead at the base. Returned at good speed all down hill to Clermont two hours too early for dinner at six, which the first meal with calling ~~Lunch~~, of the day. In gardens listening to band. P.m. sauntering.

26. A very wet day, but clearing toward evening. Excursions in the morning impossible. Called at M. Feuillade about specimens, but could not find him. Rem. called again & arranged for purchase of collection of 250 specimens for 65 francs including packing. Went to Royat & examined Roman baths &c.

27. To Royat & ascended nearly to top of Gravenoir to examine rocks. Back to Clermont, & took train for Pont du Chateau. Lunched there, at poor dirty looking hotel. Had omelette brought out into little garden attached which seemed cleaner than the house. Examined bitumen quarry or mine & works near it. Sketched church. Waited an hour & a half for the evening train back to Clermont. Pont du Chateau stretches along the bank of the Allier for a long distance & has the appearance of a large town. It is very shabby & dirty, however, written, & as I saw it, seemed to have gone asleep in the sun. Views in the valley of the Allier very beautiful.

28 June Leave by 1 P.m. train for Le Puy.
(omnibus) Reach Le Puy after 7 P.m. Day
fine & very warm. Scenery interesting, particularly
after leaving St George D'Aurac, where change
carriages. Small Coal field of Brassac
Rocks much disturbed & often standing on edge.
Several small mines. Granitic & gneissic
rocks apparently surround the basin. At
St George back again among volcanic rocks.
Often basalt with large concentrically zones
of granular olivine. Thence to Summit between
basins of Allier & Loire metamorph &
granitic rocks with frequent overlying
volcanic both fragmental & flows. All
apparently older series. Much changed
from original contour by denudation.
Interesting sections along Ry. line, which
ascends rapidly. Steep curves &c & passes
summit by tunnel through gneissic or
schistose rocks. Descend then into Tert. &
Volcanic basin of Le Puy. This section of
basalt & other volcanic rocks overlying
pale earthy or clayey beds. Valley of the
Borne breaks down through surface of

basaltic plateau & becomes very picturesque, resembles in some respects upper part of Hazeo Valley in B. Columbia, but in a cultivated state. Fine ruins at several points along route. First views of Le Puy with its pointed rocks very striking. Beautiful valley. Put up at Hôt de l'Europe. To post or find home letters.

29 June. Visit Cathedral, a remarkably picturesque building & cunningly adapted to situation, clinging like swallows nest to rock of Corneille, the summit which bears the Colossal statue of the Virgin. Climbed afterwards to summit. Stairs, ramparts, fountains. Splendid view. The rock a mass of irregularly strat. Volcanic breccia. Afn. to museum. A very creditable collection in fine building of antiquities, pictures, & natural history. Visit M. Aymard a local geologist. Old & oblivious of personal appearance. Sitting in his garden, with family party, grandchildren &c. Very obliging, communicative & talkative.

general lecture on geology & written memos, on local details which almost useless as impossible to read. A very hot day. Le Puy. Steep narrow crooked streets. Wider boulevards surrounding. Wide dusty place, with pretty garden attached. Smells. Lace manufacture great industry. Women sitting out in streets in little groups hard at work on their cushions.

30. A showery morning. Set out for Espaly (1 kilo) A village clustering round one of the peculiar projecting masses of breccia. Scanty remains of an old chateau on foot on the rock. Modern church. Walked on to Ceyssac 3 kil. further. This is another little village similarly placed. Houses planted up against the rock like swallows nests & may excavate in its substance. Rather fine ruin on the summit. Opposite Espaly magnificent basaltic column on the other side of the Borne. At Ceyssac quarries & reddish calc. & clay beds seem coming out below the basaltic formation. Very heavy showers. Rain.

M. Prulière of the hotel going fishing to

Barne, suggested that I should go also & see the Chateau de la Roche-Lambert. Fine views in gorges of the Barne on Ry. route. Erucich gry & reddish banded beds similar to those just mentioned, come out in great force under the basalts. Chateau at 3 kil. from Station. Walk bit along beautiful country road among unfenced fields. Chateau built against a cliff of basalt & Chambers partly excavated in the rock. Restored. In good order. Gardens even quite trim. Old lady conducted us through the rooms (full of bric a brac, furniture & old furniture) & even insisted on showing us the kitchen, where her family engaged at afternoon or evg. meal. Bread, wine & preserved curds apparently. The house quite a little museum. Inhabited sometimes by the owner in summer. Described by George Sand as residence of heroine Jean de la Roche. Coarse granite sand & half rounded pebble formation, with calc. fragments? coming out from below basalt of plateau. Many granite fragments in basalt, but ? if from

The broken colums used for building purposes generally. Also planted at intervals along margins of roads &c.

P.S. Please write by fast post or telegraph when we are to expect you — PM.

Waterproofs 6 – 8
Hat – 11 – 6
Pedometer 45 – 0
Compass 7 – 3 – 0
Neckties 8 – 0
Underclothes 1 – 15 – 0
Soap 0 – 7
Pocket pin frame – 24 – 0
Stockings 15 – 0

6. Stockings 11 – 0
Soap 1 – 8
Christmas & Pack 6 – 6
7. Ticket to Montreal 20 – 0 – 0
Bus – 4
Lunch 1 – 6
Luggage to Liverpool 4 – 4
Hotel at London
Tips. 2 – 0
Ry & Pullman to Edinburgh 3 – 5 – 0

Cab	1-0
Tea	2-6
Cab. Edinburgh	2-0
Small Sums Edinbro.	4-0
Hotel	1-5-0
Tea	2-0
Cab	1-6
Ticket to Liverpool	1-16-0

Inclosures
Lord Adam Gordon

Cabin

	1 basket
1	1 Valises
	1 hat-box
	1 bundle
	1 small box
	1 satchel
1	1 box (Case)
	1 hand bag
3	3 boxes specimens
1	1 trunk
2	2 small valises
8	

thus detrital formations on the parent rock. Very wait at station for train, which 45 m. late to boot.

July 1. Examined Mt Ronzon, patch of a plateau at lower level than the general great plateau which forms the higher hills. Basalt at top. Quarry of agglomerate at one side. In great part volcanic material, but also fragments of granite & more or less altered & indurated pieces of the argillaceous & calcareous beds immediately below. Rem. Took carriage & visited some of more distant points. Les Orgues D'Espaly on flank of Mt Denise. A magnificent exposure of columnar basalt. Long straight parallel columns. Overlies an agglomerate. The flow appears to be much more recent than entry volcanic plateau about here, & seems to conform to slope of side of present valley. On further side of Mt Denise from Puy extensive quarries of pozzolan & volcanic scoriae. The former material vesicular, scoriaceous, reddish, sifted out & carted away. Clear evidence of parent. Volcanic bombs. Great masses with

concentric structure, generally more scaraceous externally. Rough stratification. Great abundance of fragments of granite aqueous in all stages of absorbtion in the volcanic stoffy membrum. Granite calcined, granite having scaraceous & vesicular, quartze grains & fragments in basaltic streaky mass after rent of universal have encumbered. These granites probably on site of great pass which flow before mountains came. In continuing round the rent. by the road find the rent composed of more or less regularly bedded volcanic agglomerate. Much from ground, less scaraceous, & regular than that of the rent. Hard to tell whether this produced by previous eruptions or that of the rent. Quite similar in character to that of the Rock Corneille, R. st Michel, Rock of Castle of Polignac, that of Espaly & the remarkable pointed steeple like rocks of Puy, generally. High shattered cliffs of this breccia on the Polignac side. Quarried for building stone, for which answers admirably. Castle of Polignac an extensive & very picturesque

& interesting ruin. (See Guide) Occupies the nearly flat summit of a high isolated mass of breccia which is bounded on all sides by nearly perpendicular cliffs. Often seeing above on by hilly narrow picturesque lanes bounded by trees & hawthorn hedges & meadows to main road near Loire. Then to Peyrdeyre to see intrusive granite holding blocks & fragments of gneissic rocks. A fine fine-grained granite also occurs which accompanies upward a dyke in the gneiss. Used pr. pavy slates but quarry not at present worked. Back to Le Puy. Day changeable with heavy showers.

July 2. Mng. packed, visited the rock of St Michel, but did not ascend to the Church. Rly at 1.30 for St Etienne, reaching at 4.30. Put up at Hot. du Nord. Eng. at open air mild ay concert in square near Hot. de Ville. — Very picturesque in following Loire down through gorges which it has cut to make way from the Puy basin. Granite & gneiss chiefly, probably mostly gneiss, but difficult to observe.

many tunnels, bridges & other extensive engineering works on the line. Day fine. Not very warm

July 3. To Ecole de Mines, but found could not see museum till 2 pm. as students at work. 2 pm. returned. Settle to see. Small teaching collection of universal fossils in rather bad order. Whole establishment rather out of repair & dirty, though large new laboratory. To Credit Lyonnais to get money, but would not back circular note till communicate by telegraph with Lyons. York steam tram (Engine boxed in, drawing 3 or 4 light cars) & turned length of town! Stopped after mine on rubbish heap of which Saw fossils. Called on Director of School of Mines M. Gonthier, & obtained from him some interesting facts as to local geol. &c. Work McCornell.

July 4. York steam tramway to Bellevue & then to first station on branch line, to Coal mine (La Bérerudière) recommended by M. Gonthier as good new & typical one to see. Engineer kindly showed me plans, sections &c & explained

mode of work. Got suit of blue cotton clothes & descended to see working of the thick & very vertical seam. Plodding about underground for about an hour. Back for lunch. To Credit Lyonnais which succeeded in getting notes changed. Took omnibus or rather diligence to La Fouillouse, village about 6 m. off, crossing section of rocks of district to older cryst. series bordering the basin. Had an hour at La F. Then back by same route. Concert & exhibit by music in square in P.m. A quiet, attentive & apparently music-loving audience. 10c for chair whole costly entertainment. Day fine & warm.

July 5. Took tram to coal mine near the gas-works where had observed numerous fossil ferns &c. Collected a few, but raining almost constantly. Returned to Hotel. Packed. Left by P.m. train for Lyons. Arrived about 5 P.m. Much of distance travelled through a busy manufacturing country, extension of the St Etienne coal field. Then up along bank of Rhone. Wide river with many islands. Long oblique stone "wing-dams" to improve navigation. Rain in night.

put up at Hotel du Globe.

6. Thursday. Enquiry about Circular tours to Pyrenees, but found all began at Paris. Wrote Cook & Co at Paris. P.M. Visited the museum & picture gallery. Excellent & admirably arranged nat. hist. geol. & min. collections. Said the second only to Paris. Went to theatre Celestins. amusing Vaudeville. Chopsticks du Baille d'Italie.

7. Friday. To Fourvière across the river. Go from Quay to centre of this suburb by funiculaire inclined railway. Went by way in tunnel. Ascend Church of N.D. de Fourvière. A very fine view doubtless on a clear day, but today gloomy & misty. P.M. to Musée Guimet. Splendid collection of oriental gods & pictures &c connected with religions of India, China & Japan. Fine collection of porcelain & faience from same regions. Visited Lac d'Or Park. Five artificial waters. A small edition of Bois de Boulogne. Every day heavy rain & chilly. Wrote A. M.

8 Saturday. Rose late. Took train to station. Train at noon for Ile Barbe. Very little to see there. Highly inclined gneissic rocks, with red granitic or syenitic veins. Lunch at small restaurant. Train to Caluyon, where immense quarry of limestone, apparently dolomite. Whole mountain side cut

away to N. of station. A thick band of black apparently argil. limestone. Probably the dikes of 200 feet of beds shown. Saw a few Pectens? & a belemnite. Curious silicified bands following strat. of nature of flints? The whole forms a part of the limes of Mt D'Or Syncline & dipping up stream at low angle. The rock used in Lyons as a building stone, & carried thereby river or rail. Long wait for return train. Arrived at hotel 8 Rue. Dinner. Coffee. Showery & cool all day. A perfect down pour tonight.

Sunday 9. At museum. Lunch. Trips up the Saone on one of the river boats. Back by omnibus. Evg. concert in Place Bellecour. Very heavy rain all night & thus am. late to 10 or 11. Day cool & cloudy. Saone rising rapidly.

Monday 10: Took midday omnibus for St Cyr 2. walked to quarries at St Fortunat. Collected & examined. Back by 5 Rue. bus. Evg. Concert in Square. Packing.

Half an hours walk from St Cyr to St Fortunat. Everywhere in this part of Mt D'Or fine exposures of rocks in quarries. Great slabs of Gryphea limestone set on edge in some places to fence the fields. Fossils!

July 17. Took train for Avignon. Intended to take express, but through mistake got into omnibus, which, starting half an hour later 2½ hours longer on the road. Arrived at Avignon 7 P.M. To Hôtel D'Europe. Day showery & dull but clearing toward evening. Route rather picturesque, particularly on nearing Avignon. Hills faulted chalk & greensand projecting through Tertiary deposits. Foliage becomes darker & bluish in tint. Country curving with estate hills. Distant Mts Alps? to E.

July 12. Wednesday. A fine bright day, but windy. Strolled about Avignon. Very picturesque old place. Palace of Popes. Ruined bridge stretching 3/4 across river. Few old walls & ramparts. Visited Nat-hist museum. In bad order, dirty, & dark, though a considerable number of specimens. Present Curator evidently cares little, or knows little. Number of good specimens of insects (fossil) from Aix labelled such Entomolith. If anything deserve a minutes dirty museum must do. 4 P.M. express to Versailles. Some hilly islands of Cret. chalk or projecting through Tert. plains. Country dry & dusty as

get further South. Buildings now all whitish & pale. No red-tile roofed houses. Day fine. Mediterranean beautifully blue. Put up at Grd. Hotel de Marseille.

July 13. Rem. took carriage & drove to principal points of town. Also along Prado & back by reserve. Eng. Illuminations, fire works on hill of Sa Garde; & in Old harbour. Streets thronged.

July 14. This is the great day of the Fete National. went to Post Office but found no letters. Rem. to Nat. Hist Museum. Picture gallery. Botanic & Zool. gardens. Every Cafe & street. Fine illuminations. Main street almost impassible.

July 15. Rem. Drew £10. Took tram to Catalans & Prado. Walked most of way back; skaring rocks.

July 16. Sunday Am. took tram to Cabots & saw nothing. Pm. In botanic gardens. Strong. Wrote Ellen & Nellie.

July 17. Decided to leave Marseilles. Packed & left by 2.10 train. For Nimes. Put up at Hot. du Luxembourg. Fine day & very warm.

18. Visit the various sights of Nimes. A remarkably well preserved amphitheatre or arena, still used for bull-fights, & partly patched up for that purpose; also a Roman Temple in good preservation & used as a museum of antiquities. all found in Nimes. Repairs going on. Very hot & dry. Country begins to look burnt up. Leave by evg. train & reach Cette about dark. To hotel Basillon.

19. Get up late. Trudged about wharves, moles &c of Cette. No monuments! Town only 200 years old & grown up on account of the artificial harbour. Very hot day. More bad-smells than in any place yet visited. Beautiful blue sea & sky. Take Evg. train to Narbonne. Pleasantly cool travelling. To hotel de France. Vineyards ground of country traversed ravaged by Phylloxera. Dead & dying stumps of vines.

July 20. Visited Cathedral & museum. Strolled about town. The museum & picture gallery very creditable. Clean & well arranged. Interesting cave collection reindeer &c &c. Took 4.30 Pm train from Narbonne to Carcassonne. Put up at Hotel Bernard. Very fine. Hot.

July 21 Friday. Visit the museum, & library, & afterwards the Cité. Stroll about the town. Carcassonne consists of two parts on opposite sides of the Aude. The new town, & the old, or Cité. The former surrounded by a fine boulevard & with pretty laid out squares. Fine plane trees. The town. Clean. The latter a remarkable middle age fortification. The walls 3/4 mile in circuit. In excellent preservation, & in part restored. Contains crooked poor houses & narrow winding lanes. Dirty, & in all respects middle age. Conspicuously provided with cafés & little barriers of every kind. Very creditable picture gallery. Looked up history of neighboring town of Montréal in the library. Day fine, warm, but windy & not oppressive. Probably no fortress in France so interesting as that of the Cité. See guide.

22. Take afternoon train to Toulouse. Find letters there at Poste Restante, from home. Preliminary stroll through the town. Narrow crooked streets for the most part. Put up at Hotel d'l'Europe. (See Montréal from very in passing. Situated on top of hill amid wide plain of Aude to N. Not very unlike Montréal Mt. & plain of St Lawrence valley, but hills not equally detached, & plain of course less extensive

Sunday 23 July. Visit the museum of antiquities & paintings. Pretty but much, & most of antiquities dined on account of repairs & building. Visit museum of Nat. Hist. & Jardin des Plantes. Very fair recent collections. Fine collection of cave findings & prehistoric chiefly from this part of France. Fine skeletons of Cave bear & Irish Elk. Great series of skulls of Cave bear &c. Some very large. Bed of Biol. Collections rather poor, but good set of unique plants (mostly unnamed) from quarries near Narbonne.

24. Went in search of banker & drew £20. = 500 f. To station about circular ticket. Visit Cathedral. In search of Hotel. Guide to Pyrenees routes, but cannot find it here. Stroll about town, write home & to Miss Pettigrew.

25. Took 11.30 train to Luchon, buy the first stage in circular Pyrenees trip of Midi Ry at 75 f. Arrived Luchon at 4 P.M. Picturesque & interesting route after getting away from Toulouse. Luchon proper dirty looking little town, but great outgrowth of fine hotels. Gardens, shaded promenades establishment of bains & Casino. Dey overcrowded in Rue at Grd. Hotel des Bains.

26-27 Strolling about Luchon.

July 28. Went in Carriage to Vallée of Lac d'Oo, & then ascended to lake on horse. Expedition occupied from noon till 6.30 P.m. A remarkably beautiful drive, ending in the centre of the higher portion of the Pyrenean Chain. Lake singular, with a magnificent Cascade falling into it at upper end. occupies a circue & is a true rock basin. Story at Casino. Open air concert &c.

29 Leave Luchon by 11.30 train, & arrive at Bagnères du Bigorre 5 P.m. Warm day. Cool night. Fine views of part of Pyrenees from town.

30. Ascended the Mt. Bédat, which overlooks the town. Fine day & fine view. Spent some time on Summit reading up Guide book, & conversing with aborigines who came up to make their devotions at an image of the Virgin, which crowns the summit. Concert in Casino garden in P.m.

31. Visited "National" Marble Works, & received very kindly by manager Mr. Carney. Works not in present in operation, but got from Mr C. complete set of rough Samples of marbles of this part of Country. Walked by Chemin de Campagne to Médoux & Examined quarry of breccia marble with

serpentine. Visited M. Frossard's private museum on way back. Mr F. very kind & showed me everything. Remarkably complete & well arranged local museum.

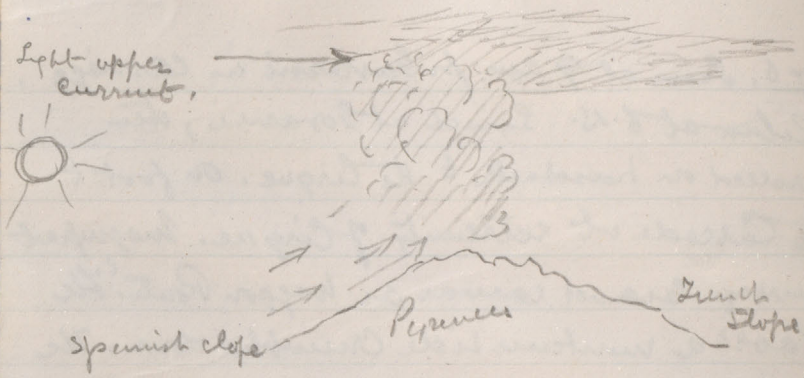
Aug. 1. Left Bagnères de Bigorre by 9.20 train. had some time on hand to wait at Tarbes. Then took train to Ossun. walked nearly two hours in melting sun looking for locality of numerous fossils mentioned by Frossard. Saw nothing but sands but no fossils. Took 2.15 train on to Lourdes. Visited the miraculous grotto. The whole route to it lined with shanties & shops filled with devotional objects. Crowds of pilgrims. Singing & services in progress in the grotto & great quantity of candles alight. The miraculous water now conducted to a series of taps where the people fill their flasks, bottles, & thus to carry away. A curious & impressive sight. Hundreds of crutches hung up round in the grot. Found a young fellow pasting a fence who proposed to conduct me to some of the places mentioned in guide as being guilded prehistoric remains. Bought a candle at the holy grotto & set out. Crept into two very narrow openings which though expanding within did not show much. Large caverns immediately above the

at Hotel des Pyrenees. Excellent & not dear.

miraculous grotto. Spent very drinky coffee & reading, very tired, & nothing particular to do here.
Aug 2. Took 10.05 train to Pierrefitte. Rly passes up a most picturesque valley. Correspondence omnibus to Cauterets 10 kilometres, by a most romantic & rugged valley. Roaring torrent below. Admirably constructed carriage road. Cauterets a town of less than 2000 inhabitants, but now full of tourists. Almost a town of hotels. Small secluded valley enclosed on all hands by rugged mountains. Strolled about a mile up valley. Eve. at theatre of Casino. Putup at Hotel de France.
Aug 3 & 4 Saunteringg about Cauterets.
Aug 5. Took 'Correspondence' coach to Pierrefitte, starting at 9.35. Decided to visit Luz, so instead of ~~wal~~ taking train. Took 'Correspondence' for Luz. A warm day. Remarkably beautiful & rugged valley to Luz. (12 kil) Putup at Hotel D'Espagne. Walked to St Sauveur about a mile. Inspected magnificent slove bridge of single span which crosses the river there. A beautiful valley in the heart of the mountains. Between Pierrefitte & Luz a profound canyon & another above the bridge referred to.

Aug 6. Leave at 9 a.m. for Gavarnie in carriage. Return at 6.15. Lunch at Gavarnie, then proceed on horseback to the Cirque. On foot to the Cascade at extremity of Cirque. Magnificent scenery. Grand canon or Waggon Route. 'The Chaos' a mountain side crumbled down. The Cirque beyond description. Cascades. The principal 450 m. high. Mountains heavy with snow all round. A mass of broken rugged walls & tables within.

Aug 7. Took the Coach at noon to Bareges. Had intended leaving for Pau today, but Lenny robbed a small collection of plants from Mr. — at Lédre found that by missing 9 a.m. Correspondance could only leave at 6 P.M. A steady climb of 7 Kil. to Bareges. Very slow a bit. Bareges a single street. Celebrated mineral springs. Great invalid resort. Large military hospital. Rather bare bleak & uninteresting compared to Luz. Walked back to Luz. Extensive work in planting mountain sides by dept of Forestry at Bareges. Visited the old fortified church of the Templers at Luz. A truly remarkable edifice. Weather very fine.


Light upper
current.
Spanish slope
Pyrenees
French
Slope

Aug 8. Leave Lucy by 9 a.m. 'Correspondence'
Leave Peerrefit by tram at 11.15. Arrive at
Pau about 1 P.m. Go over the Chateau, & stroll
about the beautiful shady walks of the town.
Splendid view of the Pyrenees from all points.
Evening music on the Square 8.30 to 10 P.m.
At Hotel de France. Day very warm &
breathless.
Aug 9. Leave by 2.35 tram for Bayonne. Reach
Bayonne at 6 P.m. Put up at Hotel St Martin.
a warm fine day. Dusty riding through pretty
undulating country. Horizon dim & Pyrenees
almost invisible.
Aug 10. Strolled about Bayonne. Visited Cathedral.
Took 11 am tram to Biarritz. Lunch. Examined
rocks. Watched bathers, strolled about the place.
Gay. Fine hotels & villas. Fine beach. Picturesque
rocks & boat harbours. Nummulite Tertiary.
Ry. Bayonne to Biarritz a curious little affair.
Two decked cars.
Aug 11. Lookup at 4.45 to take 5.50 train to
Dax, intending to spend some hours there &
visit Salt mine, then take P.m. train on to
Arcachon or Bordeaux. Missed the train.

obliged to wait till 1.45 Rem. & consequently
Come directly to Bordeaux, arriving at 8.35
Day extremely hot & frightfully dusty. In a
compartment with 3 Spanish gentlemen all the
way. Most of route across Landes, now for great
part improved with pine forests. Pines mostly
in wods of growth Banksiana. Much small
timber exported, & trees 'flaged' for rosin, with
little earthen pots attached to catch the flow.
To Hôtel de France. Sup. & Café & being tired, to
bed.

12 Aug. Went in search of banker & drew £20.
To exhibition, where spent nearly the whole day.
Took 2 hours drive round town in evening.
Cathedral, quays, fine bridge. Vault under
tower of St — with natural mummies
from burying ground of same church. Sup.
Cafe. Visit Acma.

Aug 13. Leave Bordeaux 8.45 tram. Reach
Montauban about 2 Rem. Follow valley of
Garonne. Country pretty but not very interesting.
Strolling about Montauban, a quiet plain looking
place. Visit Hôtel-de-ville - museum & picture gallery.
Sup, music on the square. Very good 13 lb Rep.

14 Aug. Up at 4 am, to take train to St Antonin. Leave luggage at station there, & take correspondence for Caylus (12 K) Heavy rain & a small uncomfortable open vehicle. Arrive at Caylus 8 am. To small hotel & get coffee. Caylus a small village picturesquely situated. Enquire as to phosphate deposits, true object of visit. Take trap at the hotel & to office of an English company where find a Mr Wills who very kindly offered to accompany me to some of the more interesting openings. Drove round to these, & returned to Caylus in time to take room Correspondence for St Antonin. Leave St Antonin 4.30 & arrive at Aurillac 10.18. Country very picturesque & rocky to junction of Aurillac line. Thence dark. Arrive Aurillac in tremendous downpour of rain. To Hôtel de Commerce. Just on the hill, but very dirty & uncomfortable.

Aug 15. To 12 Pm, train for Clermont, arriving there at 7.30 Pm, the line from Aurillac to Murat & Arvant exceedingly picturesque & interesting. Extensive engineering works on railway. Dull. Stormy. To old quarters at Hotel de Poste Clermont.

16 Sept Clermont by 6 am. train passing by Thiers to St Etienne & thence to Lyons. Put up at Hotel du Globe as before. Thiers a remarkably picturesque & industrial place. Chiefly cutlery. On the Edge of

the granitic region, & the ry. ascends from it up a very wooded & beautiful valley, numerous tunnels & viaducts. Country gradually becomes tamer on approaching St St. Got budget of home letters.

17 At Lyons.

18 Left Lyons 3.30 P.m., arrived at Geneva 9 P.m. Rooms at Hotel du Lac.

19 At Geneva. Ordered clothes. Left watch to be cleaned. Evg. Open-air concert. Met again J. Macklellop of Tamlorh Arran. Had seen him at Hotel du Globe Lyons.

20 Visited Nat. Hist. Museum. Fine new plain substantial building. 2 floors & extensive gallery. Collection particularly in Zoology very good. Fossils &c much in need of arrangement. Museum seems to be in process of arrangement only. Visited Musee Fol. Antiquities. Musee Rath. Paintings & sculptures. At open air Concerts P.m. & Evening. Geneva like a great hotel, full of strangers. Many English speaking. Weather fine.

21 Strolling about Geneva.

22. Left by 7 am Coach for Chamonix. Splendid day. Fine ride. Reached Chamonix 6 P.m.

23. Breakfast at 10.30. Walk up to Montanvert on the way to Mer de Glace. Take time to it. Splendid view of Mt Blanc range. Evening wet. Very

heavy rain with thunder.

24 Wet looking morning. Started from & walked by path to Mt Blanc, to St de Bonneus. Heavy rain & mist. Waited some time, but no guide appeared & mist clearing. Crossed glacier to Chalet or restaurant hut. Visited grotto or tunnel cut in ice. Collected some rock specimens & pendant some carb. fossils from altered rocks of Mont Chamonix Valley (see map. Remain anthracitiferous Known St (Carb.) Walked back to Chamonix by carriage road. Arrived thoroughly wet.

25 Up early & left by coach for Geneva. Fine day but rather chilly especially in early morg. In Geneva about noon. Left valley of Arves. Eng. at Convent Kirk de Bartin.

26. Wished to leave Geneva today, but the weather so bad that decided to remain till tomorrow morning. Sent off specimens addressed to Dr. Hemp. Sotwatch from water. Drew £20-0-0. Bought musical box & arranged for sending it to England. Pm. writing letters. Wg. met friends of two years ago

27. Left Geneva by steamer 11 a.m. To Lausanne. Waited there two hours & took train for Neuchatel arriving at 7.15. To Hotel de Bellevue. Day chilly & showery. Mountains generally covered.

28 Showery cloudy day. Leave by 8.20 train for Travers. Introduce myself to Mr Walsh the manager & see the asphalt works there. Lunch at little hotel in village. Return by 2 P.m. train to Neuchatel.

29 Leave Neuchatel 9 a.m. Reach Berne 11.15. Stroll about town. Lunch. Leave 2.10 P.m. by train to Thun. Steamer & train to Interlaken. Reaching at abt. 6 P.m. To Hotel Victoria. Very grand establishment. Evg. Concert at Casino. Heavy showers, cloudy & cold all day.

30 Strolling about Interlaken. Ascend Kleine Regen for view of Jungfrau &c.

31. Take carriage to Lauterbrunnen, no places left in Diligence. Lunch at Lauterbrunnen. Horse to summit of Wengen Alp. Walk down to Grindelwald. Leave Lauterbrunnen at noon Grindelwald at 6 P.m. To Hotel Schweitzer Adler. Splendid day. Magnificent views & prospects everything

peaks & glaciers. Journey leisurely & stopping letter
Sept. 1. "Then altered, crumpled, glassy rocks bare
Sent Gandelwald & asc. leisurely to
take train in direction of Lucerne. Day very wet
Decide to lie over at Interlaken. Day cleared
kaudlopping in Rain, fooling round Interlaken.
Sep. 2. Leave by 9.35 train for Brienz. Steamer up lake of
Brienz, passing celebrated Giessbach falls. Delightful
drive across Brünig pass to Alpen Gasthof on Lake Lucern.
Steamer to Lucerne. Splendid day. Fine views of lake & mts.
Pass however not nearly so picturesque as Lake Wäg.
Sep. 3. Sunday. Could not visit bank or do other
business. Visited Glacier garden. Concert at Casino 8½
Sept. 4. To bank. Bought small valise so as to leave
heavy luggage at Lucerne. Bought pair of boots 12.
Take 1.45 boat to Vitznau & ascend Rigi by railway.
Fair view but distant mts concealed by mist.
Enjoy music games & gaiety on in dreary room of hotel.
Sep. 5. Wait, rain this afn. to view sunrise. Descend
by 9.15 train to Vitznau. Wait there till 1.50 to
let weather clear & get back guide book which had
turned up at Rigi. Steamer to Flüelen. Tram to
Göschenen at entrance to St Gotthard tunnel.
Omnibus thence in one hour to Andermatt. Put
up at Hotel Bellevue. The St Gotthard railway

a wonderful walk. Unfortunately misty & wet. Only the valley visible

Sep. 6. Mist, fog & rain all day. Rev. walked down to Göschenen examined rocks & entrance to St Gotthard Tunnel. Back by omnibus. Devils Bridge. Swiss army, or a party it quartered at Andermatt. Exercising.

Sep. 7. ~~Left~~ Walked from Andermatt to Hospinthal this am. Dense fog. Swiss troops popping away at sham fight in direction of Furca pass. Leave Andermatt by noon bus. Göschenen: Take train through the St Gotthard tunnel. Stop at Airolo to examine rubbish heaps. Here to rail all Rev. Train at 6.53. Dark. Pass through fine scenery without seeing. Get out at Biasca. Station Hotel.

Sep 8. Up at 5.45 to get train at 6.30. Fine morning. Go on to Bellinzona, where arrive before 8 am. Curious & extensive old fortifications. Picturesque & thoroughly Italian town. Get out here to see the Carboniferous reported. Can find only micaceous schists: Have to wait for 1.30 train, which turned out an hour late. On to Lugano. Arrive at Hotel Suisse 3.45. Harlem to bank, but closed, holiday. Could not get quarters at Hotel du Lac, (but) full. Here all servants

small

Sep. 9. Drew 10 francs from Swiss Italian bank. Took B. 50 train to Como. To Hotel Volta. Stroll about Como & Co. Coffee in evg. with a couple of new found friends. Como Solitary, quiet Italian. Weather fine

Sep. 10. Score at 8.10 am. & send up Cole to Colico at head. Serve punch at Bellagio. Take diligence at Colico & arrive at Chiavenna at 7.30. Day fine & warm. Rain in the very early very prospect of bad day tomorrow.

Sep. 11. Serve of diligence at 6 am. Raining, & on mounting toward the Splugen pass soon enveloped in dense mist. Cold wet & mist all across pass, & reach top of Splugen. Lunch there. Rain on to Coire. Weather good. pass via Inola & arrive at Coire 7 Pm. To Hotel Suckmanner, which near the Post office. Wrote home

Sep 12. strolled about Coire. visited Cathedral, rumed of which dates from 8th century. Saw various curious old paintings, manuscripts, relics & treasures. Left Coire by 12.40 Pm. train & arrived in Zurich 5 Pm. To Hotel Belleme. Evg. reading English papers &c.

Sep 13. Visited museum of antiquities where a very fine extensive & well arranged collection of relics from

the lake dwellings &c. Rem. visited museum in the Polytechnic School. Remarkably fine geological & mineralogical & in beautiful arrangement. A wood room devoted to fossil plants from Oeningen &c. went to Prof Heer's house & by good luck, but did not succeed. Enjoy short guide books &c. Day miserable. Cold & wet with wind.

Sep. 14. Left Zurich by 2.33 train, arriving at Schaffhausen at 5 Rem. Pass falls of Rhine on way. Very jarring rather uncomfortably. Schaffhausen a quaint old-fashioned place, quite interesting. Mediaeval &c. &c. To Hotel de la Conserve. 15 Interesting Geol. excursion. Took steamer up Rhine to Stein & walked to Oehningen to see quarries celebrated for fort. plants. Could not find quarries after long search. Lunch at little German Inn. Walk back to Stein & wait all Rem till 6 o'C for steamer back to Schaffhausen. Day cold dull & stormy. Steady rain in evening.

16. Left Schaffhausen by 9.30 a.m. train. A slow one, but giving ample time to see country. To Singen. Change carriages & on through heart of Black Forest country to Offenburg. Change again, & after one more change arrive at Strasburg at 7.45 Rem. To

Hotel Ville de Paris. Day miserably wet & cold throughout. Interesting sojourning works on railway near summit between waters of Danube & Rhine. Broken hilly country with intervening fertile valleys as soon as reach granite & gneissic rocks, as in centre of France when same rocks met with.

17 Examined Cathedral. Same clock go through its ridiculous performances at noon. Strolled about the town. Visited Nat. Hist. Museum. An extensive & fine collection of stuffed animals, birds &c, but badly housed. Geol. & Mineral. Collections shut, & could not be seen. Take 5.7 P.M. train for Heidelberg, & arrive there at 9.30. Go Prince Karl Hotel.

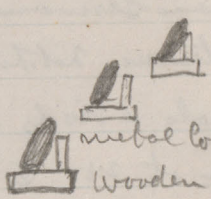
18 At Heidelberg. Wretched weather. Cold steady rain. Visited extensive library of University where many curious Mss. Sculpture, ornamentation &c old illuminated Mess-books. Early printed books &c. Visited Collection of minerals, which good & extensive but not striking.

Sep. 19. Took 12.12 train for Frankfort. Put up at Frankfurter Hof, a very large hotel. Wandered about the town which however in rain looks rather dismal. Reading papers &c.

Sep. 20 Visited various interesting quarters of town. Twice broken & drew £20. Visited the art institution & picture gallery. Took 5 Pm. train to Mayence. The hotel at Frankfurt conducted on common principles. Charge posted for as 8 named seat rooms, in price for which last service a light included.

21. Intended going down Rhine by steamer, but morning so horribly wet that decided not to do so. Visited museum at Mayence. Very fine collection of Roman; Romano-Germanic & antiquities. Pictures not much. Extensive nat. hist. museum. Chiefly stuffed animals & birds. Minerals & conchology poor. Took train at 2.5.5. to Andernach. A quaint little town. Narrow streets. Some picturesque ruins, wall &c. Appears rather out of usual tourist beat, as no one in hotel can speak anything but German. Day horrible

22. Hired carriage last night & left at 9 a.m. for Neidermendig, Laacher See & back to Andernach by the Brutel Valley. Poor & narrow roads generally very muddy & much damaged by recent rains. At Neidermendig visited the basalt quarries, & old



arrangement of litho. specimens in upright Cases utilizing space well.

underground quarries used as beer cellars. The very low temperature prevailing in the quarries has led to the establishment of breweries here. Rows on rows of great tuns. Then to Laacher See. Picturesque enough in fine weather. Lunch at hotel there. On down Brohl Valley. Very picturesque & interesting Traas or volcanic sand quarries. Back to Andernach 4:30, 5:30 train to Bonn. To Hotel Royal.

23. Bonne. Visited museum of antiquities & of casts in university. Also the Church. Then visited the Nat hist museum. Very good & extensive. Especially the rocks minerals &c. Visited Dr C. Krans dealer in rocks minerals fossils &c. Very large collections. Bought a set of 150 Rhine Volcanic rocks. Mines, Flora, Springtrope

24. Leave Bonn by 9:10 train (1/2 hour late) for Cologne. To Hotel du Nord. See Cathedral various churches &c

25. Visited Cologne museum yesterday, antiquities &c, Seubert Valve with specimens & extra large diameter.

26 Sept. by 9:38 train for Hannover, Saturday to

Stay there tonight & go on to Berlin tomorrow. Arrive Hannover 3.10 P.m. Look about town, which does not appear specially interesting, though some fine streets & shops. Eve. to Palmengarten a winter-garden where excellent concert. On looking at guide & map think I will make diversion to Harzburg tomorrow.

27 Sept. Set Hannover 9.28 a.m. train for Clausthal. Change twice, & at 2nd change find I have to wait from about 12.15 to 4.10 P.m. Dull stupid place. Get to Clausthal about 6 P.m. to Hotel Goldene Krone. Weather fine but cool. This being town cold. Primitive sort of hotel but clean & comfortable. Harz Mts so far seem not much interest. Quaint wooden tile-roofed villages & dark pine woods.

28 Obtained permission to visit the Dorothea mine, about 1½ m. from Clausthal. Waited in office some time for the overseer. Clad in very old dirty clothes wandered for some time through the mine. Down & up slippery ladders. To surface at last by man-engine. Walked back to Clausthal in shower of rain. Dinner, & left by diligence at

three forty for Goslar. Drive chiefly through spruce woods. nothing striking in scenery. Goslar 6 P.M. Quaint interesting old place. wooden houses with projecting upper stories curiously carved. Stroll about town till dark.

Sep 29. Set out at 9 am in company with a young Swedish gentleman who could speak a little German but no Eng. or Fr., for the Rammelsberg mine. Walk of half an hour. Readily admitted. wandered about in mine for 3 to 4 hours. See various mechanical boring machines, a fan for ventilation (blower) worked by small turbine. Man-engine 12. Back to Goslar. Dinner, & leave by 3.33 train for Berlin. To Central Hotel, but not being able to get room there, to hotel St Petersburg, a much smaller establishment. Get bedight by four letters.

Sep 30. Cold wet windy autumn morning. To Imperial museum. wandering about town.

Oct 1. To National Gallery, again to Royal Mus. To Aquarium. Very well got up. Geological grottoes. walking about streets. Eve. to the "Krolle" excellent Concert.

In ethno. museum Mind Japanese
great variety of masks show recalling the
N.W. coast though genuine rather different style.
Stone Club about 20 inches long. This shape,

recalls stones found at Wetta Katta.
Among New Zealand objects a number
of masks dressed with hair or feathers &
coloured (generally in black & red) made
rather roughly in wood. Also various other
wood carvings which show very close general
resemblance to Haida workmanship.

Oct. 2. To bank & drew money. To Berg. Acad. & called on Prof. Hentschel presenting Dr Hunt's card of introduction. Must return tomorrow for information required. Purchase some amber ornaments. Visit a wax museum. Eve. to Friedrichs-Wilhelmstadt-Theatre. Jungfrau von Belleville an adaptation of Kotts Pucelle de Belleville.

Oct. 3. Called again on Prof. Hentschel. Saw the Berg academic museum, & obtained very useful information & introductions. The museum metallurgical, geological & mineralogical, very fine. Bought geol. map of brown coal fields of part of Saxony. Left at 2.30 P.M. for Leipsic, arriving at about 6 P.M. To Hotel Hausse. Walk some in Eve.

Oct. 4. Visited Art gallery & Ethnological museum. Latter very extensive though badly housed. Walked about the town. Called to see Prof. H. Credner but W. in. Eve. to Opera house. Play Hans — . Not much interest though fine theatre.

Oct. 5. Called on Prof. Credner who was extremely polite. Gave me various useful hints. Stored my collection maps &c of Saxony. Left by 2 P.M. train for

new form of candle seen in Starnfurt.
Three openings from top to bottom. Entirely prevents guttering, even in wind.

Slag cast in cubical blocks about 6 inches extensively used in paving streets here in Halle. Do not know where it comes from. Evidently run into mould of hole about 2" in diameter at side which afterwards turned down in road.

Stassfurt, & arrived there after four changes at 6 P.m. Went out to try to find Mr Schreiber to whom had card, but did not succeed.

Oct. 6. Called on Mr Schreiber this am, but found that the underground overseer being in the mine, could not well go down till 3 P.m. Hard work passing the time till then. Went very thoroughly over the mine & works in P.m. Very interesting. Eve. writing notes.

Oct. 7. Up at 6.15 to catch train at 7.25 by roundabout route for Halle, which however expeditious compared with that before travelled. Reach Halle at 10.05. Call to see Herr Bergrath Hecker, but out & not to be back till 5 P.m. Take carriage & go out to returning brown-coal lignite mines "briquette" factory about 5 m. off. See the whole affair above ground, though without introductions. After return visit Salt wrap. works at Halle. Then call on Mr Hecker. Procure letter from him to manager great returning brown coal works in neighbourhood, but cannot go till Monday.

Oct. 8. Sunday. Halle. Evening with Prof. Kuhnert, Zolnier & Porter abt. compass. Hard task to pass the time, though the market-place is interesting & mediaeval looking.

Oct. 9. Took 9 am train to Oberrobligen west of Halle to visit brown-coal mines & works there. Found Bergrath Hecker in same train on way out to test a boiler. Accompanied him to mines. Spent most of day looking over works &c. Lunch in a little inn where met some curious people. 3 Pm train back to Halle. Write up notes.

Oct. 10. Took 8 am train to Leipzig. To Hotel Hauffe. Called again on Prof. Credner. Took 2 Pm train to Freiberg. Very slow. 5.30 to junction where had to wait till 8 Pm. Freiberg at 9 Pm. To Hotel de Saxe.

Oct. 11. Called on Prof. Stelzner at the Berg academie. Obtained much useful information. Introduced to Herr ——— who in Pm, conducted me to the dressing works.

Oct. 12. Up at 6.15 & off at 7 am with Herr ——— to George Hoke Berke mine. Saw some old workings. Back at 12. Pm, called again on Prof Stelzner.

Oct. 13. Leave by 9 am train (express) for Dresden. To Hotel Bellevue. Visited picture gallery. Stroll about the town

Oct. 14. Weather yesterday & today wretched. To the 'Green Vault' saw fine jewels & collection of rubbish. Rm. to Royal Library in Japanese Palace. Evg Opera: Taming of Shrew, in German.

Oct. 15. To Picture gallery & afterwards to exhibition of porcelain. Evg. to theatre. See 'Solomon & Queen of Sheba'. Lost home

Oct. 16. To bankers drew 10 pounds. To Zoological mineralogical & Geol. museums. All good, but no points of very special interest. Took 12.50 train for Teplitz, arriving there at 5 Pm. Saxony country along the Elbe. Particularly & rural cliffs. Put up at Hotel Stadt London. Day cold & drizzling.

Oct. 17. Up at 6.45 - Coffee. Omnibus to station to get train to Dux. Walk about 1½ m. to Richard Hartmann Shaft, to director yesterday have ~~letter~~ card of introduction from Dr Stetzner. See the mine machinery &c very satisfactorily. Return to station. Lunch & wait till 2.15 - for train back to Teplitz. Take carriage at station & drive out to mine. Spend two hours underground there with the Engineer who

was extremely civil. Drove back, arrived at 6 Pm.
Dinner. Reading. Nothing to do. Retire at 8 Pm.
18. Up at 6.30. Train at 8 am. for Prague.
Arrive about 11 am. to Englisher Hof near State Ry
Station. Lunch. General Inspection of town. See
military funeral on small scale. Band playing a
wild & lugubrious march. Church dignitaries & lay saints
lanterns. Poll bearers with torches. Day dull &
rainy in morning but Prague really picturesque &
interesting looking. Old towers streets & bridges, &
five steeples. Eve. to Variety theatre. Boffoonery &
rubbish, but did not know when Sleep put in eve.
19 Oct. To German university hoping to see Prof.
Laube, but had to go in search of him to
Zoological inst. Veinberger gassel. Then out to
Lunch. To other side of river in search of Dr
Barrande, but found he was in Paris. To
Cathedral. Return to Dr Laube's & find him
in Wednesday. Eve to Bohemian Theatre.
Boccacio in Czech? the Bohemian language
Oct 20 Called on Prof Laube at 10 Am & spend
two hours looking over his collections in the
Naturwissenschaftlich? Inst. Named Tert. &
Cret. plants from Bohemia. Also up Sil. plants

from Stages G + H. Fine series of Cret. fossils also Sil. Good Carb. plants from Bohemia &c. Enjoyed away the afternoon as best I could. Eve. wrote to W. & wrote up notes.

Oct. 21. Left Prague by 10.15 train for Vienna. Express stopped only for a few & short stoppages. Drivers telegraphed for & handed into the carriages really served. Arrive Vienna 7.30 To Hotel Metropole. Walk about town with Mr Stephenson & Sullivan & Mr Thos Eve. at Prague. Day rather fine.

Oct. 22. Visit several churches, including the cathedral. To the Prater & see various little places permanent there. Very like a fair. Weather raw but fine

Oct. 23. Spend the Royal Library. Extensive walks about town. Eve. to Royal Opera See the Meistersinger.

24. Visited treasury. Then to Geol. Inst. Extensive & fine collection. Beautiful crystals from Solutions. Splendid series of Cret., fossil plants Carb, Trias, Lias, &c. & Tert generally also Cret. Visit Theatre & Belvedere galleries Eve. Coffee

Oct. 25-26. Visited remaining sights of Vienna. Oriental Museum, Nat Hist Cabinet, Town Arsenal. Lower Belvedere & Ambras Collections. Anatomical museum at Josephanum, Polytechnic museum & laboratories. Austrian Museum (like S. Kensington). ascended Spire of ~~St Pauls~~ Cathedral 85. Oct 25 to Opera in Evg. Oct 26 to Concert hall.

Oct. 27 Mrs Stephenson left Vienna for Munich. Go out to Geol. Inst. to look for gentleman to whom had card of introduction. Could not find him. Went to Geol. Museum again. Strolled round Ring strasse. Packed, wrote home. Evg. at Concert Hall.

Oct. 28. Left by 7 am. train from Sud Band station for Venice, which should have arrived at 11 P.M. Good weather through Semmering Pass, but heavy rain afterwards. Fields & country generally appear flooded. At Portogna just before Italian frontier told that line broken beyond, & cannot go any further. Leave luggage at station, & after some trouble find accomodation in a little inn. Torrents of rain, with lightning.

29. All uncertainty this am, as to when can get off. Thought at one time would have to go round by the Trieste line. At length find that train to start from Pontebba on Italian side of frontier at 2 P.m. Luggage later over there & get away. Very slow train & numerous delays, but arrive finally at Venice at 10 P.m. To Grand Hotel.

30. Oct. Rainy & very dark nearly all day. Stroll about. See St Marks Square & Church. Also manufactory of Venetian Glass trinkets &c. Feeling headachy & generally miscrable.

Oct. 31. Visited Palace of Doges. Then to Academy of Arts & walked through the innumerable rooms full gold pictures. Stroll about town & ascend Tower of St Mark Eve. Cafe. Felt too ill to do after dinner here.

Nov. 1. Took gondola this am, & spent most of day cruising about town, examining various churches museums &c (at museum). This being all Saints day great ringing of bells, & religious services. Stops for most part closed, & crowds refusing to island of Campo Santo. Slowly on return of quays waiting for

boats reminding of souls on brink of Styx waiting for Charon

Nov. 2. Left Venice by 1.45 train for Milan. Obliged to go round this way as bridges or broken & direct lines impassible. Train late & very slow. Arrive Milan 1 A.M., & proceed to Gd. Hotel de Milan

Nov. 3. Visited Brera gallery. Lunch. To Cattedrale & strolling about the City. Live but cool day.

Nov. 4. Leave by 11.45 train (express) for Florence, & arrive there at 10 P.M. considerably late. Wonderfully. P.M. free, but passed through the best sewer after dark. To Hotel New York

Nov. 5. Sunday. To post & get mass of correspondence of last month or so. To Pizzetta Michel Angelo. Walked through the Uffizi Gallery. To Boboli gardens.

Nov. 6. To the Pitti gallery. The Cattedrale, Baptistery, St Maria Novello &c

Nov. 7. To Nat Hist Museum & "Tribune of Galileo" To bank. To St Croce. P.M. took Carriage with Mr Sevanison & drove out to Fiesole Magnificent view.

Nov. 8. Leave Florence by 8 am. train. Express, & arrive at Rome at 4 Pm. Scenery by the way interesting. To Hotel Quirinal. Stroll about the town.

Nov. 9. Take cab & drive all round the city to get general orientation. Also out to basilica of St Paul. Pm. Explore the forum & neighbouring excavations. Stopping at Post Office.

Nov. 10. To Vatican museum & galleries. To St Peters. Walk in Corso.

Nov. 11. To Capitoline museums. Lunch. To Palatine excavations, Colliseum &c. Eve. Wrote letters.

Nov. 12. Sunday. To baths of Caracalla. Lunch. To Pantheon. To Pincian Hill where band plays in way

13. With Mr Swainson drove to Catacombs of St Calixtus. See Appian way, & Lateran Museum. Lunch. To bank &c.

14. Up at 4:30 am to get train for Naples at 6 am. Arrive in Rome at 12:30. Take cab & drive over principal part of city.

Nov. 15. Take Carriage at hotel & go to Herculaneum & Pompeii. Return at 6.30 a drive of about 2½ hours each way. Day fine.

Nov. 16. Had arranged to ascend Vesuvius with a gentleman in the hotel, later going to office of funicular railway found all places taken. Spend rest of day at museum. Rain in the afternoon

Nov 17. Day stormy & wet. Go on up Vesuvius. To museum. Purchase pictures. To aquarium, & for over book. Station with Dr Dohrn. Sorg writing to.

18. Up at 6.45. Breakfast, & start for Vesuvius. Carriage to lower station of Funicular Railway. Railway & short climb to summit. Fine view &c. Back to town at 4.30. Stormy in P.m.

19. Carriage to Pozzuoli, Baiae &c. Return at 3.30. Walking about the town. Splendid day & magnificent views.

20 Up at 4.45 am to catch 6.45 train to Rome. Arrive 1.45 - P.m.

21. Had intention of going to Genoa by

Coast line, but find bars uninteresting.
To books office & bank. Bought ticket to London via ~~Geo~~ Florence, Genoa, Nice, Marseilles & Paris. Shetty about town.
Headache.
22. Rome to Florence. to Hotel D'Europe.
23. Leave Florence 9-6 a.m. Leave Rome & reach Genoa 6 P.m. to Hotel Isotta
24. At Genoa. Strolling. Day rotten wet.
25. Up at 5.30 Train at 7 for Nice, arriving at about 2 P.m. Day fine & views beautiful along the Coast, through many tunnels. Strolling
26. Leave by P.m. train for Marseilles, arriving in time for dinner. To Hotel Louvre & Paix.
27. Strolling about Marseilles with Rev C. Swainson. Leave by 4.40 express for Paris.
28. Arrive at 8 a.m. To Hotel Selle & Albion. To tailors & order suit of Clothes. Strolling.
29. Paris. To Louvre & about microscope with Hartnects.

30. Visit museum Prehistoric & Gallo Roman at St Germain. Very extensive & interesting

Decr. 1. Paris. Strolling. At Opera Comique.

Decr. 2. Visited museum of Ecole des mines

Decr. 3. Louvre & strolling, watched wet day with snow

Decr 4. Leave by 9.40 train for London & arrive at 7.30. To Charing Cross Hotel.

Decr 5. See Mrs Redfeart. Business in the city &c.

Lunch	3.00
28. Cab Paris	3.50
Small sums	1.00
29. book	2.00
objective	35.00
Lunch	6.50
~~Hospital~~	3.00
30. Clothes (suit)	190.00
St German & back, cab &c	3.20
~~Small~~ Small sums	2.00
Dec 1. Drew £ 40-0-0 big last of circular notes.	
Valise	35.00
Hand bag	15.00
Silver knives (2 pairs)	32.00
Bugel &c	5.25
Small sums	2.00
Theatre	6.20
Dec. 2. silver buttons	10.00
Necklace	50.00
Lunch	1.50
Dec 3. Small sums.	2.50
Hotel (6 days)	94.57
Dec 4. Fees	4.50
Cab	3.00
Fees & lunch	2.00
~~Postage~~ sums	1.00
English money	
5- Pokers	2-0
Storage of portmanteau	6-8
Hat	11-6
Bedowlin (for Dr Hunt)	45-0
Compass (for Survey)	7-3-0
Necktie rings	8-0
Underclothes	1-15-0
Lunch	0-7
Porcelain paints	24-0
Stockings &c	15-0
Stamps &c	1-0
Fee	10-0

19. Carriage & fees to Bejaia &c	23.00
Small items.	2.50
Hotel	116.00
Tip	2.00
20. Fees	1.00
Ticket to Rome (2nd)	23.00
Luggage	3.60
Lunch	1.00
Roman pearls	17.00
Cab	1.00
21. Ticket to London (1st)	302.00
Grev $20-0-0	
22 Hotel.	36.50
Fees.	2.00
Luggage	5.00
Lunch &c	2.00
23 Hotel	15.00
Fees & Luggage	7.50
Lunch	1.50
Coffee	.50
24. Lunch &c	1.50
25 ~~25~~ Fees	2.00
Luggage	3.50
Lunch coffee &c	3.00
Hotel	31.55
26. Hotel Nice	14.00
Fees & baggage Marseilles	5.00
Lunch & small items	2.00
27. Hotel. Marseilles.	2.00
Fees	7.00
Luggage &c to Paris	

11. Entrances to museums &c	2.00
Lunch small items	1.00
Museum &c	3.00
Cicerone maps & guide	27.00
Cab	1.00
coffees	1.00
12. Lunch	2.50
Cab	1.00
Stamps	5.00
13. Cab.	0.75
Fees	1.00
Book	2.00
Hotel	86.00
Fees.	3.00
14. Fees	3.50
Ticket to Naples (2nd)	23.50
Luggage	3.80
Cab.	4.50
Lunch	1.90
15. Entrance to Herculaneum, photos	3.00
Lunch	2.50
Guide	2.00
Fee to Caretaker	2.00
16. Cabs.	2.00
Lunch	3.00
Museum & Fees	3.00
Statuettes.	18.00
17. Cabs. Draw £ 10-0-0	2.50
Museum	1.00
Pictures	60.00
Water colour sketches	15.00
Paper, lunch &c	1.50
Aquarium entrance	2.00
Boards for pictures	2.00
18. Cab	1.00
Pennies stuck	25.00
Guide	5.00
Lunch	3.50
Small items	1.00
picture	7.00

Nov 1. Fees Entrances to museums &c	7.00
Forgotten	6.00
Drew £ 10-0-0	
Nov. 2. Tolls	2.00
Hotel	64.10
Fees	5.00
Ticket to Milan	21.10
Luggage	4.00
Small sums	2.00
Nov. 3. Entrance to Brera	1.00
Lunch	1.00
Underclothes	12.20
Coffee	.30
Tobacco	2.71
Small sums	1.00
Nov 4. Hotel Milan	25.25
Fees	2.00
Ticket to Florence (1st)	43.00
Luggage	5.00
Dinner	4.00
Small sums	1.00
Paté	.60
Nov. 5. Lunch	1.00
Sellers	1.00
Lunch & small sums	1.00
Carriage to Fiesole	5.00
Fees	1.00
Drew £ 10-0-0	
Nov. 8. Hotel	52.50
Tips.	3.00
Ticket to Rome (2nd)	26.00
Luggage	5.00
Lunch	1.00
Stamps	.50
9. Carriage	9.00
Lunch	1.00
Night starts	10.00
10 Romanesco for Vatican	2.00
Fees	1.50
Cab through small fees	2.50

Theatre	2-60
Small items	1.60
26 Small items	1.00
~~Fee~~	2.75-
Breakfast	1.20
Drink	2.80
Concert	.50
27. Fee	.30
~~Small items~~	~~.50~~
Photos	3.30
Cig. holder	.80
Paper	.15-
Dinner	2.80
Breakfast	1.00
28 Hotel	16.45-
Fees	1.50
Breakfast	1.00
Cab	1.60
Ticket + Venice (2nd)	29.40
Baggage	3.40
Fee	.30
Dinner	1.50
Coffee	.30
29. Hotel Pontaffa	2.30
Lunch &c	1.30

Italian money

30 Coffee	.20
Fees	1.50
Baedeker N. Italy	8.00
Glass ware &c	21.00
Book	6.00
31 Oct. Admissions & fees.	3.00
Coffees &c	1.00
Shell bracelet	1.50
Pictures	25.00

18. Hotel	7	80
Tips		50
Reg & luggage to Prague	6	20
Porter		50
Theatre	1	30
Cig		31
19 Tea tickle	4	50
Lunch		60
Tram		10
Repair gloves		35
Theatre	1	40
20 Coffee		20
extra valise	2	00
Trifles	1	80
Stamps		10
Coffee		14
21. Hotel Prague	13	65
Tips	1	80
Railway to Vienna (2nd)	15	80
Baggage	1	00
Dinner	1	30
Coffee		30
Cab		80
Small sums		80
22 Meals	Say 4	00
Small sums	1	00
23. Tea		25
Lunch		50
Dinner	2	20
Breakfast Cheddar	1	50
Theatre	2	50
24. Small sums		80
Sponge bag	1	20
Cigarette case	1	50
Dinner	2	00
Breakfast	1	00
Chocolate		42
25 Museum	1	00
		80
Tea		41
Tobacco		20
Lunch	2	80
Dinner	1	00
Breakfast		

Small sums	1.30
Oct. 6. Fees in mine 12	5.00
Book on Salt mines	2.00
Oct 8 & 9. Ticket Obersteyer	2.60
Food	1.40
Oct 10. Hotel Halle.	
Ticket to Sapine	2.60
Fees	2.00
Luggage	.50
Hotel Sapine	5.25
Fees	1.00
Cabs.	1.80
Brooch	15.00
Ticket to Freiberg	6.50
Luggage	.50
Supper	.80
Oct 11. Geology of Bohemia, book on Briquettes	21.00
Oct. 12. Fees in mine	2.00
Books	1.00
Oct. 13. Hotel at Freiberg.	22.65
Ticket to Dresden	3.50
Fees 02	2.50
Cab	1.00
Cigarettes	.65
Oct. 14. Exhibitions	2.50
Theatre	5.50
Small sums	.50
Oct 15 - Small sums say	1.00
Theatre	4.00
Oct. 16. Hotel Bellevue Dresden.	36.80
Fees	2.50
Ticket to Teplitz	6.80
Cab	1.00
Luggage	.60
Small sums	1.00
Drew £. 10 - 8 - 0	Austrian money fl. K.
Oct. 17.	
To Dresden & back	60
Fee	50
Carriage to mine in Teplitz	2 - 50
Lunch	1 - 00
Small sums	- 25

Sep. 29. Fees in Maine	3.50
Hotel	12.00
Fees	1.50
Railway to Berlin (2nd)	16.50
Luggage	1.50
Cab at Berlin	1.60
30. Cig &c	1.00
Small Sums	1.00
Music. (German Songs)	4.00
Hat	10.00
Oct. 1-2 Aquarium	.50
Concert	2.00
Cig.	1.50
Ticket in B.B. Lot.	10.00
Repair of Valise	1.50
Amber purchases	29.00
Museum &c	.60
Coffee &c	1.30
Theatre	3.00
Sum letters &c	.55
Drew £ 20-0-0	
Oct. 3. Hotel	39.50
Cab.	1.50
Lunch	.60
Maps	16.00
Ticket to Leipsic	11.80
Luggage	.90
Fees	2.50
Small Sums	.50
Oct. 4. Museum	1.00
Theatre	3.80
Small Sums.	.60
Oct. 5. Hotel	21.30
Fees	2.50
Cab	.90
Ticket to Mayenfurt	6.80
Luggage & Small Sums	1.03
Oct. 7. Hotel	12.00
Fees	1.30
To Halle	5.70
Luggage &c	1.10
Cab.	5.50
2 meals	4.00
Fees	1.50

	Museum	2·00
21.	Hotel	10·15-
	Fees	1·50
	Porter	·70
	Ry to andernach	6·50
	Luggage	1·70
	Porter	1·00
	Photo &c	2·21-
22	Fees &c	1·70
	Lunch	1·75-
	Book	1·20
	Carriage hire + fee	13·00
	Hotel	5·00
	Fees	1·00
	Ry to Bonne	2·50
	Luggage	·50
23.	Fees at Museums	3·00
	Collection of works from Krauss with packing	48·00
24.	Hotel	20·60
	Fees	2·00
	Ry to Cologne	1·75-
	Luggage	·50
	Fees at Cologne	1·00
	Bracelet	30·00
	other purchases	11·00
	Cigarettes	·70
25.	Museum	·75-
	Tobacco	3·60
	Sending petroleum to Leith	9·50
	Tickets	9·80
	Lunch & Coffee	·70
26.	Hotel at Cologne	25·13-
	Fees	2·50
	Ticket to Hanover	22·50
	Lunch & small sums	1·60
	Circuit	·80
	Stamps	1·00
27	Hotel, Hanover,	10·00
	Fees	1·50
	Railway to Clausthal	7·60
	Lunch	1·60
	Luggage	·60
28	Fees at mine & hotel	5·00
	Hotel	9·00
	Drilling at Goslar	2·60
	Visits of Goslar	2·00

Sep. 11. Hotel Siavanni	13.00
Lunch	4.00
small sums & fees	3.10
Sep 12. Hotel Coire	12.75
Fees	1.00
Tge to Bacristan	1.00
Railway to Basel (2nd)	8.50
small sums	.85
Stamp	.25
13. Lunch to Karlsruhe	8.00
Fees & tunnels	1.00
Penals	1.20
Telegram	7.70
Stamps	.25
Coffee	.30
14 Hotel Zurich	36.00
Fees	2.20
Railway & luggage to Schaffhausen (alt)	6.00
Coffee	.20
15 Oschungen & back	2.35
Lunch &c	1.20
Hotel at Schaffhausen & fees	13.00
Ticket to Strasburg (2nd)	14.00
Luggage	7.50
Tunnels & small sums.	3.00
	M. Fr.
German money	
17. Hotel at Strasburg	12-00
Fees	2-00
Ticket to Heidelberg (2nd. express)	10.00
Luggage	4.20
Small sums	.40
18. Fees	1.00
Cigarette	1.50
19 Hotel & fees	21.00
Railway to Frankfurt (2nd)	5.00
Luggage	3.00
Cab	1.50
Dinner & tea	4.40
20 umbrella	13.00
Meals	6.50
Washing	3.50
Fees	1.50
Ticket to Wayland	2.50
Luggage	.55
Small sums	.50
Photos	2.00
2 Cabs	2.70

Grew £ 20.

31. Hotel Interlaken.	29.50
Dejeuner	3.50
Small sums	2.00
Fees	4.00
Sept 1. Hotel Grindelwald	10.50
Fees	1.00
Horse carriage & 3 1 & 1 st	38.00
Other expenses	13.00
Sep. 2. Ticket to Lucerne	15.50
Hotel Interlaken	2.00
Luggage	22.50
Lunch &c	2.50
Cigarettes	1.65
Sep 3.	
Drew £10 - 0 - 0	
Sep. 4. Hotel ~~Guillaume~~ Lucerne.	26.25
Fees	3.50
Boots	22.00
Police	20.00
Ticket to Rigi	9.00
Sep 5. Rigi Hotel (Schreiber)	15.50
Rigi to Vitznau	3.50
Luggage	1.00
Lunch	2.50
Vitznau to Flüelen	3.00
Flüelen to Andermatt	4.40
Small sums	1.00
Sep 6. Minerals bought	20.00
Sep 7. Hotel	36.75
Fees	1.50
Buss.	2.00
Lunches	1.10
Ticket Gosteren to Airolo	2.05
Minerals bought	5.00
Ticket to Bellinzona	7.25
Sep. 8. Hotel at Biasca	6.00
Tea	.70
Lunch & small sums Bellinzona	2.80
Railway to Lugano ?	5.00
Cig.	.70
Sep. 9. Hotel Lugano	12.00
Fees & small sums	2.50
Railway to ~~Lugano~~	3.50
Sep. 10. Hotel Como	14.75
Fees	1.50
Steamer to Colico	4.80
Lunch	2.00
Diligence to Coire over Splugen	32.00

Aug 19. necktie	2.00
Small sums.	1.50
Cigarettes	1.30
Beer	1.50
20. Small sums	2.00
21 Grol wop	25.00
Port	2.15
small sums	1.80
22. Hotel	43.50
Coach & laundry	21.00
Fees	2.00
Lunch	4.00
23. Small sums	2.00
24 Fossils	2.50
	2.00
Ice cave Gl. des Bossons	1.00
Small sums	15.00
25. Fare to Geneva	43.50
Hotel	1.50
Fees	1.00
Lunch	115.00
Suit of Clothes	1.00
Small sums	.80
Cigarettes	7.50
Spectacle holders (3)	
26. Cleaning watch	10.00
Box of specimens. paid to Antwerp	10.00
Musical box	250.00
Stamps	2.50
Small sums	2.00
Cigarettes	1.30
New £ 20-0-0	
Hotel	27.00
27 Simon to Lausanne (tickets)	5.00
Ouchy to Lausanne	.45
Lunch	2.00
Lausanne to Neuchatel (2nd)	5.80
Luggage	1.50
Small sums. porters &c	1.00
28 Ry to Travers & return	3.50
Lunch	1.50
Small sums	.60
Hotel & fees	25.50
29 Fares Neuchatel to Interlaken	11.00
Luggage	5.00
Lunch	2.40
Small sums	2.00
Book	4.50
30 —	about 6.00

Coffee &c	1.20
Berrai? (Hotel)	8.50
Hotel	18.50
11 Fees &c	1.10
Coffee & dejeuner	5.00
Lotos y Basques	3.50
Omnibus Bordeaux	1.50
Coffee & small sums	1.50
12. Exhibition	1.00
Cigarette holder	2.00
Cigarettes &c	0.75
Carriage	6.00
Hotel	34.50
Small sums.	1.70
Drew £ 20 -0-0.	
Aug 13. Fees.	1.50
Cab to station	2.50
Luggage	.80
Refreshments.	2.10
Omnibus Montauban	.60
Hotel Diner & bed Montauban	5.50
Fee	.50
Aug 14. ~~Hotel~~ Ticket to St Antonin	4.50
Correspondence & Caylux & back	2.00
Hotel at Caylux & carriage	11.00
Small sums	.50
Ticket to Aurillac	13.70
Dinner	3.00
Aug 15. Hotel Aurillac	8.00
Ticket to Clermont	15.75
Coffee	.80
Book	3.50
Small sums	.50
Aug 16. Hotel	8.00
Ticket to Lyons (2nd)	15.50
Fees &c	1.00
Lunch	1.30
Coffee	1.00
Small sums	1.00
17 Small sums	1.50
Cigarette holder	1.50
Box & bard	1.20
18 Hotel Lyons.	25.75
Fees.	2.00
Baggage to Geneva	2.60
Ticket	15.50
1 meal	3.00

31. Small Sums	2.00
Aug 1. Hotel	42.40
Fees.	2.50
Lunch at Sarbes	3.60
Small Sums. Lounder.	4.00
Aug 2. Hotel	9.00
Omnibus	1.50
Fees	.80
Coach from Perrefit to Cauterets	3.00
Porter	0.50
Knife	4.00
Theatre	3.00
Aug 3 24 Theatre	6.00
Small Sums.	2.00
aug 5. Hotel & Rooms	36.00
Fees	2.50
Coach	2.50
Coach	3.00
Lunch	3.00
Small Sums	1.60
Coffee	.50
Aug. 6. Carriage to Gavarnie	20.00
Horse, trombone & fees	6.80
Coffee & small sums.	1.10
Aug 7. Coach to Barege	2.00
Coffee	.40
Photos & Berrai	6.60
Small Sums	.50
Collection of plants	10.00
Hotel	26.00
Fees.	2.00
Coach to Perrefit	3.00
Lunch	1.50
Small Sums fees &c	3.00
9 Hotel	15.75
Fees	1.50
Omnibus	.75
Small Sums.	1.70
Cigarette holder	1.50
10 Biarritz & back	1.00
Lunch	5.00

22 ~~Jul~~. Hotel Carcassonne	24·00
Fees	1·50
Small sums.	1·40
Rly to Toulouse (2nd)	8·50
Omnibus	·50
23. Small sums	1·40
24. Lunch	2·40
Small sums.	1·[illegible]
Diem £20.	
25. Hotel	34·20
Fees	3·50
Bus &c	2·00
Circular ticket C du Midi	75·00
Lunch	2·00
Small sums	3·00
26-27 Small sums	5·00
28 To Valley ~~[illegible]~~ Lac d'Oo.	57·50
Mules expenses, horse &c.	8·00
Small sums.	0·90
29 Hotel	41·60
Fees	3·50
Omnibus	1·20
Coffee	1·00
Theatre	4·00
Small sums	·30
30 Shoes	·50
Coffee	1·00
book	1·50

Guide book	2.50
Small sums	.55
13 Cab.	8.00
Small sums	1.30
Meter tot	2.00
14 Small sums	.70
15 – Small sums	3.70
16 " "	2.10
15 – Dreyfus	
Stamps	1.00
17 Hotel at Marseilles	80.65
Tips	2.50
Cab.	1.75
Ticket to Nimes (2nd)	11.80
Small sums.	1.30
18 Small sums	1.30
Hotel	12.00
Tips	1.00
Reg to Cette (2nd)	7.30
Meals	[illegible]
Coffee	.50
19. Hotel	8.00
Ticket to Narbonne (2nd)	6.50
Small sums	2.00
Book	1.50
Bus	.80
20 Hotel	10.00
Reg to Carcassonne (2nd)	6.40
Small sums	2.40
21 - Small sums	2.30

4.	Omnibus & small expenses.	2.2
	Fee to Capt of mine	4.0

Cashed note for £10 today 251.25 francs

5.	Tram &c.	.60
	Fees	1.00
	Hotel at St Etienne	34.00
	Ticket to Lyons (2nd)	5.60
	Coffee &c	1.00
6.	Small sums	1.50
	Theatre	2.80
	Small sums. food	2.30
	Guide to Pyrenees	15.00
7	Straw hat	5.[illegible]
	Lunch	2.50
	Cig	.60
	Hair & shave	1.00
8	Lunch	.80
	Cig.	1.50
	Small sums.	[illegible]0
	Omnibus &c	.70
	Guide to Lyons	2.50
9	Lunch	1.70
	Small sums.	1.50
	Aerodyne (as a stand type)	3.00
10.	To St Cyr & return	1.00
	Small sums	1.80
	Lunch	1.50
	Trad grammer	.90
	Packing paper	.70
11	Hotel	64.05
	Fees	4.60
	Ticket to Avignon (2nd)	21.40
	Books &c	1.65
	Lunch	1.00
	Small sums	1.20
12.	Hotel	15.25
	Fees	1.20
	Small sums	1.20
	Ticket to Marseilles	15.00

24	Railway	4.80
	Lunch	2.50
	Guides &c	7.00
25.	Carriage &c to Puy de Dome	8.50
	Coffee cigs.	1.10
26	Omnibus shave, coffee	1.30
	Collection of coats, packing. (Mr. Fielbonk	65.00
27.	Ticket to Pont du Chateau & return (3rd)	1.40
	Lunch & Coffee	1.35
	Omnibus, cig. Coffee &c	1.70
	Hotel bill	66.95
28	Lunch	3.00
	Fees	2.50
	Rly to Le Puy (2nd)	13.65
	Coffee &c	.50
29.	Minor expenses & stamps	3.60
	Ticket to Bourne & return	1.40
	Fees & minor expenses	2.20
July 1.	Carriage, pourboire & fee	11.50
	Coffee	.40
2.	Hotel	43.00
	Fees &c	2.30
	Photos	2.00
	Rly to St Etienne (2nd)	7.80
	Small sums	1.85
3.	Small sums	1.40

	Theatre	3·30
	Pencil	·40
18.	Musee Grevin	1·00
	Lunch	1·80
	Panorama Reichhoffen	1·00
	Concert	1·50
	Envelopes & shoes.	·75
19	Lunch	2·00
	Theatre	3·30
	Coffee	·60
	Draw £20	
20	Slippers	9·00
	Hotel	138·05
	Fees	13 00
	book	1·50
	Ticket to Versailles	2·60
	Cab.	2·50
	Ticket to Nevers (2nd)	23·55
	Lunch	1·00
21	Omnibus Nevers.	1·25
	Pastilles	·20
	Hotel & fees	16·50
	Ticket to Clermont (1st)	20·55
	Fees, coffee &c.	·80
22	Fees	1·50
	Cig. Shave, Coffee	1·40
	Spermaceti Petit-Suisse Spring	1·50
23	Coffee omnibus &c	1·65
	Spermaceti	·50

13. brought fwd

13 Relief Hampstance	1.20
Store	.45
Lunch	2.20
Tour St Jacques	.30
Theatre	3.65
Coffee	.50
Cig	6.00

14 June.

Lunch	2.00
note books	.50
Coffee Chairs &c	.70
Opera glass	30.00
Concert	3.20

15 Omnibus &c. Watches. Store 1.90

Micro for Food Geol. Survey	375.00
Objective for B	35.00
Stamps	1.00
Lunch & fees	2.60
Theatre. coffee	5.70

16. Lunch 2.00

book	2.50
Fees & Omnibus &c	1.40
Theatre	3.50
coffee	.50

17. Omnibus, boat. fees. coffee &c 3.40

Lunch	2.00
Jardin de Acclimatisation	1.00

		f	c
	Soap		65
	Coffee		25
Jun 9	Hotel	14	90
	Fees	2	50
	Difference on ticket to Paris (1st class)	4	00
	Cab & fee paris	3	50
	Theatre	4	40
	Cig		60
	Stamps.	1	50
10	Hair	1	50
	Lunch	1	30
	Sol. of France	5	00
	Envelopes		10
	Omnibus		15
	Paper		40
	Theatre (Vaudeville)	1	50
	Coffee		40
11	Seats at Madeleine		60
	Lunch	2	20
	Catalogue, paper, shoe ss	1	20
	Cigarettes		60
	Postcards		20
	Theatre	3	20
12	Studs	1	20
	Guide Musique	10	00
	Dy guide		40
	Lunch	3	00

June 2. Hat –	5 – 6
Bus. stamps stew	– 8
Purse	1 – 6
Carry for Coupons	30 – 0
Carry Instruments for Geol Survey.	14 – 15 – 0
Passport –	18 – 0
Lunch	1 – 3
Cab	1 – 0
3 Omnibus & Rly	1 – 8
Dinner	2 – 8
Clips for Museum	24 – 0
4 Rly Lonnubes	1 – 10
5 Omnibus &c	1 – 3
Map	2
Sketch books	1 – 4
Dinner	2 – 6
Theatre	3 – 0
6 Omnibus, lunch &c	2 – 3
7 Chiselhurst & return	2 – 6
Omnibus &c	3
8 Hotel bill	2 – 15 – 4
Fees.	4 – 4
Omnibus Rly	8 – 6
Ticket to Paris	2 – 15 – 0
Lunch & fees	2 – 6

Theatre	4 - 3
Sat. Bus	- 4
"	- 6
Ry to Finchley & bk.	1 - 6
Cig.	7 ½
Tuesday. Bus	- 2
Sketch for William	2 - 7 - 0
Lunch	2 - 0
Pamphlet on phenograph	- 6
Maps Geol. of Stamford	2 - 2 - 11
Sketch book	2 - 6
Theatre &c	5 - 0
Wednesday. Bus	- 4
Academy & lunches	4 - 0
Ry & to Crystal palace	2 - 0
Dinner at Crystal palace	2 - 0
Cig.	0 - 6
June 1. Water Colour exhibition	2 - 6
Lunches	1 - 0
Omnibus	- 6
Ry. to Woolwich & back	1 - 2
Tea	1 - 6
Dinner	2 - 9
Parcels. Fathers & B.J.H. to France	4 - 9
Postage. papers &c	0 - 5 -

22 Cab	1 - 0
23. Cabs	3 - 0
Photos. of water	10 - 0
Hotel	30 - 0
Tea	2 - 6
Bus	1 - 0
24 Ry. to Mid Calder	2 - 6
Cig	1 - 6
Store & Bradshaw	1 - 0
25. Servant	2 - 0
Cab.	2 - 0
Porter	0 - 3
Ticket to Sheffield	20 - 6
26 Cab.	6 - 6
Hotel. Sheffield.	11 - 9
Fees	1 - 0
Ticket to London	15 ?
Fees	1 - 2
Cab	2 - 0
Theatre	3 - 0
Post Cards	3½
Photos of Water	13 - 0
Knife	2 - 0
Map of London	1 - 0
Cooks tours	0 - 3
Lunch	0 - 6
Bus	0 - 3

Expenditure.

Passage to Liverpool	$ 79.00

Liverpool

Tea	0 - 2 - 0
Omnibus & ferry	-9
Chesterfield	3 - 6
Cab	1 - 0
Shave	0 - 6
Stg. Case	1 - 6
Flowers	2 - 9
Hotel	
Ticket to Edinburgh	25 - 0
Porter	-3
Ticket Carlisle	2 - 6
Way to Hotel Caledonia	15 - 0
Porter	6
Cabs	2 - 6
Hat	16 - 0