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A U V E R G N E:  
*its Thermo-mineral Springs &c*  
R. C R O S S. M. D.





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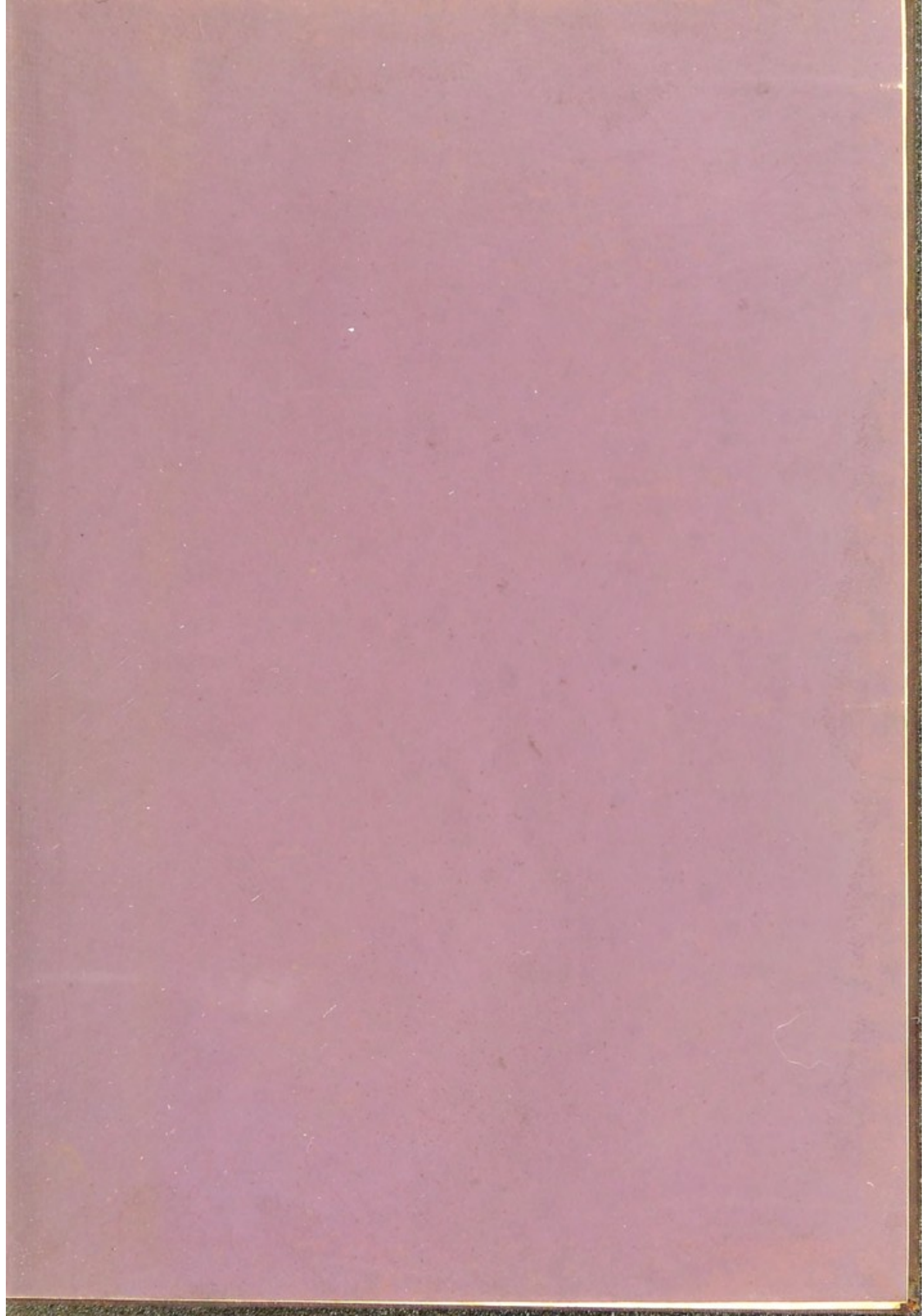
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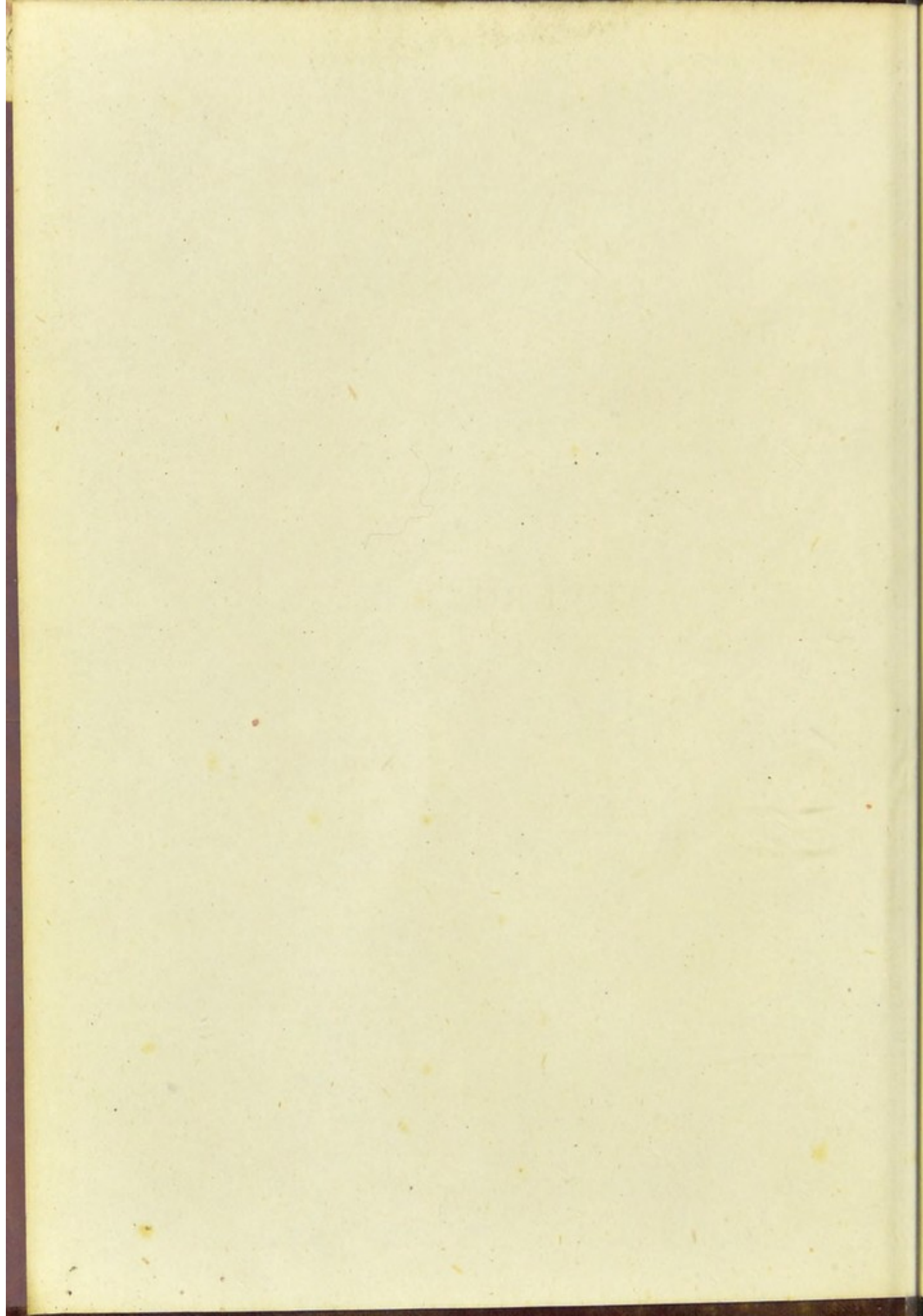
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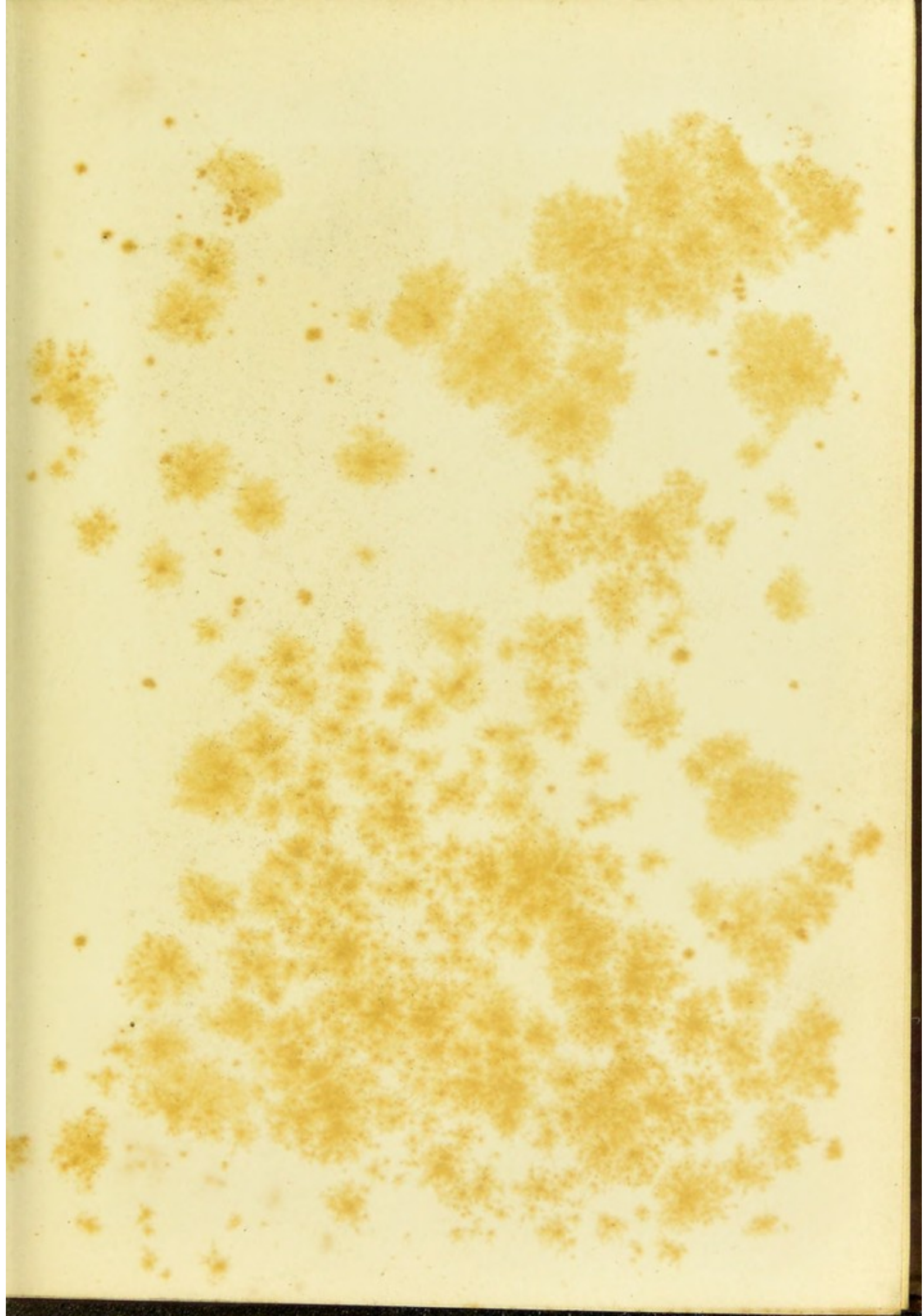




AUVERGNE.



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CLERMONT-FERRAND.









# AUVERGNE :

ITS THERMO-MINERAL SPRINGS, CLIMATE, AND  
SCENERY.

*A Salutary Resort for Invalids.*

BY

ROBERT CROSS, M.D. EDIN. & HEIDEL.

F.R.C.P.ED. & M.R.C.S.E. &c.

AUTHOR OF 'PHYSIOLOGY OF HUMAN NATURE.'

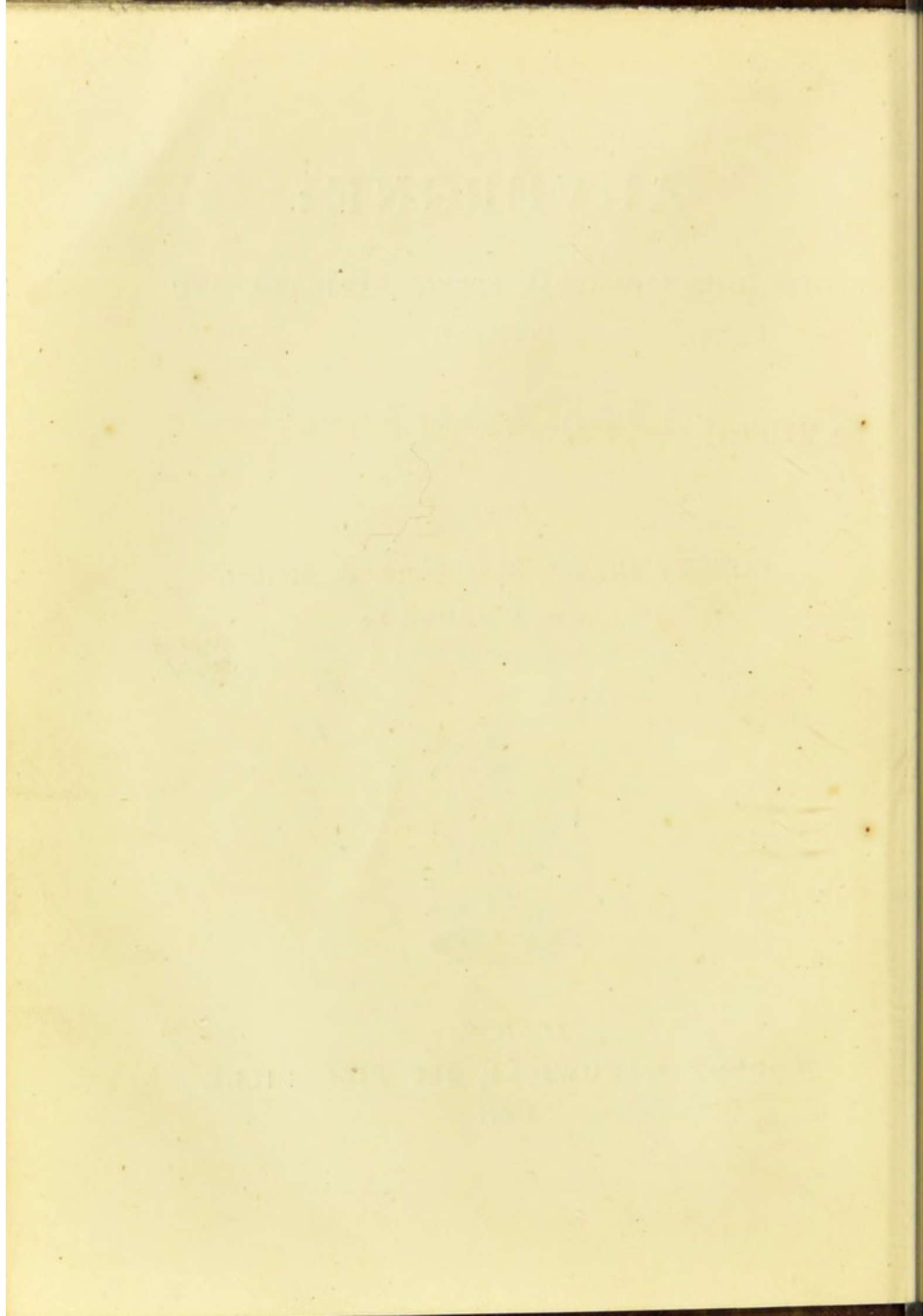


LONDON :

ROBERT HARDWICKE, 192 PICCADILLY.

1867.





TO THE  
MEDICAL PROFESSION OF THE UNITED KINGDOM

THESE PAGES,

THE GATHERINGS OF AN AUTUMNAL HOLIDAY,

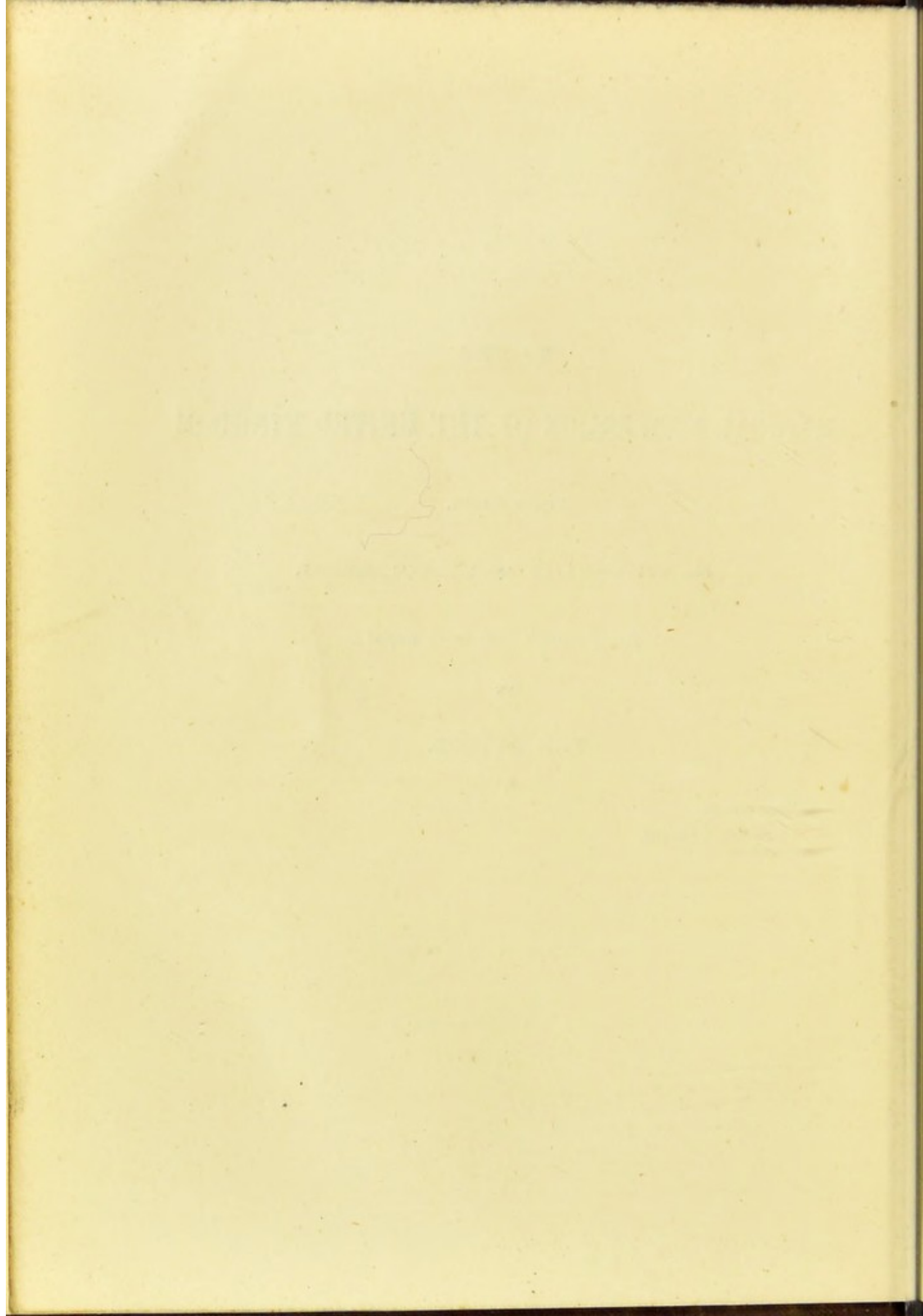
Are Dedicated with much respect

BY

THE AUTHOR.

20 NEW STREET,  
SPRING GARDENS.





## PREFACE.

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AUVERGNE would appear to be little frequented by English visitors, from the fact that the author, on his return to Paris, was unable to pay his fare in sovereigns, even at the important station of Clermont, in consequence of the employé's ignorance of the coin and its value.

Such an indication of limited intercourse would, therefore justify at the outset, a brief preface regarding the geographical position and natural features of the country, in which the mineral springs about to be considered are seated, and serve at the same time as an introduction to the subsequent details of the subject in the body of the work.

The province of Auvergne is situated in the centre



of France, and includes the departments of Puy-de-Dôme and Cantal. An extensive and fertile plain, the Limage d'Auvergne, occupying the site of an ancient lake of vast area, is enclosed, east and west, by a peculiar disposition of the surrounding mountain groups, mostly of volcanic formation, which border the limits of Puy-de-Dôme. Distantly they reach, and become continuous with, the lofty ranges of Cantal.

An imposing chain of these mountains, their highest peaks towering from five to six thousand feet above the level of the sea, extends some sixty miles across a magnificent country, and encloses within its luxuriant valleys, the numerous stations of the thermo-mineral springs of Auvergne.

This vast expanse of scenery, presenting an ever-changing series of landscapes, varying from the grand and wild to the picturesque and verdant; the genial and refreshing air of these several mineral stations, occupying a considerable general elevation, beneath the sheltering eminences which surround them; and the rich and varied mineralisation of



their sources, give to the Auvergne region a pre-eminent position among the Spa districts of Europe.

The advantages of a wide-spread locality, so favoured in climate and so attractive in scenery, to the eye of taste, and the appreciation of an innate sense of the beautiful, appear to the author, from the well-known influence of these natural objects on the moral as well as physical health, to deserve a special notice. Regarded as beneficial auxiliaries to the medicinal treatment of the waters, in themselves supremely efficacious, it does not seem inappropriate to the main subject, to seek to impress upon the mind of the invalid the importance of their salutary aid.

Interspersed, therefore, with the more formal but necessary details of the qualities and properties of the several mineral springs, the author has endeavoured to picture, aided by a few illustrations engraved from sketches, his personal impressions of the scenery through which he passed from one station to another. It is to be understood, however, that it does not at all pretend to be a guide to the various objects of interest lying in the way.



Neither the time at command, nor the intention of the journey, would consistently admit of any such an attempt being made.

For a full description of these rural districts, their ruined edifices, and sites of feudal tradition; and the architectural monuments of the towns, with an itinerary of the route and means to reach them, the visitor is referred to the '*Guide en Auvergne*,' by M. E. M. Thibaud, published at Clermont-Ferrand.

It contains a very complete and entertaining history, ancient, mediæval, and modern, of the province of Auvergne, and is replete with every kind of local, statistical, and archæological information. To the topographical details of this work the author is himself greatly indebted for the acquisition of much interesting knowledge of places and of districts, otherwise unattainable from his limited opportunities of observation and inquiry.

On his tour he had the pleasure of becoming acquainted with the medical inspectors of the more important establishments, from whom he received much attention and useful information. Especially

has he been benefited by the published experience of MM. les Drs. Basset, Pieronnel, and Chaloin. He has also had the advantage of consulting the comprehensive treatise of MM. les Drs. Allard and Boucomont, 'Sur les Eaux Thermo-Minérales d'Auvergne.' To each of these writers he is desirous of acknowledging the obligation he lies under in the use he has made of their valuable observations and researches.





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# AUVERGNE.



## THERMO-MINERAL SOURCES OF PUY-DE-DÔME.

THE HABITS OF THE AGE have undoubtedly had a material influence in determining the type of diseases most commonly affecting the health of the public in their social and business relations.

Fast living, in the most general sense of the term, has of late years been the order of the day. All the civilised community is at full speed, in locomotive and intellectual progression, and in sensational excitement.

A spirit of national rivalry and of individual competition for the foremost positions in the affairs of the world, is taxing the mental and physical powers to the very utmost. Life now to the many is a routine of hard head-work, protracted toil, and



gas-light labour ; of close sedentary employment, and anxious speculative adventure ; of wearisome endeavours at ingenuity in the production of literary novelties, and after new discoveries and inventions in science and arts. These efforts directed in a great measure to the dominant object of making haste to be rich, or to be exalted in station, are producing the inevitable consequences of intemperate action on the moral, emotional, and organic economy of the human system.

Certain it is that the mental and moral, no less than the physical attributes of humanity, are governed by laws of a beneficent provision, which cannot in either case be violated with impunity. It is a well-known physiological fact, that an indifference to the sanitary laws instituted for the preservation of bodily health, entails the liability of physical disease ; and it is equally true that a disregard of the moral laws, divinely appointed, and of still higher obligation on mankind, as commonly leads to an aberration of mental and moral health.

It is not remarkable, therefore, that of the host so hotly engaged in this eager battle of life, the few only are its victors, the many are much more surely



its victims. Rare is the organisation which can long bear the wear and tear of such a vital contest ; numerous indeed are they who break down in the struggle. The brain and nerve centres, and the organs of vital force, subjected to this excessive and continuous over-action, become exhausted in their powers and embarrassed in their operations. Sooner or later, derangements of the cerebral, nervous, and digestive functions are induced, first warnings of impending mischief, which, if not attended to and relieved, are liable to proceed from functional disorder to structural disease, and end in confirmed and frequently incurable lesions of the implicated organs.

As might have been expected, there has been of late years an immense increase of disorders originating from these causes. Dyspepsia, in its varied forms, producing a vitiated chemistry of the secretions, and consequent mal-assimilation of food, and anemic condition of the blood, not unfrequently terminating in established cachexia. The generation of gouty elements in the system. Neuralgia, especially cranial, from debility and irritability of nerve force. Cerebral excitement threatening insanity ; or the disorganisation of brain substance tending to paralysis,



are in truth among the but too common results of these morbid influences in prevalent operation.

It is always difficult, and often impossible, to deal with diseases in the midst of, and while yet subject to, the influence of their exciting causes. Hence it has been found absolutely necessary, under such circumstances, to prescribe a change of air and scene, of sufficient duration to restore the impaired vital functions to their full tone and healthy action.

In aid of this object, nature has bountifully provided, both on her surface and beneath her soil, a rich variety of salutary resources.

The sea beach and the mountain side are such well known and appreciated restoratives, that they are commonly had recourse to by all who feel the need of change and rest, and can obtain them. In cases of simple debility and loss of appetite, a moderate sojourn at one or the other of them, will generally send the visitor back to his occupation completely refreshed and invigorated.

Where, however, the sequelæ of diseases remain to be dealt with, it would mostly be found desirable to add to change of air and rest, the advantages of a course of mineral waters. And here the difficulty is



not to find a suitable place of resort, but to make choice of the most available among the many of established celebrity, the furthest distant being, in these days of easy and rapid transit, within reach of even the invalid traveller. This very profusion of sanitary means, however, implies the necessity of a qualified judgment to determine their exact applicability to the morbid conditions they are intended to relieve. It is, indeed, as much the part of the physician, to advise his patients on the use and preference of these natural medicaments, as it is to prescribe for them in the ordinary way. They are, in fact, simply a supplementary means of treatment, and need to be administered according to the same therapeutic principles.

The curative properties of mineral springs have been long known, and their employment dates from a very ancient period. The excavation from time to time of the remains of Roman bathing establishments, on the site of still existing thermo-mineral sources, incontestably proves that this highly civilised people were well acquainted with, and accustomed to the use of medicinal springs. But modern discoveries in physiology, animal chemistry, and minute pathology,



have determined, in a more special manner, the kind, mode, and object of their employment; and have enabled the physician of the present day to advise them with much greater certainty of a beneficial effect.

For this purpose it is not only necessary to take into consideration the constitutional derangements, but also the temperament, habits, pursuits, and even tastes of the patients.

A due regard, equally for the moral as for the physical idiosyncrasy of the invalid, ought invariably to be exercised in the selection of any proposed mineral station; otherwise, however efficacious and even applicable its medicinal properties may be, its expected advantages would be liable to be frustrated. In short, its general local advantages, as well as its medicated means, should be adapted no less to the individual than to the disease, to render the course of treatment as effective as possible.

The people of this country are accustomed, from their childhood, to out-door exercise, and to be active, and even adventurous in their habits of recreation; and this too is more or less a governing influence in the invalids' search after health. For them, therefore, the invigorating air, picturesque



scenery, and other local advantages of a mountain district, possess a peculiar attraction, and wherever the means of gratifying these instinctive preferences can be combined with the benefits of an appropriate mineral treatment, there they are naturally disposed to go.

On this account, it is satisfactory to be able to direct attention to the thermo-mineral springs of Auvergne. While it is almost a 'terra incognita' to the health-seeking British public, the various and peculiar sources of its mineral spas, possess an importance as medicinal agents of a rare and very extensive character. The remedial means of the Auvergne springs are, in fact, more varied than those of any other known hydro-mineral district, not even excepting the Pyrenees. It contains within its area a series of sources unequalled in the range of their therapeutic properties, being adapted indeed to almost every form of disease, for which a course of mineral treatment is commonly prescribed.

In addition, moreover, to these prolific medicinal resources, there are certain moral and physical advantages, peculiar to the grand and picturesque expanse of country over which they are dispersed.



It is the unhappy condition of the great majority of invalid visitors to the various bathing establishments, not only to be labouring under some actual chronic or latent disorder of the digestive, excretory, or nervous functions, but, as a consequence, to be the victim of depressed vital energy, affecting to a distressing degree the spirits, and inducing in many instances, a state of complete hypochondriasis. To such persons, freed for a time from the predisposing influences of a protracted season of town life, close confinement to business, or over-taxed mental energies, there is a peculiar advantage in the calm and quiet residence to be enjoyed at one or other of the Auvergne mineral stations. All are situated in valleys of the most charming beauty, under the shadow of lofty mountain scenery, verdant nearly to the summit, and amidst the breezes of an atmosphere pure and vivifying almost beyond comparison. They afford also facilities for exercise of every kind. Under these combined influences, both the moral and physical powers are recruited, and the patients are placed in the most favourable condition possible, to benefit by the medicinal effects of the mineral treatment prescribed for them.



The value of the thermo-mineral system of treatment, in certain chronic forms of disease, is not perhaps sufficiently appreciated by the medical world generally. And yet it is a fact, that these medicated waters possess the same therapeutic properties as those of their kind furnished from the pharmaceutical dispensary, and in a higher degree of admixture and efficiency. From the nature of their combination, by heat and pressure, within the subterranean laboratory of their formation; they are endowed with a constitution which no artificial synthesis can perfectly imitate. They may, indeed, so to speak, be termed native and living medicaments, springing forth as they do, ardent and sparkling from the bosom of nature, ready prepared by a process of never-ceasing, never-failing assimilation, and supremely impregnated with the elements of their particular medicinal virtues.

The district of Auvergne, and particularly the department of Puy-de-Dôme, is beyond dispute one of the richest known in thermo-mineral springs. According to Dr. Nivet, whose inquiries into the waters of Auvergne have been most extensive and minute, there are not less than 229 sources scattered over 52 different communes. All these springs, except



those of Puy-de-la-Poix—a source the most highly charged with sulphurous elements in the world—belong to the class of the alkaline mixed chloro-carbonated gaseous waters. But by their varied mineralisation, they furnish all the chemical shades between the free bicarbonates, and the soda chlorides.

It is not necessary here to specify all these numerous sources, varying only as they do in intensity of temperature, and in the relative quantities of their chemical qualities. It is, indeed, sufficient to mention, as eminent types of the entire series, the more important sources, namely, those of Royat, Bourbon-le, Mont-Dore, St-Nectaire, St-Marguérite, Me-daigne, Châtelguyon, and Châteauneuf.

The department of Cantal is scarcely less rich in its mineral springs than that of the Puy-de-Dôme.

These also have been examined by Dr. Nivet, who has published his researches on the subject. He speaks of 103 different sources, belonging to the same hydro-mineral class as those of the Puy-de-Dôme, with the like varieties of chemical composition.

The waters of both departments, though analogous in their general characteristics, have yet according to the predominance of one or other of their chemi-



cal principles, their degree of temperature, their amount of carbonic acid gas, and the altitude of their locality, special differences in their therapeutic action, requiring an equally special direction in the use of their administration.

The presence of arsenic in considerable amount, and of chloride of sodium, in the waters of Bourboule, constitutes them a kind of specific in scrofulous and skin diseases, and in intermittent fevers.

The springs of Mont-Dore, possessing similar medicinal properties, but in a diminished degree, especially as regards the arsenical element, are available for the same class of diseases, but suitable for constitutions and temperaments of a less robust and more impressible character.

This is still more to be observed in the waters of St-Nectaire and St-Marguérite. Mineralised with the like ingredients, but in still smaller quantities, they offer the same special advantages to patients endowed with an organisation of a more highly irritable nature; whilst by their exalted temperature, they are in their effect admirably adapted for the treatment of muscular and chronic articular rheumatism.



The springs of Royat and Châteauneuf, having a lower temperature, as well as weaker force of mineralisation, excepting in the amount of bicarbonate of soda, possess a speciality no less beneficial in the treatment of neuralgia, rheumatism, gout, disorders of the digestive and genito-urinary organs, chlorosis and other kindred diseases.

There is, moreover, a more or less amount of iron in all these springs, which effectually counteracts any debilitating effect of temperature and alkaline influence.

Whilst, then, the chemical combinations inherent in some of these sources of Auvergne, present specialities peculiar to themselves, and offer particular advantages by their efficacy in certain obstinate chronic affections; others by the analogy of their constitution to the neighbouring waters of Vichy, and to those of Ems, and similar German springs, possess a no less reliable and deserving reputation as remedial agents, in the cure of that class of diseases for which those spas are justly celebrated.

## CLERMONT-FERRAND AND ITS NEIGHBOURHOOD.

BEFORE entering on a more minute description of the most important thermo-mineral sources of Auvergne, and their system of administration; it would not be out of place to give some account of the general characteristics of the country, which possesses not only a special provision for the invalid, but also a singular attraction for visitors of every kind of taste, whether scientific or artistic.

The province of Auvergne is situated in the centre of France, along the line of the Paris, Lyons, and Marseilles Railway. A ten hours' journey from Paris by express will bring the traveller to Clermont-Ferrand, the principal town of the department, and a starting point from whence the various mineral stations are commodiously accessible.

The railway route towards Auvergne passes



through a broad, well-wooded, and extremely fertile plain. For some considerable distance however, before arriving at Clermont, the horizon on either side is bounded by lofty mountain ranges. Seen in the early dawn, about which time the night service brings the traveller into their neighbourhood—their summits gilded by the rays of the rising sun, and their slopes glowing with every variety of tint, from roseate to deep purple hue, they picture a landscape the charm of which it is impossible to describe.

By degrees the line approaches the mountain mass on the right, and presently, passing round the shoulder of an eminence studded with residences, glides into the station of Clermont, situated at its foot; the lofty Puy-de-Dôme, here the culminating point of the range, forming an imposing object in the distant background.

Clermont-Ferrand is a place of considerable size, with a large population. It presents the ordinary appearance of an old French town, partly modernised by more recent erections, with, however, certain very interesting and unique features impressed upon it, by the ancient architectural remains to be noticed



in several of its public buildings, churches, and houses.

Clermont in fact has been respectively the capital of Gallic, Roman, and French Auvergne.

It is more than probable that the *Νεμοσσὸς* of Strabo was the Gallic town inhabited in the quiet times of that period, and Gergovie the fortress of refuge during the times of the first wars. The name of Augusto-Nemetum was given to it by its Roman conquerors. Sidonius Apollinaris, however, called it *Urbs Arverna*, and Gregory of Tours, *Urbs Arverna Arvernorum*. In the middle ages it was known by the name of *Claromons Claromontium*, probably derived from the vivid picture presented from the mamelon or mount of the ancient fortress of the neighbouring village of Ferrand, which being now united, constitute the present Clermont-Ferrand.

The capital of both Higher and Lower Auvergne, Clermont was until 1790 the residence of intendants, and the centre of a vast administration. It then became a simple chief place of prefecture. Notwithstanding this loss of rank, it still retains almost all the importance of the olden provincial metropolis. Its situation, the rich produce of its surrounding hills



and valleys, in corn, cattle, and fruit, of which it is the natural emporium ; its highways of communication with all parts of the country, and its railway traffic, make it still a busy focus of commerce and of transit. The principal military station of the district, the seat of a bishopric, and site of a university, Clermont continues to maintain its influence over the entire department.\*

Seen from the east, Clermont presents the aspect of a magnificent panorama, of which the town is the centre ; the hills constituting the first of the series of ridges which terminate in the dominating Mont Puy-de-Dôme, sweep a semi-circle some fifteen or eighteen miles in range. Around about the city a luxuriant vegetation forms as it were a verdant framework to the enclosed buildings, their flat roofs and round red tiles giving it the appearance of an Italian town.

In this view the pavilion dome of the college, the Roman tower of Notre Dame de Port, the Gothic form of the church des Carmes, and, above all, from its loftier site, the summit of the cathedral, break the monotony of the general mass of edifices.

\* M. Thibaud's *Guide en Auvergne*.



The omnibuses and other vehicles which await the arrival of the trains, bring the traveller to the Place de Jaude, where are situated the principal hotels, and from whence depart the various public conveyances to every destination in the provinces. It is an extensive open square, and serves the purpose of a Champ de Mars for the military. On it is erected a bronze statue of General Dessaix.

The principal objects of interest are the cathedral and churches; the Academy of science, belles lettres, and arts; the Cercles (clubs) du Commerce, du Barreau, and d'Agricole, all of which are open to strangers by the introduction of members. The Hôtel Dieu and the preparatory school of medicine; the école public de littérature et de science; and the école communale professionnelle of drawing, music, sculpture, mathematics, and mechanics. A library, containing 50,000 volumes, open to the public daily; a museum of pictures, antiquities, and objects of art; a collection of natural history and mineralogy; and an extensive and well-arranged botanical garden.\*

\* M. Thibaud's *Guide en Auvergne*.



The archæologist will find in Clermont, as well as in the neighbouring village of Mont-Ferrand and elsewhere, many very interesting remains of the Roman, Averno-Roman, and middle-age styles of architecture, represented not only in the churches, but also in some of the ancient residences, still standing and in a good state of preservation.

In the provinces, especially in Guienne au Limousin and de l'Augoumois, the Byzantine form of ecclesiastical architecture is not uncommon; while the church of St. Front de Perigneaux is constructed after the plan of St. Mark at Venice.

At the village of St. George, near to the town of Billom, a few miles to the east of Clermont, and in the vicinity of the river Allier, there is a church built in the style of the fourteenth century, over the porch of which is a representation of St. George and the Dragon; according to local tradition, this church was erected by the English at the time they held possessions in Auvergne. This architectural relic of the patron saint of England, and the name still retained by the village, certainly seems to favour this interpretation, and would naturally be an object of attraction to visitors from this country. The history of Auvergne, indeed, during the middle ages, neces-



sarily possesses an interest for the British traveller. During the twelfth century, Henry Plantagenet (Henry II. of England) having married Eleanor of Guienne in 1184, became at once King of England, Duke of Normandy and Aquitaine, Count of Anjou and Poitou, Touraine, and Maine; and the consequence of this succession was the subsequent wars of Edward III. of England with France. It is a curious circumstance, moreover, that the English rule in Auvergne has left its impression, even up to the present day. A mountain village still bears the name of the Crest, and the patois of its inhabitants contains many words of English origin.

Scientific visitors will meet with ample enjoyment. To such as have a taste for botany, it may be mentioned that Auvergne possesses many rare specimens. Its flora is rich and various, consisting of about two thousand species of plants, comprising five hundred distinct genera, and affords a wide field for the study of that interesting science.

For the geologist it is replete with interest. The ancient province of Auvergne is now represented in a great measure, though not entirely, by the two departments of Cantal and Puy-de-Dôme. Its moun-



tain ranges stretch first in a north-westerly direction from Mont-Lozère, under the name of Montagnes de la Margeride, for about fifty-five miles, and then directly north through the departments of Cantal and Puy-de-Dôme, sending off from their most elevated points a lesser and gradually subsiding chain westward, which separates the basin of the Loire from that of the Garonne. The highest range traverses the district of Puy-de-Dôme, and is sixty-five miles long from north to south.

The most lofty of these summits are the Puy-de-Sancy, a peak of Mont-Dore, Mont-Cantal, and Mont Puy-de-Dôme, elevated respectively 6,246, 6,118, and 4,806 feet above the level of the sea.

The general effect of this mountain scenery is of a wild grandeur, particularly imposing from its contrast with the adjoining plains outside its slopes, though most of the rocky ridges overhanging the valleys are well wooded, and almost everywhere it is green and fertile, some of its loftiest eminences, indeed, being covered with verdure to the very top. The entire area contains the most remarkable and extensive group of extinct volcanoes to be found in Europe, or even perhaps in the world.



There are no less than twenty-two craters in a more or less perfect state of preservation. In some the lava streams are as distinctly marked as if they had been newly cooled. Whatever may have been the period when these volcanic fires were active, it is plainly evident that their eruptions passed through a granite formation, surmounted by tertiary strata, and consisted principally of trachyte, basalt, and tufa. The highest point of the Cantal group, the Plomb de Cantal, is formed of a mass of basalt. The Monts-Dore constitute another somewhat circular system of volcanic mountains, about four leagues in diameter, their loftiest summit, the Puy-de-Sancy, being the most elevated spot in central France. The trachytic rocks here occupy the central and largest portions of the mass, being only skirted around with basalt.

The greater number of the more modern volcanoes are to be found within a moderate distance of the town of Clermont. Though for the most part these craters exhibit different degrees of preservation as regards lava currents, accumulations of cinders, ashes, and ejected portions of pre-existing rocks; there are some in which there has been a modification of the



usual effects of volcanic action, and show but imperfect traces of lava and other products. Of these, one of the most remarkable is the Puy-de-Dôme, which is formed of a light grey rock, containing fragments of granite and porphyritic trachyte.

The remains of animals so placed, that they must have been entombed in the situation where they are now found when the Auvergne volcanoes were in activity, would from the kind of remains discovered, indicate that these eruptions have most probably been continued up to a late period of the supra-cretaceous epoch.\*

The craters of Auvergne therefore represent two distinct volcanic periods; an ancient and a more modern era of action as indicated by their igneous products. The older is characterised by basaltic, trachyte, and tufa remains; the more recent by those of lava and scories. The Puy-de-Pariou, near to Mont Puy-de-Dôme, exhibits one of the best preserved craters in Europe. It has a depth of 93 metres, about 100 yards; and a diameter of 310 metres, upwards of 330 yards. The crater of Mont-

\* MM. Croizet and Joubert.—*Cyclopedia of Useful Knowledge.*



Gravenoir, still nearer to Clermont, close in fact to Royat, of a lower altitude, and consequently more easily attained, is yet of considerable interest, presenting masses of scories of the most grotesque forms. Travellers who have visited Vesuvius regard this crater as conveying a good idea of the condition of that volcano in the intervals of its eruptions.

A natural phenomenon, similar to that of the Grotto del Cano, near Naples, is to be found in many of the grottoes formed by the lava currents from the volcano of Gravenoir. Through numerous fissures in these caverns there is a constant issue of carbonic acid gas, in such abundance, indeed, as to produce a very decided giddiness upon persons remaining under its influence for any length of time. Birds and other animals seeking refuge within these caves in stormy weather, become at once asphyxiated, and are almost immediately destroyed. It is on the borders of these lava beds that the thermal springs of St-Mart, at Royat, are situated. They receive, indeed, from this same source, a supply of carbonic acid gas, which constitutes a part of their speciality; and they have utilised this gaseous element, and



employed it with a very beneficial effect in the treatment of particular diseases.

The physical characteristics of the country have already been alluded to in a general way. It remains to be mentioned, however, that Auvergne is not wanting in the usual picturesque objects, which contribute to complete the charming effect of highland scenery. Embosomed amongst the mountains, between Mont Puy-de-Dôme and Mont-Dore, there are no less than ten lakes of larger or smaller size; and the rivulets from these sources, rushing along their rocky and frequently precipitous beds, form waterfalls in various parts of their course, often of not inconsiderable altitude, and always of wild beauty.

These several mountain streams, according to their locality and direction, give origin to the rivers le Dore, la Darolle, l'Allagnon, les trois Couzes, and la Sioule, all of which empty themselves into the Allier, the principal river of the country, and one of considerable navigable importance—which in its turn, after traversing an extensive plain for upwards of 350 miles, pours itself into the Loire near Grevers. The Dordogne, which arises on the slopes

of Mont-Dore, after receiving many tributaries, swells into a river of some importance, and eventually empties itself into the Garonne near Bordeaux.

For the information of visitors who have a taste for fishing and shooting, and whose state of health will admit of indulging in these sports, it may be mentioned that coursing the valleys of the several mineral stations, are mountain rivulets which contain a rich supply of trout and other fish ; while the neighbouring heights and country around are not deficient in game. It may not be unimportant to add, that everywhere the cuisine is good and well furnished with all the usual necessities of the table.



## ROYAT.

THE word Thermal, commonly occurring in the course of the work, is derived from the Greek θερμός, signifying hot. It was adopted into the Latin tongue by the expression thermæ.

Amongst the Romans the thermæ and the balnea were regarded as distinct from each other. The balneum was the simple bath, prepared in the usual way, and employed for ordinary purposes. The thermæ were a particular means of administering heat humid or dry, and were less commonly used. They were had recourse to as a luxury, rather than as now for medical purposes, and wherever the natural thermæ could be had they were taken advantage of.

These remarks seem desirable in explanation of a term little used in English phraseology.



Wherever the victorious arms of the Romans carried their conquests and established their rule, there they introduced and exercised those higher habits of civilisation which so pre-eminently distinguished them in their day. Among these the use of the bath, in the two-fold sense alluded to, was commonly practised ; and hence it is that the remains of bathing establishments are so frequently discovered in the excavations of old Roman sites.

It was to be expected, then, that the natural riches of Auvergne in thermo-mineral springs, would not escape the penetration of a people so well acquainted with their use, and so practical in their application of them. It is probable therefore that these springs were very commonly employed by them wherever they were discovered in convenient proximity to the principal military stations ; though the surface evidence of their occupation has been obliterated by the devastating hands of the Visigoths, who, in succession to the Romans, overran the country and ruthlessly destroyed all such objects of luxury, the use of which they, in their rude nature, utterly contemned.

Pentenger, indeed, an authority in the reign of



Honorius, makes mention especially of three establishments under the names of Augusto-Nemetum (Clermont), Aquæ Calidæ, and Aquæ Neris.

The remains of the first at Royat, and, as supposed by Dr. Bertrand, of the last at Mont-Dore, have been exposed, and their ancient sources made available for modern use.

The springs here called Augusto-Nemetum, the Roman name of Clermont, would naturally suggest that they had their source in the immediate neighbourhood of that city. It is highly probable therefore that the Bains de César, standing on the site formerly known as the Granier de César, at Royat; a small town about a mile and a half from Clermont, with other Roman remains, excavated there in 1822, together represent the ancient establishment of this name.

These springs are situated in the valley of St-Mart, at the entrance of the gorge of Royat, which is here surmounted on the right by the hill of Chateix, almost entirely covered with vines, and on the left by the celebrated lava rocks of Gravenoir. Higher up it is narrowed by the little river Tiretaine,



and by chesnut woods and other foliage, skirted by lofty eminences on either side, between which lies the town, and elevated on a basaltic rock rises the tower of an ancient fortification, now converted into a church.

At the further extremity of the gorge commences the ascent of those more distant crater hills, which overtop each other till they terminate in the lofty peak of Puy-de-Dôme.

It is difficult to conceive anything more charming than the vicinity of Royat, both for its animated loveliness and its primeval grandeur.

Objects strangely contrasting with each other in their features, yet all of exceeding interest, unite together to diversify the picture, and link the present with the intermediate and the far remote past. These ruins of art, the relics of Roman luxury, lately disintombed, and now devoted to modern purposes, are dominated by the still more imposing ruins of nature, the dilapidated debris of bygone volcanic ages ; while out of the dead and scattered ashes of their long extinguished fires, has sprung up a living vegetation, clinging with fertile profusion to



the sides, and creeping into the sinuosities of their over-lapping lava beds.

Under a sunny sky, the verdant slopes and scoriated eminences of these igneous mountains; the white-walled and red-roofed buildings of the little town itself, seen through the shady groves and thickets of variegated foliage, filling the depths and lining the ascents of the pent-up glen; the terraces of over-hanging vines, and the murmuring rivulet rushing within its rocky boundaries through their midst: constitute a scene, not only varied and rare, but singularly impressive, from its associations with these stony records of ancient physical convulsions, and the reminiscences of a remarkable historical period and people.

Seated on the hill of Chateix, and turning on the one side to this graphic picture of past events, and on the other to the far stretching plain below, with Clermont lying almost immediately beneath, pregnant with busy life and active civilisation; there is suggested to the mind a mingled subject for contemplation, which it is worth while to travel all the distance to realise.

The close proximity to Royat of the town of Clermont, replete with all things needful for the visitor, is a great convenience. It is only right to mention, however, that there are several good hotels at Royat, and that it is proposed to erect others, and to raise a large and commodious building for public amusements. It is also intended to convert a piece of rising ground, commanding a noble view, into an extensive terrace, and to carry out various other improvements of an ornamental kind. In this case the place, in addition to its natural advantages, will offer every necessary means of accommodation and recreation, for all who may prefer to reside on the spot during the bathing season.



## THERMO-MINERAL SPRINGS OF ROYAT.

ACCORDING to the researches of M. Lecoq, the waters of Auvergne, excepting those of Puy-de-la-Poix, have certain generic properties in common, and others which are peculiar and constitute differences between them: their volume and temperature seeming constant, and each containing in solution materials saline and gaseous, and a substance which appears to belong to the organic kingdom.

When these waters arrive at the surface of the soil, they are limpid and transparent, and at their exit hold in perfect solution their mineral principles, whilst almost all emit a considerable amount of carbonic acid gas.

Soon afterwards, however, in their course, they throw down a more or less abundant deposit, consisting principally of subcarbonate of lime, oxide of

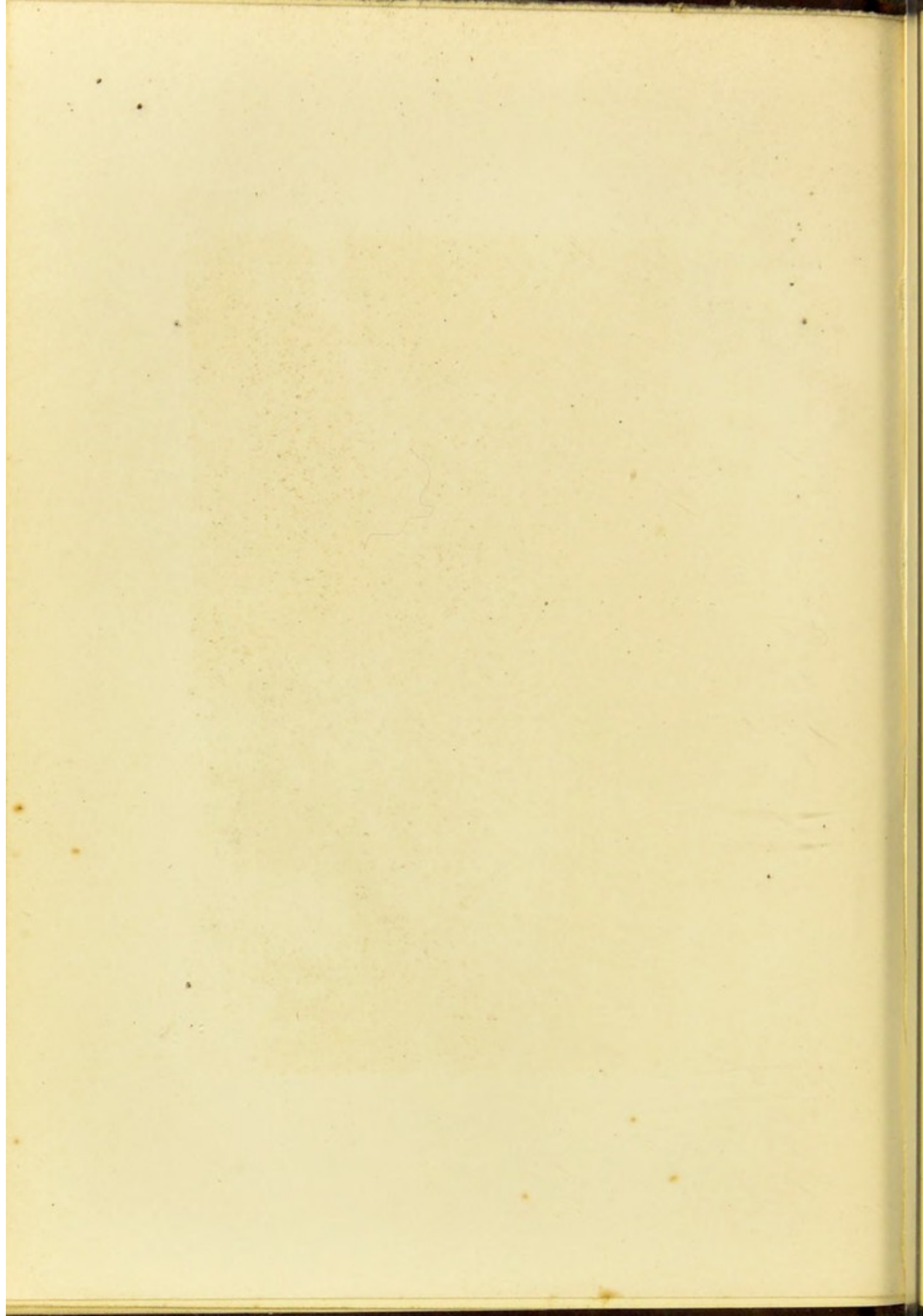




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ROYAT





iron, carbonate of magnesia, and a peculiar organic matter.

The exact nature of this organic material has hitherto escaped analysis, although to it is attributed, by M. Lecoq, an important part of the hygienic action of these thermal springs. The reports of several of these mineral establishments make mention of this organic element, which is transformed into a sort of mucus of a greenish tinge. Its action is said to produce a remarkable suppleness of the skin, and an augmentation of vital force, never experienced in ordinary baths. It is another interesting fact that they possess also a well ascertained electric condition.

Dr. Allard states that from experiments made in his presence by M. Brion, of Dijon, they were proved to be endowed in a high degree with the properties of negative electricity. In addition, therefore, to their general qualities they may also be regarded as electric baths.

These waters are all perfectly limpid, colourless, inodorous, of an acid taste, slightly alkaline and ferruginous, and of a very agreeable flavour. They



mark their passage on the soil by an abundant deposit of hydrated sesquioxide of iron mixed with the sulphate, of carbonate and phosphate of lime, and of arsenite of iron.

The temperature varies from  $20^{\circ}$  to  $35^{\circ}$  Centigrade, about  $68^{\circ}$  to  $95^{\circ}$  Fahrenheit.

The presence of iodine noticed in the waters of Royat, has lately again been demonstrated by M. Gonod fils, of Clermont; while that of arsenic, which was first pointed out by M. Chevalier, has since been confirmed by Baron Thénard. Operating indeed on the ferruginous deposits left upon the soil, the most decided indications of this metal may be readily obtained.

The most recent examination of the waters of Royat was made by M. Lefort. It is published in the *Études chimiques sur les Eaux minérales et thermales de Royat et de Chamalières*, and is adopted by Dr. Allard in his *Précis sur Royat*.

All these waters had been previously analysed, namely, in 1844–1845, by M. Nivet, with similar results as to their chemical and physical properties. M. Lefort gives the following table of the residuum

of each, in a litre of the waters. A litre is a pint and three quarters English measure.

						Grammes
Waters of the station	Royat	.	.	.	.	4.152
"	"	S. Mart	.	.	.	1.952
"	"	des Roches	.	.	.	2.760
"	"	de César	.	.	.	2.344

A gramme is a little over fifteen grains English weight.

The relative proportions of these several properties, compared with each other, and with those of Vichy and Ems, are set forth in the following tables. It is necessary to mention that the latter are stated in English grains, and by Fahrenheit's thermometer, which gives them a much higher figure.



1. *Table of the density, temperature, and substances contained in a litre of the several sources of Royat.*

	Royat	Cæsar	S. Mart	Les Roches
Density . . . . .	1.0025	1.0016	1.0020	1.0022
Temperature . . . .	35.5° C.	29.° C.	31.° C.	19.° C.
Azote . . . . .	5.2	3.8	2.2	2.8
Oxygen . . . . .	1.1	0.9	0.8	0.4
Chlorine . . . . .	1.050	1.466	1.022	1.708
Bromine and iodine .	indications	indications	indications	indications
Carbonic acid . . . .	2.974	2.294	2.491	2.920
Sulphuric acid . . . .	0.107	0.065	0.092	0.069
Phosphoric acid . . .	0.010	0.008	0.004	0.003
Potassa . . . . .	0.225	0.148	0.161	0.189
Soda . . . . .	1.185	0.572	0.689	0.909
Lime . . . . .	0.392	0.267	0.320	0.372
Magnesia . . . . .	0.204	0.127	0.164	0.192
Alumen . . . . .	traces	traces	traces	traces
Silica . . . . .	0.156	0.167	0.089	0.102
Protoxide of iron . .	0.020	0.009	0.018	0.018
Oxide of manganese .	traces	traces	traces	traces
Arsenic . . . . .	indications	indications	indications	indications
Organic matter . . .	indications	indications	indications	indications

2. *Synoptic table of the several anhydrous saline combinations attributed to a litre of the waters of Royat.*

	Royat	Cæsar	S. Mart	Les Roches
Free Carbonic } litres	0.377	0.620	0.532	0.831
acid: } grms.	0.784	1.229	1.050	1.646
Carbonate of soda . .	1.349	0.392	0.421	0.428
„ potash . . . . .	0.435	0.286	0.365	0.312
„ magnesia . . . . .	0.677	0.397	0.611	0.514
„ lime . . . . .	1.000	0.686	0.953	1.822
„ iron . . . . .	0.040	0.025	0.042	0.042
„ manganese . . . . .	traces	traces	traces	traces
Sulphate of soda . . .	0.185	0.115	0.163	0.123
Phosphate of soda . .	0.018	0.014	0.007	0.005
Arsenite of soda . . .	traces	traces	traces	traces
Iodide and bromide of sodium . . . .	indications	indications	indications	indications

Table 2—*continued.*

	Royat	Caesar	S. Mart	Les Roches
Silica . . . . .	0·156	0·167	0·102	0·089
Alumen . . . . .	traces	traces	traces	traces
Organic matter . . . . .	indications	indications	indications	indications
Weight of anhydrous saline combinations, the salts being in a state of bicarbonates	5·724	4·067	5·396	5·140
Weight of anhydrous combinations found by experiment, the salts being in a state of neutral carbonates	5·152	2·346	3·952	2·760

3. *Table of grains of anhydrous ingredients, in a pound troy of the waters of Vichy and Ems.*

	Vichy, Grand Grille	Ems
Temperature . . . . .	107° Fahr.	84–107°
Carbonic acid gas in 100 cubic inches . . . . .	97·	51·
Carbonate of soda . . . . .	21·9058	8·065
"    ammonia . . . . .	0·0277	—
"    lithia . . . . .	—	0·0405
"    baryta . . . . .	—	0·0022
"    strontia . . . . .	0·1134	0·00080
"    lime . . . . .	1·444	0·8556
"    magnesia . . . . .	0·2036	0·5918
Protoxide of iron . . . . .	0·0072	0·0120
Subphosphate of lime . . . . .	0·0026	—
"    magnesia . . . . .	0·0189	—
"    alumina . . . . .	—	0·0014
Sulphate of potash . . . . .	1·1760	0·4050
"    soda . . . . .	0·6780	—
Chloride of potassium . . . . .	—	0·0388
"    sodium . . . . .	3·3338	5·7256
Bromide of sodium . . . . .	0·0007	—
Iodide of sodium . . . . .	0·0002	—
Fluoride of calcium . . . . .	—	0·0014
Alumen . . . . .	0·0049	—
Silica . . . . .	0·3696	0·3104



These latter analyses were made by M. Struve.

In conjunction with these analytical tables, it will be well to add that of the sulphurous springs of Puy-de-la-Poix, situated in the commune of Clermont, though close to Royat.

In 1844, M. Nivet examined this source and found a residue of 82·67 grammes in a litre of the water.

The same measure contains—

	In Grammes	In Litres
Carbonic acid . . . . .	1·5140	0·7648
Hydrosulphuric acid . . . . .	0·0166	0·0107
Oxygen and nitrogen . . . . .	—	0·0500

The following is a detailed table of its several ingredients in a litre of the water :—

Carbonate of soda . . . . .	traces
Sulphate of soda . . . . .	7·9481
Chloride of sodium . . . . .	70·9170
Sulphide of sodium . . . . .	0·3869
Chloride of potassium . . . . .	traces
Carbonate of magnesia . . . . .	0·1550
Chloride of magnesium . . . . .	0·5713
Carbonate of iron . . . . .	0·1300
Carbonate of lime . . . . .	2·0400
Sulphate of silica . . . . .	traces
Bitumen and organic matter . . . . .	0·1520

The quantity of bitumen thrown up by this source is very considerable, and might be made more available for use. But little of it is dissolved in the waters; the greater portion of it indeed overflows.



The temperature of this source is  $14.5^{\circ}$  C. Its taste is extremely bituminous, sulphurous, and intensely saline. It is undoubtedly the most highly sulphurous of any known spring in Europe. The Source de Bayen, at Bagnères des Luchon, the most sulphurous of the waters of the Pyrenees, according to Filhol, contains only 0.0777 grammes of the sulphide of sodium, and the Source du Tambour at Barèges 0.0404 grammes in a litre of the waters. They do not, therefore, contain a tenth part of the sulphurous elements of those of Puy-de-la-Poix.

These waters are not suited for internal administration; they have been employed, however, for bathing, and are spoken highly of by Dr. Basset, the able medical superintendent of Royat, for the treatment of certain cutaneous diseases, and M. Lecoq has found them promptly efficacious in the cure of itch.

Experience has proved that properly sealed this water can be preserved for years, without undergoing the least alteration in its chemical constitution. It might, therefore, be transported to any distance, and would, from its rich combination of sulphurous, saline, and bituminous properties, prove everywhere



a valuable external application in skin diseases. The presence of this spring so singularly diverse in its qualities, and yet issuing in close contact with the neighbouring sources of Royat, they also differing to a certain extent in their mineralisation, indicates in a remarkable manner the prolific mineral resources of this confined district for the treatment of an unusually extensive class of diseases. In common moreover, with most of the mineral stations of Auvergne, from the general elevation of the country, it occupies a position of considerable altitude, being 1,380 feet above the level of the sea. It consequently enjoys a comparatively cool and refreshing air during the hottest months of the season ; while from its situation it is sheltered from any early or late cold winds.

The waters of St-Mart have been suspended in their operations since 1835, when an inundation carried away the establishment. They might, however, at any time be readily restored to working order, and as well also those of les Roches, which have too of late fallen into disuse.

As these waters differ from each other, and from the rest of the springs, in the proportions of their ingredients, and are fitted to occupy distinct posi-



tions in the general treatment of diseases, it is to be hoped that the rising prospects of the station will replace them in their sphere of usefulness, and once more complete the group in their full efficiency.

The source of the baths of Cæsar is situated on the left bank of the Tiretaine, or Scation; a stream which springs from the celebrated grotto of Royat, itself an object of great interest to the lover of the picturesque.

The baths occupy the site of an ancient Roman construction, formerly known by the name of the Granier de César. These remains were discovered in 1822, buried some fifteen feet beneath the surface of the soil, and consisted of a structure about four feet square, having at one of its angles a mineral source, traversed by a current of carbonic acid gas. The walls enclosing it have served for the foundation of a modern reservoir, in the form of a hollow column, into which the waters bubble up to a height of four feet and a half above the level of the soil. A drinking fountain is attached to the face of the column.

The establishment consists of a single building, enclosing the fountain and eight compartments for



bathers. Each cabinet is furnished with a bath, fed with a constant running stream from the source ; and to which are adapted local movable douches for external and internal purposes. There is also an unceasing current of carbonic acid gas, directed not only to the common service of the baths, but by a proper apparatus it is converted into a separate gas douche. The direct employment of carbonic acid gas in the treatment of disease, is a speciality peculiar to the practice of these establishments, and its therapeutic effects are being carefully studied by the medical superintendents, under whose directions they are administered, and promise to furnish a valuable adjunct to the general usefulness of these mineral stations.

The waters of Cæsar less resemble those of Vichy than the other mineral sources of Royat. More abundantly supplied with carbonic acid gas, with however a less amount of chloride of sodium, and earthy alkalines, and a lower degree of temperature, they aptly meet the requirements of certain conditions of disease, of temperament, and of constitution, for which the other sources are not so well suited. They thus serve to render more entire the course of treatment furnished by this station.



In the selection of a source, whether at Royat or elsewhere, the patient ought always to be guided by medical advice. It may be stated in a general way however, that the waters of Cæsar are specially adapted to debilitated states of the system, and to atonic forms of disease. From their lower thermality and weaker mineralisation, these baths never produce depressing or exhausting effects; they are borne indeed under all circumstances with ease and comfort. Given internally, these waters are very refreshing, and are decidedly tonic in their action. They are used with great success in difficult and painful digestion, and in derangements of the liver connected with dyspepsia; in atonic gout, and sub-acute rheumatism; in neuralgic affections depending on irritability and debility of the nervous system; in chlorosis, irregularities of the menstrual functions, fluor albus, and uterine catarrh; in diabetes, gravel, and catarrh of the bladder; in languid struma, and early mesenteric diseases of children; and in the sequel of fevers. In most cases, the internal administration of the water, in conjunction with the baths, greatly expedites the cure.

These waters are pre-eminently suitable for drinking. They have a slightly alkaline and ferruginous



flavour, and being highly charged with carbonic acid gas, have a sharp and extremely agreeable taste. Mixed with the wine of the country, they are very commonly drunk at table to assist digestion. Taken medicinally, they correct flatulence, relieve gastric irritation, and improve the general functions of the stomach. For these purposes they are superior to any other mineral waters in use. They are inodorous and colourless, and are sparkling and effervescent when poured out. They are not in the least degree decomposed by keeping, and may, therefore, be transported to any distance, and be preserved for any length of time, retaining their mineral and gaseous qualities perfectly unimpaired.

There is little doubt that were these waters brought fairly into notice, they would be highly appreciated by the profession. In dyspeptic and gouty constitutions, they might be prescribed with the very best effect. In very many cases, indeed, they would be preferred to those of Seltzer and Vichy. It may be predicted for them that they are destined to become an article of commerce on an extensive scale.



The waters of the principal establishment at Royat are now called the Source Eugénie. This name was adopted by permission of the Empress of the French, in commemoration of her Imperial Majesty's visit to it in 1862.

The account of their ancient origin and modern restitution is interesting.\* It is related that a popular tradition, descending from generation to generation, had perpetuated the idea among the inhabitants of Royat, that their forefathers had once possessed there a thermal establishment, which had disappeared at an epoch, and from causes, altogether unknown.

To these traditions were added certain local indications corroborative of this idea. For instance, it was noticed that along a particular track of the soil, the snow melted more quickly, and the moisture after heavy rains was more speedily dried up than elsewhere. The supposition thus supported, was further confirmed by the discovery in 1843 of an old watercourse, strewn with the remnants of tiles and other objects of a Gallo-Roman manufacture.

\* M. Thibaud's *Guide en Auvergne*.



It was brought to light in repairing the highway under which it passed. Subsequent researches, after some labour, exposed a piscine, six feet nine inches square, divided into two compartments. Afterwards a second bath was discovered of similar dimensions, but of an hexagonal form. Lastly, following the course of another ancient canal, a vaulted chamber was arrived at, enclosing the shaft of a pillar of white marble, and floored with a tessellated marble pavement of an antique character. All these compartments were found to be supplied from separate sources with water of a temperature of  $35^{\circ}$  C.  $95^{\circ}$  F., which had hitherto expended themselves by subterraneous exits.

The inference drawn by persons in the neighbourhood, interested in antiquarian researches, was, that important thermal establishments had from an early date existed on this spot; that they had been used for a time, and then abandoned; and that they were subsequently restored at a later period, but were eventually destroyed.

The source which supplies the establishment Eugénie is beyond dispute, says Dr. Allard, the most abundant of all the springs in the department of



Puy-de-Dôme. It comes from the calcareous stratum which borders the right bank of the Tiretaine, and surges up somewhat after the manner of the spouting springs of the Sprudde! at Karlsbad. The waters are conducted from a closed reservoir into a vaulted one, whence they are distributed through pipes lined with charcoal, to the drinking fountain and the baths and piscines, preserving in their course almost entire their native caloric. Thus, according to Dr. Nivet, the temperature of the waters taken at the buvette is  $35.5^{\circ}$ , at the spout entering the baths  $35^{\circ}$ , and in the baths  $34.5^{\circ}$  Centigrade.

The present establishment consists of two galleries each containing twenty-five baths. These galleries open right and left into a vestibule which leads to the inhalation baths and to the piscines. The abundance of the source, its fixed integral quantity of contained carbonic acid gas, and its constant natural temperature, render it capable of furnishing an unfailing current of supply. A double apparatus conducts and regulates the entrance of the water into the baths: the one, the stream which arrives directly from the source; the other, that which



comes from a reservoir artificially heated to a higher degree, to be employed for special purposes.

At the extremity of each gallery is a waiting-room, one on the right for females, and another on the left for males.

The chambers for inhalation are placed on the first floor of the central pavilion, which separates the two galleries; each is preceded by a vestibule serving for an entrance also to the rooms for vapour douches, and these open into two other ante-chambers heated carefully to 25 degrees C. as a precautionary measure of transition from the external atmosphere to the high temperature of the vapour chambers. The mineralised vapour enters through a pipe defended by a cowl, and the patient is placed on a seat in convenient apposition to it.

The two piscines are situated beneath these chambers. The water constantly flows into and over the edges of these baths, and falls into an external aqueduct which empties itself by a common waste-pipe. In these departments are also two baths furnished with vertical douches.

There is also an annex in which are provided twelve additional baths for the administration of



vertical and lateral douches. It is served by means of two jets of water, one at 34° Cent., and the other at an artificially advanced temperature of 60° Cent. for special purposes.

Besides these appliances, accommodation is afforded for the employment of cold hydropathy, of the Russian bath, and indeed of all other modes of bathing to be found in the best appointed establishments.

The physiological effects of these waters have been carefully studied by Dr. Basset.\* According to his experience, under their influence the appetite is improved, digestion becomes more prompt and easy; flatulence is subdued; habitual looseness of the bowels is controlled; and tendency to vomiting is allayed. Respiration is but little affected by these baths, and the circulation is rarely disturbed by them; the pulse commonly maintains its normal beat. The urine is very generally augmented in quantity, and becomes rapidly alkaline. The skin is intensely reddened; and when the baths are administered at a high temperature, perspiration is of course freely induced.

\* *Études sur les Eaux thermales de Royat.*



After some days of treatment the patient feels more robust; lassitude, indeed, is never experienced unless the baths be prolonged beyond a proper point of endurance. For the purpose of restoring depressed tone and energy of the vital forces, these baths, reduced to a more temperate degree, are highly effective. Thus administered, they act in a similar manner to those of the baths of Cæsar at their natural temperature.

They may, therefore, be regarded as tonic to the constitution, alkaline to the blood, and stimulating to the several excretory functions. And they produce two different effects upon the nervous system, according to their duration. At first, and for a short period, they are exciting; afterwards, and prolonged, they exercise a calming and soothing influence.

The internal use of these waters is commonly prescribed in conjunction with the baths. Two or three glasses are a dose readily borne by all patients. In some cases it is increased to five or six glasses. With a few persons it produces a slight feeling of intoxication, owing to the large amount of contained carbonic acid gas. To prevent this inconvenience, it is simply necessary to agitate the water in order



to facilitate the escape of a portion of the gas. These waters assist digestion, increase the appetite, and augment the flow of urine. They have a slightly contrary effect on the alvine excretions, easily obviated by a gentle aperient when required. For this reason, however, they are often useful in mild diarrhœas. It is necessary to mention that there are certain morbid conditions of the digestive and secreting organs, which for the time forbid their use. It is therefore desirable that the medical adviser of the establishment should in all cases be consulted before they are tried.

Dr. Allard, in his *Précis*, speaking of the vapour inhalations, points out that, besides being sudorific, they exercise a topical action on the mucous membrane of the air-passages; not simply mechanical, as would be that of heated air, but therapeutic, by reason of the vaporised mineral elements with which they are charged. To realise this effect in cases where it is the primary object, it is required that the temperature be so regulated as not to excite profuse diaphoresis, in order that its principal effect may be determined rather to the pulmonary tract than to the skin.



The duration of these mineral vapour inhalations is generally from half an hour to an hour. The exact time, however, suitable for individual cases, the kind of clothing, whether of linen or of flannel, the degree of temperature, and all other details of management, can only be properly prescribed on the spot, and according to special circumstances. The therapeutic action of these inhalations induces a medicated bronchial diaphoresis which augments the vital powers of the mucous lining of the air-tubes, and favours the resolution of congestion, and the absorption of serous infiltration. It acts powerfully in subacute inflammation of the nasal, pharyngeal, laryngeal, and pulmonary passages, in obstinate catarrhs, and in asthma.

The general therapeutic effects of the waters of Royat have been carefully observed by Dr. Basset,\* and also by Dr. Allard,† the former medical inspector of the station. Under their able ministration, an extensive class of diseases have been very successfully treated by the combined use of the baths, douches and buvette.

\* *Études sur les Eaux thermales de Royat.*

† *Précis sur Royat.*



The waters, no less than their vaporised elements, have been found serviceable in removing the sequelæ of neglected catarrhs, both of the air-passages and of the bladder. In certain conditions of the lungs, however, their employment in the form of baths is not only preferable but imperative.

Dyspepsia in all its forms receives early relief and permanent benefit by a sufficient course of bathing and drinking. The mitigation of obstinate gastralgia is said to be greatly facilitated by local douches over the epigastric region.

In cases of atonic gout, where its elements are only imperfectly eliminated in their natural course, and linger for want of vital force to throw them off, these baths and the water together act in a very satisfactory manner ; partly by neutralising the gouty element in the system, and partly by determining it to the surface. Thus at first, as is found to be the effect of other Auvergne springs, there is induced a slight augmentation of local symptoms, very speedily however subdued, and terminating in a more healthy condition of the structures.

Chronic rheumatisms, both muscular and articular, are alleviated, and very commonly removed. The



douche is applied topically every morning for fifteen minutes, followed by a bath at its natural thermality for three quarters of an hour, and three or four glasses of the water are drunk daily. The variety of this affection however, termed nervous, or rather rheumatism complicated with extreme nervous prostration, is most of all and very decidedly amenable to their curative influence. They seem indeed to exercise a special and elective action upon the nervous diathesis. In all atonic conditions of the nervous system, whether produced by moral anxiety or mental overwork; by hemorrhages, or privation of nutrition and mal-assimilation of food; from impaired appetite and imperfect digestion, the waters of Royat are of incontestible utility. They subdue nervous irritability, and fortify the tissues by improving the functions of digestion and secretion, rendering alimentation and hematose reparation more complete, thus restoring the equilibrium between the sanguineous and nervous systems.

Pure neuralgia in all its forms, trifacial, intercostal, crural, lumbar, and sciatic, are treated very efficaciously by local douches in the bath, and by douches of carbonic acid gas. The direct application



of this anesthetic, here so conveniently available, has produced the most satisfactory results, and promises to become a very valuable agent in the treatment of neuralgic affections.

The carbonic acid douche, whether injected in the form of gas, or in solution in the waters, as strongly recommended by Dr. Herpin, of Metz, in diseases of the uterus and its appendages; has been tried with great advantage at Royat in uterine neuralgia, amenorrhœa, dysmenorrhœa, leucorrhœa, and in congestions, ulcerations, and hypertrophy of the mouth and neck of that organ.

The use of the baths and ascending douches has also been followed with very beneficial results in the same affections.

The large class of diseases here prescribed for, and the success attending their treatment at Royat, affords such indisputable testimony of the value of its waters that it is not too much to claim for them a position in the first rank of mineral stations.

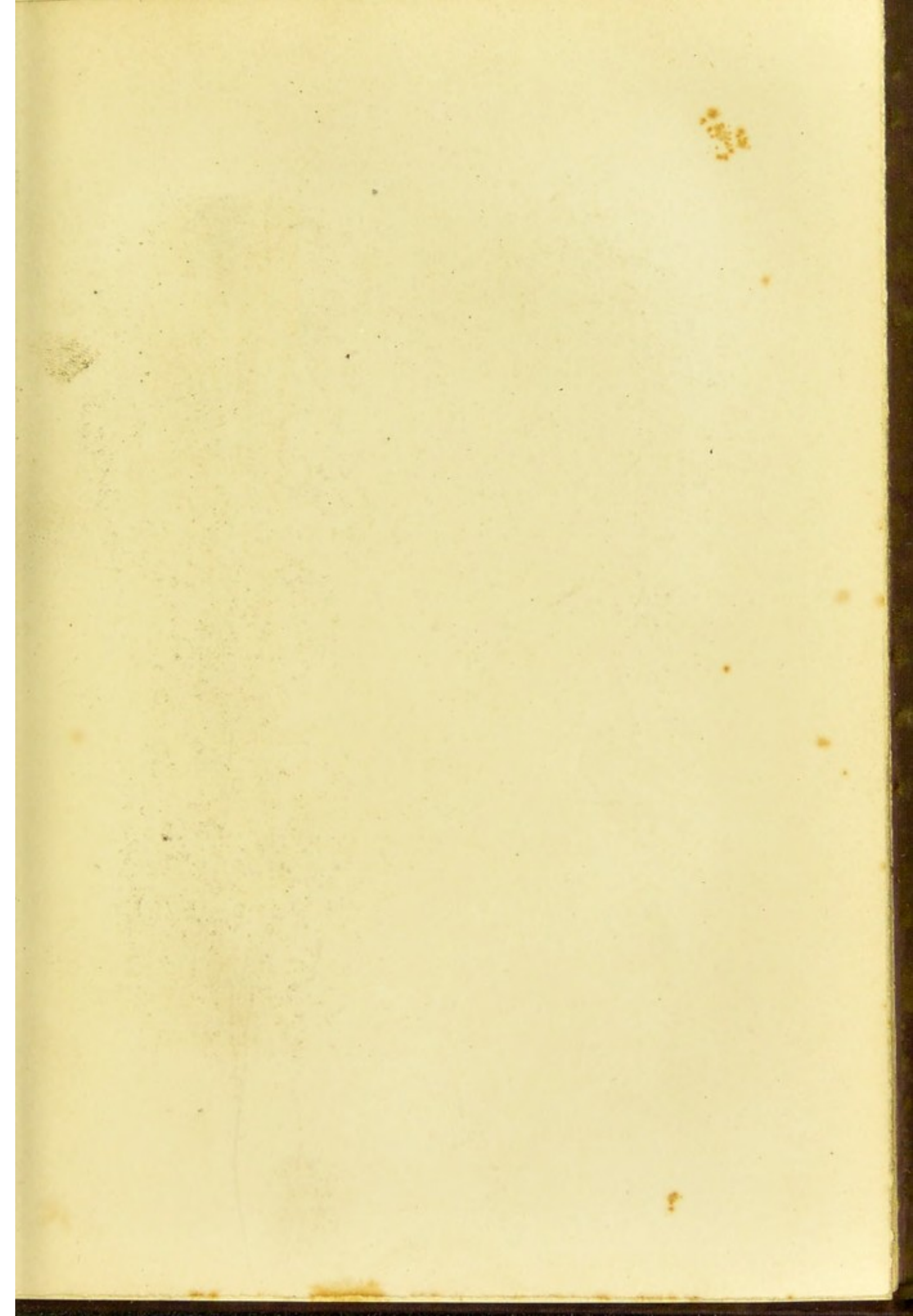
Without professing to be a rival to those of Vichy, which however they resemble qualitatively if not quantitatively, they are no less successful in the treatment, though under different circumstances, of similar



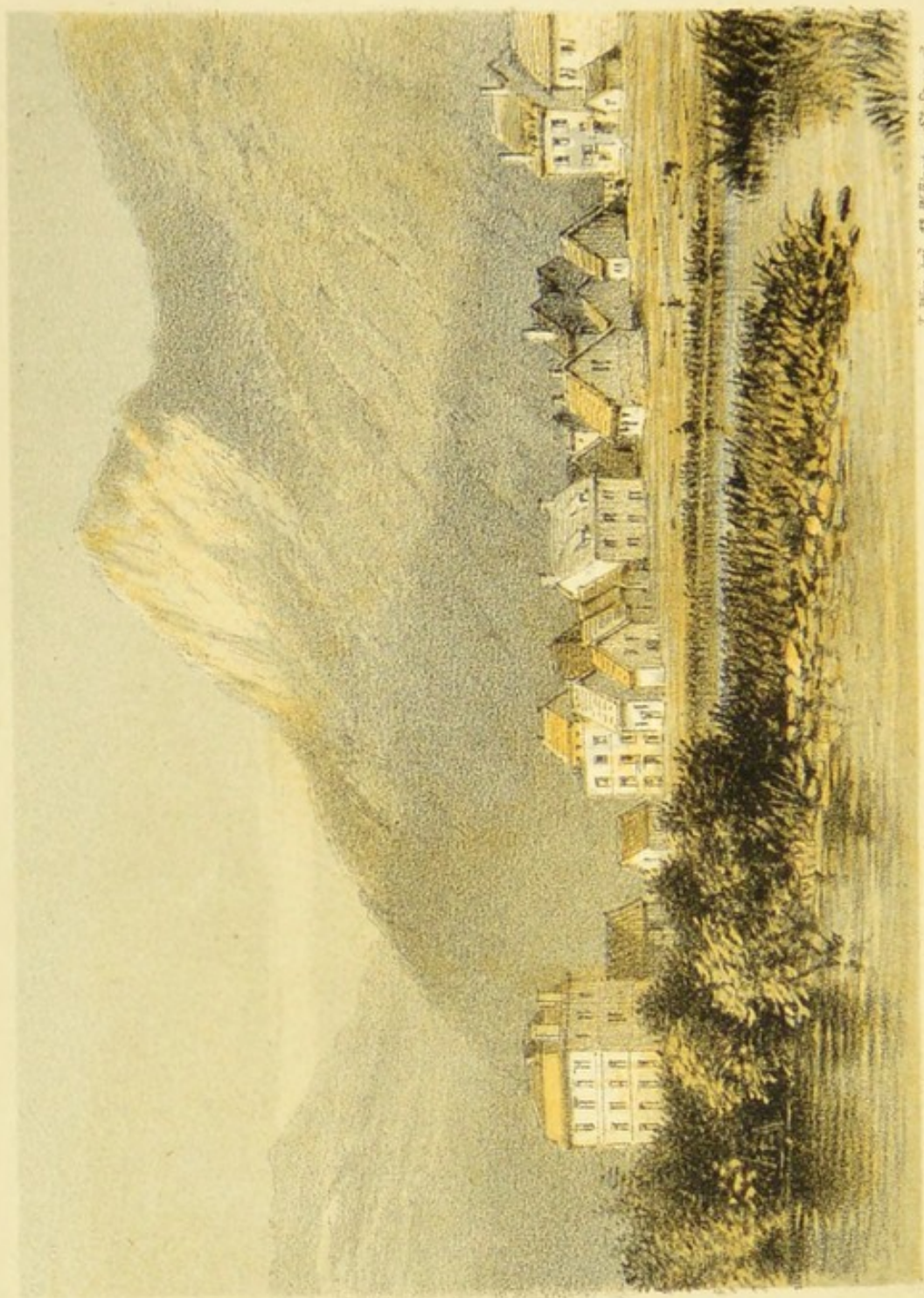
diseases. The superior activity, from their higher alkaline properties and temperature, of the waters of Vichy, fit them for patients of a sanguine temperament; while the tonic and reconstituent qualities of the Royat waters as appropriately adapt them to the lymphatic and nervous temperaments. The choice between the two therefore is determined by a distinction of temperament rather than of treatment.

It would be an omission not to mention that the grape cure, and the goat's milk cure, are practised at Royat, which is well provided with the means of carrying them out.









J. May, del. R. Wellington, sc. Grand.

BOURBOULE



## BOURBOULE.

DURING the season diligences leave Clermont every morning at seven and ten o'clock for Mont-Dore by two different routes: one through Rochefort, Laqueuille, and Murat le Quaire, a journey of fifty-three kilometres, about thirty-two English miles; the other by Leschamps and Randanne, a shorter distance of forty kilometres, or rather less than twenty-five miles.

Visitors who prefer it can always be accommodated with a carriage and pair, which is of course a much more desirable mode of travelling through a country replete with every variety of charming landscape scenery, and presenting frequent objects of notice, both geological, architectural, and picturesque, worth stopping awhile to admire and investigate.

In this manner, and by way of Rochefort, the author left Clermont for Mont-Dore at ten o'clock in the morning, with an English friend and the Vicomte de Sedaiges, an Auvergnat, well acquainted



with the country, and connected by proprietorship and practical acquaintance with many of the thermo-mineral stations of the district. It need scarcely be said that such a companionship was most advantageous, not only as regards the general interest of the journey, but also as to the special object for which it was undertaken.

The road passed by Royat on the left, and presently afterwards Mont Puy-de-Dôme on the right, its lofty peak standing out in a well defined outline on the clear sky beyond. The way followed the usual course of a highland route, over the slopes of mountains and down into the valleys at their feet. At length, after mounting an abrupt acclivity, and traversing a considerable plateau, a remarkable zigzag descent led to the town of Rochefort, the chief place of a canton which comprises a considerable portion of the mountainous district extending from the Puy-de-Dôme to the limits of Limousin. It is situated in a gorge overhung on the one side by the slopes of the highlands of Laqueuille, and on the other by a sharp cone surmounted by the ruins of a fortress formerly inhabited by the Dauphins of Auvergne. Further on, at Murat le Quaire, the



summit of Mont-Dore came distinctly into view, and a considerable and elevated plain of grazing land well stocked with cattle, conducted eventually to a point where a road to the right descended into the valley of Bourboule, while the direct route scarped out along the ridge, led to the mineral station of Mont-Dore, situated at the base of the mountain.

Bourboule being our immediate destination, we followed the former track. We arrived there at the dusk of an early September evening, and found very comfortable hotel accommodation. Bourboule is situated at the western extremity of a lovely valley, in the midst of the chain of mountains which culminate in the peak of Mont-Dore. Open only to the east, it is closed completely to the north, west, and south by a circular disposition of the hills around it. In consequence of this arrangement, though placed at an elevation of 846 metres (some 2,085 feet) above the level of the sea, it enjoys a temperature much more genial than is commonly found in high mountain districts, an advantage which prolongs its season of bathing much beyond that of less favoured localities. The summits of these encircling hills are luxuriantly garnished with firs and beech-



wood, and the village itself is immediately overhung by a towering ridge of granite rocks.

The slopes which descend more gradually from the opposite range of hills are verdant with rich pasturage, variegated in the season with fields of golden corn, extending down to the edges of the river Dordogne, which, descending from its source at the foot of Mont-Dore, traverses the whole length of the valley.

The rushing stream, the interspersed patches of green and yellow lands, in contrast with the deep dark wooded glens and rocky passes in the distant direction of Mont-Dore — the granite crags, and foliage-crowned hills, together form a picture unequalled even in this region of lovely scenery.

The walks and drives about the neighbourhood are very beautiful, especially that to St-Sauves, which lies in a charming valley about three miles distant.

The volcanic products of basalt and lava, characterising the geology of the Mont-Dore district, are arrested in their course before reaching the valley of Bourboule, which rests on a granite foundation, having superimposed upon it, however, a thick bed



of tufa and trachyte conglomerates, covering to a considerable depth the site of the village.

It is through this soil, or rather perhaps at its point of intersection with the granite formation, that all the sources of the station make their exit, excepting one, which comes directly through the granite. They have been named le Grand Bain, la Source Nouvelle, le Bagnasson, la Source du Coin, la Source des Fièvres, du Communal, and de la Rotonde.\*

These several springs, while differing somewhat in the relative proportions of their ingredients, agree generally in the nature of their mineralisation. They vary much more widely, however, in the degree of their temperature. The most ancient source, le Grand Bain, which formerly alone furnished the establishment with its supply of waters, possesses a temperature of 50° C. 122° F. The volume of this supply has been augmented by six or seven tributary sources lately discovered in its close proximity. They have been utilised and directed by a common channel into a reservoir now connected with the general service of the establishment. It is to these

\* *La Bourboule, sa station thermale, les Eaux minérales, et son établissement*, par Dr. Pieronnel.



united springs that the name of la Source Nouvelle has been given. The temperature of these waters varies from  $40^{\circ}$  C. to  $52^{\circ}$  C., the mean being about  $47^{\circ}$  C.

The Bagnasson rises to the surface at a short distance in front of the establishment, into which it is directly conducted. Its temperature is a little above  $37^{\circ}$  C.

The Source du Coin, so called from the situation at which it emerges, enters the baths in its natural course from below their foundation. It has a temperature of  $39^{\circ}$  C. Both these sources furnish a small but constant current of supply.

La Source des Fièvres has a special name, from the efficacy attributed to it at an early date for the cure of periodic fevers. It is situated at some distance to the north of the establishment. Primitively it was enclosed, as was also the neighbouring source of the Rotonde, in a construction of masonry, and was exclusively used as a drinking fountain. A few years since its waters were conducted by an underground conduit to a reservoir at the Grand Bain, where they mark on the thermometer a temperature of  $25^{\circ}$  C.



The Source Rotonde, arising in the same vicinity, but at a higher level, and issuing directly from the granite elevation, was also formerly used simply as a buvette. It, too, has of late been directed by similar means to a reservoir common to both these sources, having also the low degree of  $28^{\circ}$  C. Together these two sources furnish the temperate waters of the establishment, suitable to reduce the more exalted thermality of the other springs, when such an object is desirable for special purposes. They are however more particularly adapted to the service of the buvette, from their temperature, and the peculiar properties which they conjointly possess for the treatment of intermittent fevers.

The Source Communale has not been utilised, but it has been analysed and found to possess a similar mineralisation. There would be no difficulty in including it in the plan, which has been successfully carried out with the other sources, to concentrate them all under one establishment. It is also certain that a much more abundant supply from all these sources might be obtained from an enterprising management; while the establishment itself, at present small and unworthy the high character of the



waters, might, by an energetic direction, be advanced to a first-rate position.

The waters of Bourboule have a specific gravity which varies between 1,005 at the Source des Fièvres, and 1,008 at the Source Nouvelle. They are perfectly limpid, whether hot or cold, which proves the fixity of their elements of combination, and renders them fit for exportation. They are all so completely transparent that the smallest object may be distinctly seen at the bottom of the bath.

Collected in the mass they become covered, after a time, with a pellicle of a peculiar greasy nature, which has been named la Bourbouline.

They are unctuous and agreeable to the touch, and have a slight odour of sea-weed.

Their taste is prominently salt, modified, however, somewhat by difference of temperature and the varied amount of carbonic acid gas contained in them.

These waters were analysed as far back as 1670, by Duclos, and in 1738 by Chomel. Duclos obtained 1,170 grammes of residue in a litre of the water, composed principally of chloride of sodium.

Chomel found 1,205 grammes of residue in the same, but he regarded the leading element to consist of the carbonate of soda.



A more exact analysis was afterwards made by Dr. Bertrand, who confirmed the fact of the preponderating amount of chloride of sodium.

At a still later period these springs were examined by M. Lecoq, who places in their order of importance the chloride of sodium, double in quantity that of the carbonate of soda the next in proportion, followed by lesser amounts of the sulphate of soda, carbonates of magnesia, lime, &c., with, however, a considerable amount of carbonic acid gas.

But it was not till 1854 that the presence of arsenic in large amount was discovered by Baron Thénard, in the waters of Mont-Dore and St.-Nectaire, and especially in those of Bourboule.

In a communication made to the Académie des Sciences, after having stated the proportion of arsenic contained in the springs of Mont-Dore and St.-Nectaire, he announced that he had found in the waters of Bourboule an amount of this mineral which had astonished him. He had obtained, in a single litre of water from the source of the Grand Bain, 8 milligrammes 5 dixièmes of metallic arsenic, representing 13 milligrammes 2 centièmes of arsenious acid, or 20 milligrammes 9 centièmes of



arsenite of soda, being fifteen times more in quantity than was contained in the waters of Mont-Dore.

This report, though coming from such an authority, was at the time received with considerable scepticism. It was indeed considered that, notwithstanding his high scientific reputation, he had committed an error, and had enormously exaggerated the quality of these waters in this particular.

At a subsequent period however, these springs were again analysed by M. Lefort, and in 1862 he communicated his researches in a paper to the Société d'Hydrologie, wherein he says, 'the mineral waters of Bourboule are undoubtedly by far the richest in their arsenical element of any known springs;' thus confirming substantially the opinion of Baron Thénard.

Dr. Allard, in his work,\* states, that while the waters of Bourboule hold a high position in the thermal group of the centre of France, as chloro-soda waters, they are still in this respect only analogous to others in the district. In their effects, however, owing to their arsenical properties, they

\* *Eaux Thermo-minérales d'Auvergne.*



are without a rival either in France or elsewhere. They possess, consequently, an incomparable speciality in the treatment of certain affections of the skin, such as psoriasis, lichen, eczema, tetters, and ring-worm. Internally administered they have also from time immemorial been extensively and most successfully employed in the cure of intermittent fevers. For this purpose, as well as for the treatment of cutaneous diseases by internal use, they may be exported to any climate and to any distance, without detriment to their chemical qualities.

It was supposed at one time that the arsenical element was combined with the iron contained in the waters, and that it might eventually throw down an insoluble deposit. The researches, however, of M. Lefort have demonstrated that it is contained in the form of an arsenite of soda, which is perfectly and permanently soluble. The waters of Bourboule, therefore, are capable of being made a valuable means of resource for patients at a distance, who may be unable to avail themselves of their use on the spot.

The following is a table of the proportions and combinations of the chemical properties of the more



important sources of Bourboule, according to the analysis of M. Lefort :—

*Ingredients contained in a litre of the Waters of Bourboule.*

	Source du Grand Bain	du Baguassou	de la Rotonde	des Fièvres
	grains			
Free carbonic acid .	0·3852	0·8789	0·9758	0·9324
„ sulphuric acid .	—	—	traces	traces
Chloride of sodium .	3·3457	3·1972	3·0458	0·0298
„ of potassium .	0·2353	0·2295	0·2164	0·2213
„ of magnesium	0·0390	0·0332	0·0255	0·0384
„ of lithium	indices	indices	indices	indices
„ of caesium				
„ of rubinium				
Sulphate of soda .				
Bicarbonate of soda .	0·2788	0·2829	0·2342	0·2324
„ of lime .	2·2719	2·0157	2·0260	2·0455
„ of peroxide	0·1964	0·1911	0·1771	0·1774
of iron .	indices	0·0033	0·0025	0·0063
„ of manganese	indices	indices	indices	indices
„ of ammonia				
Phosphate of soda				
Arsenite of soda	0·01263	0·01468	0·00742	0·00717
Iodide and bromide of				
sodium . . .	traces	traces	traces	traces
Silic acid . . .	0·1093	0·1075	0·1080	0·1080
Alumen . . .	0·0301	0·0218	0·0185	0·0182
Bituminous organic				
matter . . .	traces	traces	traces	traces
	6·90433	6·97578	·83702	6·81687

So long ago as 1460 the baths at Bourboule were in operation. In 1740 they were enlarged, and thus continued until 1821, when the proprietor of the



source, M. Lacoste, constructed a new erection—the present one ; which, however, proved insufficient for the increasing number of patients frequenting the baths. Consequently, in 1859, successive proprietors supplemented the accommodation by an annex.

The establishment itself consists of a basement and a first floor. The former only is at present used for bathing ; and consists of eight baths circularly arranged, and divided by a partition, completely isolating them from each other ; and all are spacious and commodious. Each bath is supplied with an apparatus for administering the descending and horizontal douche.

The annex is situated contiguous to the principal building, and consists of four compartments of like dimensions, each furnishing also similar means for bathing and for the use of the douches.

The drinking fountain is conveniently placed in the rear wall of the establishment.

When it is considered that these waters contain the ingredients of the chloride of sodium so abundantly, of the carbonate of soda and lime freely, and of the iodide and bromide of the same salts in a certain measure, it is evident they possess the elements of



an inland sea bath. The additional mineralisation, however, of the arsenite of soda in such profusion invests them with a still higher and special character, the two combining together to create properties so rare and so unequalled, as to give them the place of pre-eminence over all other springs of the same hydro-mineral class.

The physiological effects of the waters of Bourboule have been carefully studied and well described by Dr. Pieronnel.\* He very properly observes, that as it is necessary to understand fully the physiological phenomena of healthy organic action, in order to appreciate the morbid changes which take place in disease: so also is it needful, in the administration of the hydro-mineral treatment, to be aware of its normal influence upon each organic system, and on the vital functions generally, rightly to direct its employment as a curative agent.

The immediate action of these waters is stimulating to the nervous system. In their most simple mode of employment, whether by a glass or two of the waters internally, or by a bath at a temperate

\* *Bourboule, sa Station, ses Eaux, etc.*



degree, they produce at once an appreciable effect upon the sensibilities of the patient. In their continued and ulterior results, they are highly alterative, and reconstructive of deteriorated and vitiated organic action.

At first they moderate the appetite and the powers of digestion, and need therefore, both internally and externally, to be administered with a cautious precision, adapted to each case. Thus regulated, however, they do not produce debility ; but seem, by their inherent properties, of themselves to sustain the vital powers.

The waters of Bourboule stimulate sensibly the essential organs of the circulation. Always, after a dose or a bath, the pulse becomes fuller and more frequent, and the temperature of the skin is for a while afterwards somewhat increased.

It is believed that these effects are principally due to the sthenic action of the arsenic on the muscular fibres of the heart and larger blood-vessels. For patients of a full habit, additional care is necessary lest an artificial plethora be produced.

These waters are also invariably a powerful excitement to the cerebral system, the nervous centres



and their branches, with the remarkable exception of the cerebellum. On the especial functions of this organism, they seem generally to produce a sedative effect.

Under their influence, voluntary and motor action becomes more prompt and energetic, with an increased capacity for muscular exertion. They act but slightly on the urinary organs, affecting but little the quantity of the water, or its quality, except after a few days' use, to render it more alkaline.

On the skin, however, they have a much more decided action, reddening it, and increasing its vascular as well as its perspiratory functions: it becomes very supple and unctuous to the touch. The warm baths at 36° C. about 97° Fahr. generally produce abundant diaphoresis, a useful auxiliary in the treatment of certain cases.

Dr. Pieronnel\* no less justly remarks that these well ascertained effects of the Bourboule waters on healthy organism, not only indicate their properties, but also the kinds of disease for which their administration is applicable.

\* *Bourboule, sa Station, ses Eaux, etc.*



A tonic of the first order, they are extremely beneficial in conditions of debility, whether accidental, as the consequence of prior active disease, or constitutional, from an atonic state of the blood, and from exhausted nerve power. Expressly stimulating, not only to the general circulation, but also to the capillary and lymphatic vessels, they are highly advantageous in decreased energy of these systems, and in languid action of the glandular functions.

A powerful excitant of activity in the cuticular textures, they exercise a specific effect upon most of those obstinate forms of skin disease, so frequently unmanageable under ordinary treatment. This may be readily understood when it is considered that, from the nature of their therapeutic properties, these waters are notably and in a supreme degree alterative and reparative in their influence upon the several tissues of the body.

In enumerating the extensive class of diseases in which their curative treatment has acquired a high and well-established reputation, among the most important is that of scrofula, both in its cutaneous and glandular varieties, and in scrofulous ophthalmia.

In his report on the mineral waters of the



neighbouring station of Mont-Dore, Dr. Bertrand, alluding to those of Bourboule, remarks, that with respect to strumous affections, wherever their seat, and whatever their form and degree of intensity, there are no mineral waters at present known to be compared in their curative properties with the springs of Bourboule.

They are employed in these cases internally, and by the daily use of the baths and topical douches; the doses, the temperature, and duration of these several means being regulated by the condition of the disease, and the strength and temperament of the patient.

A very favourable account is given by Dr. Pieronnel of the treatment by these waters of white swelling, whether affecting the soft or hard parts of the articulation, ulcerated or not ulcerated.

Great benefit has undoubtedly been derived from their employment in recent cases, and before they have proceeded to the extent of fistulous openings into the joints, or disorganisation of their structural textures.

It is not to be expected, indeed, that when a degeneration of their articular tissues has actually



occurred, either this or any other medical treatment can be of any material service.

The exfoliation of superficial caries and necrosis of the bones, including those of the vertebral column, has been greatly facilitated by the restorative action of these waters. So long as the constitutional powers are vigorous, and can be well supported, their persistent use affords a fair promise of a permanent cure.

Many cases of lupus, both of the erythematous and tubercular form, have been submitted to the action of these waters. A sufficiently extended course of their full administration has succeeded in eradicating about a third of them, and very decidedly ameliorated the condition of the rest. Unexpectedly it has proved most efficient in the tubercular variety.

In the treatment of skin affections, moderate doses of the water and daily baths are very generally sufficient for their cure, without the aid of the douche. In obstinate cases, however, especially when the eruption remains for any length of time stationary, the douches have been found to accelerate the healing process.

There are certain diseases of this class which, in



their acute stage, from their severe constitutional symptoms, are necessarily precluded from the immediate use of mineral baths. The principal of these is erysipelas. In the convalescent state, however, the Bourboule waters are regarded as possessing a counteracting influence over the erysipelatous predisposition, which remains in the system for an indefinite period, and renders it liable to be recalled into a state of activity. In this sense they are considered to be of undoubted advantage.

Erythema, though unimportant in its nature, is yet very annoying, especially when affecting exposed parts of the surface. It very readily yields to the action of these waters, as does also pityriasis, which is now regarded as a chronic or scaly form of the same disease.

Urticaria is another skin affection of little consequence in itself, though also intolerably annoying, especially when it becomes chronic and recurrent. In this form it frequently comes under the treatment of these springs, and is very effectually relieved.

The troublesome vesicular cutaneous disease, eczema, and its chronic scaly variety, psoriasis, both so very refractory to ordinary medical means, are



usually manageable under a sustained course of these waters. Few cases, indeed, resist its action eventually.

They are also very generally successful in discussing that chronic inflammatory condition of the sebiparous glands, termed acne. The hard, red, conical pimples of which it consists, are sometimes perpetuated for years by successive crops of the eruption. Of no importance as a disease, its unsightly appearance, however, in young persons, most subject to it, is to them a serious affliction. To those who can afford the time and means, it would be well worth the while to try the effect of a season at Bourboule.

Exostosis and periostosis, whether spontaneous or traumatic, have invariably been aided in their resolution by the continued action of a course of these waters.

The high temperature and rich mineralisation of these springs render them suitable for the treatment of rheumatism, for which they have obtained a high reputation. Hydrological experience has invariably proved that an elevated temperature is one of the principal conditions of the treatment. Dr. Pieronnel



insists, however, from his own personal observation, that at Bourbonle the density of the waters and the nature of their ingredients contribute more materially to the curative effect.

The varieties of rheumatism most commonly frequenting the baths at Bourbonle, are the muscular and the chronic articular. The ordinary treatment consists in the daily hot bath, and local douches at a high temperature.

All the various forms of neuralgia receive here a very prompt and decided benefit. Their commonly periodic character is specially combated by the arsenical element in the composition of the waters. In cases of sciatica, crural neuralgia, facial tic douloureux, and neuralgic lumbago, even of long standing, they offer the means of an almost certain cure.

The waters of Bourbonle have had a reputation from time immemorial for the cure of intermittent fevers, due, no doubt, to the well-known influence of the arsenic so largely contained in them. This mineral, in fact, has been pharmaceutically prescribed almost universally in these diseases, generally with benefit, but often without success. It is probable, however, that its natural and intimate mode of pre-



paration in these springs, formed under and in combination with a high temperature, renders it a more effective remedy than the artificial formula usually ordered in practice.

In this country the practitioner is constantly meeting with persons who, from residence in the East and West Indies, the coasts of Africa, and other fever localities, have been, as it were, so completely impressed with the miasmatic virus, that an intermittent character is given to the most simple passing ailments. In this chronic condition of the disease, the usual remedies of quinine and arsenic relieve temporarily, but frequently fail to eradicate the latent miasm within the limits of an ordinary course of treatment. It seems, indeed, rather to wear itself out under the favourable influence of a European climate.

In cases of this description, a season at Bourboule promises, by means of its waters, its fine air, and general local advantages, to effect a much more speedy radical cure.

The author has had occasion to notice the marked influence of arsenic in arresting, for a time, the progress of cancer. One remarkable case deserves to



be mentioned. A patient who had been afflicted with epithelial cancer of the orifice of the uterus, extending to the vaginal surfaces, and who had gone to reside at some distance in the country, sent an urgent request to be visited there.

The object of the consultation proved not to be the old disease, but an attack of illness which had lasted for some weeks. The symptoms under which she laboured suggested the idea of arsenical poisoning, and this was confirmed by an examination of the paper of her bedroom recently renovated. Removed to another apartment, and placed under proper treatment, she slowly recovered from its effects. Meanwhile the pain, hæmorrhages, and fetid discharge of her original complaint had been so completely suspended, that her attention had been entirely diverted from it to her new malady. The arsenical disease had, in fact, superseded for the time the cancerous. As however, the former subsided, the latter again came into activity; and being now far advanced, very soon afterwards came to a fatal termination.

It is a matter really worthy of consideration, whether, in the incipient state of cancer, it might not



be expedient fairly to try the effect of keeping the blood well charged with this seeming prophylactic ; carrying it on, in fact, to the highest point, and for the longest time consistent with safety.

For this purpose, no more desirable means could be conceived than a complete course of the Bourboule waters, administered, as they would be, under the experienced and intelligent direction of their medical inspector. Strongly impressed with this conviction, it is the intention of the author to suggest to him a future trial of their effect in the incipient stage of this disease.

It requires to be noticed that the use of these waters is very decidedly contra-indicated in certain peculiarities of constitution and predispositions of temperament. However rare these cases may be, they yet suggest the necessity of at once submitting the patient to the particular examination of the medical superintendent, in order that any untoward consequences may be avoided.



## MONT-DORE.

It is about a six miles' drive from the mineral station of Bourboule to that of Mont-Dore. The road ascends along the side of the rocky ridge on the left, gradually mounting higher and higher, till it looks down from a considerable eminence upon the valley below, now assuming rather the character of a deep ravine, through which rushes the mountain stream of the Dordogne. The chain of hills bounding it on the right is broken here and there by dark wooded passes, extending back towards the higher range of the Mont-Dore mountains in their rear, which complete, in the distance, the lofty background of a magnificent view.

The village of the springs, indeed, though itself situated at a high elevation, is imposingly dominated by the various eminences of Mont-Dore, and above all, by its towering summit, the pic de Sancy, the



most lofty point of central France. Around about the neighbourhood are to be found the most varied objects of picturesque beauty. The scenery is at once wild, grand, and luxuriant, presenting the singular features of a rich vegetation, of verdure and foliage, and of wild flowers, flourishing in the midst of bare gigantic peaks of volcanic rocks and beds of snow retained within their narrow gorges. Almost immediately the visitor comes upon the grand cascade du Mont-Dore, which, from the configuration of the spot, falls in a kind of circle over a precipice of some seventy feet, and then courses along a bed of steep descent, furrowed in the rocks, till it precipitates itself into the Dordogne below, and forms from first to last, a waterfall of very considerable extent.

A little further distant, in front of the roc de Cuzeau, itself a striking object and guide to the locality, descends the pretty cascade du Serpent, so named from the picturesque resemblance of its white, foaming current to a silvery snake, twisting and turning downward through a track of woods and flowers lying in its course.

Southward the limited plateau, on which the village is placed, opens upon the gorge d'Enfer, a



dark ravine formed by a wild chaos of disjointed basaltic columns, les Rochers du Portail and des Fernes, towering on either side, and overshadowing between them, the chasm d'Enfer, wherein the sunshine scarce ever penetrates, and the winter snows lodged in its clefts never completely disappear.

Extending the excursion over the slopes of the puy de Cascadogne, and the pan de la Grange, a miniature mer de glace presents itself, situate at the base of the pic de Sancy. The bed of snow and hillocks of ice which cover the little plain remain unthawed even by the summer sun. Here, within an icy crevice, lies the source, and springs forth the stream of the Dore, which gives its name to the district, whilst from a similar and neighbouring origin, flows the Dogne; both fall into the valley below, and eventually unite in their course, to form between them the river Dordogne.

It is from this glacial bed the ascent of the pic de Sancy takes its rise, and clothed, as it is very extensively, with a vigorous vegetation of verdure and wild flowers, it offers a strange contrast to the cold, bleak sterility at its foot. In stormy weather the wind on this spot whirls around it so violently as



to render it difficult to keep the feet, a matter somewhat serious when it is considered, that on the south-west side of this elevation is a precipice of nearly three thousand feet in depth.

The ascent up the pic is sufficiently steep and trying to the nerve, muscle, and wind of an inexperienced hill-climber, to afford a considerable amount of satisfaction at the achievement of the feat. The effort made to attain it however, is amply repaid by the magnificent and extended panorama seen from the summit.

It overlooks completely the mountain ranges of puy de Dome and Cantal. Lesser heights, which yet appeared so lofty from the vallies below, are dwarfed and confounded together into an almost dead level. From distance to distance may be noticed many a volcanic mount, some conical; others flattened at their tops; all, however, exhibiting the distinctive marks of their crater character.

Closely within sight, and contrasting with the dark landscape around them, glisten the blue waters of the lakes of Chambon, Chauvet, Pavin and Estervadon, each of them occupying the area of an ancient crater of very considerable dimensions.



The view extends on the one side to Nevers, and on the other as far as Montauban ; on the west it is lost in the horizon towards Bordeaux, and on the east it traverses numerous undulations, till it rests on the far distant chain of the Alps themselves.\*

The thermo-mineral station at Mont-Dore affords good hotel accommodation, and possesses a complete and well-appointed establishment for patients. In this respect it has a very great advantage over that of Bourboule. Placed some 3,000 feet above the level of the sea—a peculiarity that distinguishes it from the rest of these springs, excepting those of Cantaret, similarly situated—its atmosphere is so rarified as to produce a sensible effect on the respiratory functions, by modifying the oxygenisation of the blood, both as regards the degree and force of the chemico-physiological changes which take place in the process.

This fact, apparent in a general sense to mere casual observation, has been ably demonstrated by Dr. Jourdanet, who points out † that at the height of 1,000 metres, the human body sustains a weight

\* *Guide en Auvergne.*

† De l'altitude des stations thermales dans le traitement des affections chroniques de la poitrine.—*Gazette des Eaux*, 1862.



of atmosphere diminished by four hundred pounds, as compared with that which it supports at the ordinary level below. The air inspired in this high region loses an eighth of its density and of its normal weight; and the respiration receives but seven-eighths of the quantity of an equal volume of air respired at the level of the sea. Admitting the exactness of this calculation, which assigns four hundred and eighty litres of air as the quantity respired in an hour, there is here a diminution of sixty litres per hour, or one thousand four hundred and forty litres per day, which represents three hundred litres of oxygen. The air therefore, which enters the human organism, being of a density proportioned to the weight of the atmosphere, is breathed at the height of Mont-Dore with a diminished amount of oxygen, sufficiently notable to modify its force on the physical transformations that go on in the system.

On account of this subdued atmospheric action on the lungs, the climate of this situation is declared to be very favourable to, and even to aid materially the treatment of these waters in cases of delicate lung organisation, in persons suffering from



chronic irritation of the air-passages, and other conditions of embarrassed breathing.

According to commonly received notions, an atmosphere deteriorated in its vital property of oxygen would scarcely be regarded as a suitable locality for morbid conditions of the respiratory organs. The opinion, however, of Dr. Jourdanet, confirmed as it is by the experience of the late Dr. Bertrand, long the intelligent medical superintendent of the station, constitute together a practical authority which cannot, on mere theoretical grounds, be reasonably disputed.

Admitting this speciality in favour of Mont-Dore, there is yet no doubt that the more genial climate of Bourboule, no less than the richer properties of its waters, gives it a preference in certain other, and indeed, in the majority of diseases suitable for their treatment. The selection of the one or the other can only be rightly decided by medical advice, particularly since the benefit to be expected from the use of either, depends as much, if not more, upon the temperament and general organic condition of the patient as upon the nature of the disease.

As a rule, the waters of Mont-Dore are better



suited to persons of an impressible nervous temperament, of a delicately-organised structural system, and of an unusually acute susceptibility of the action of remedies in their ordinary way of use. The pure and rarified air of Mont-Dore is said to enable patients of this description to bear the treatment of its waters with greater tolerance, and consequently with better assured advantage. Less energetic and exciting than those of Bourboule, they yet largely resemble them in their action, though in a modified degree. So much alike, indeed, are their physiological and therapeutic effects, and their application in treatment, that it is unnecessary to repeat again in detail the cases in which they are here also prescribed and the mode of their administration. It is sufficient to say that they treat with success at Mont-Dore the same class of diseases as at Bourboule, and that, additionally, the most beneficial relief is found here in long-standing neglected catarrhs, chronic bronchitis, habitual asthma, and in certain stages of congestion and irritation of the mucous coat of the air-passages, not unfrequently supervening upon the sudden disappearance of cutaneous eruptions, and the abrupt



retrocession of gouty symptoms, and of muscular rheumatic pains.

For the exercise of this department, the establishment is provided with spacious inhaling chambers and convenient ante-rooms, forming an annex to the principal building, which is itself a large and commodious erection, with some architectural pretensions. It contains an extensive range of baths and douches, with piscines, all in excellent order, and furnished with every kind of apparatus required to render them efficient.

The station is supplied from eight sources, of which seven are thermal and one is cold. They spring from a volcanic soil, amidst the trachyte and tufa at the base of the plateau de l'Angle. Their temperature varies from 12 to 45 degrees Centigrade.

The waters of Mont-Dore have been analysed in conjunction with the waters of Bourboule, by M. Lefort; and the results of his labours have recently been published in the '*Annales de la Société d'Hydrologie de Paris*.' The principal sources are those of de Bertrand, de Cæsar, and du Grand Bain. The following is a synoptic table of their mineral contents and temperature :—



*Synoptic Table of the Principal Sources at Mont-Dore.*

	Bertrand	Cæsar	Grand Bain
Temperature . . . . .	45°	43°	44°
Free carbonic acid gas . . . .	0·352	0·596	0·381
Carbonates of soda . . . . .	0·536	0·536	0·545
„ potash . . . . .	0·030	0·021	0·030
„ magnesia . . . . .	0·175	0·167	0·167
„ lime . . . . .	0·342	0·320	0·314
Chloride of sodium . . . . .	0·368	0·358	0·363
Sulphate of soda . . . . .	0·076	0·076	0·075
Arsenite of soda . . . . .	0·00096	0·00096	0·00006
Silicite . . . . .	0·165	0·155	0·168
Iron . . . . .	0·020	0·025	0·023
Alumen . . . . .	0·012	0·009	0·008
Total of fixed principles . . .	1·408	1·388	1·404

It was not likely that the Romans, with their acute and practical instinct for military positions, would leave such a post as the site of the village of the baths unoccupied, being as it was the mountain pass over the shoulder of Mont-Dore from the valley of Bourboule to the plateau beyond Vassiviere on the other side. It is not surprising therefore that there should have been discovered at Mont-Dore the remains of baths of Roman construction. Dr. Bertrand, in his researches into the history of these springs, has suggested, and with much probability, that these are the relics of the ancient Roman establishment of Neris, mentioned in the records of Pentenger.



## ST.-NECTAIRE.

ALONG this pass over the shoulder of Mont-Dore, now a well-appointed highway, lies the route to St.-Nectaire, the mineral station next in succession on the road back to Clermont-Ferrand. Descending downwards, it crosses an extensive highland plain of luxurious pasturage, and well stocked with herds of cattle. Presently ascending again, it skirts the ridge of a wild and lofty mountain range, and eventually, by a steep and winding declivity overhanging a considerable precipice, dips down upon the lac Chambon on the right, and the well-preserved structure of the Château de Murol on the left. This ancient castle forms a picturesque object in the scene. It is surrounded with a wall at some distance from the building, strengthened at intervals by round towers, which in olden times rendered it impregnable against the means of war-



fare in use at the epoch of its feudal grandeur. From its battlements is obtained a splendid view of the surrounding mountains, and the waters of the lake Chambon lying still and dark beneath their overshadowing heights. This lake, so quiet and beautiful, fills in to a considerable depth the cavity of an ancient volcanic crater. From this point the route traverses a tolerably level country to St.-Nectaire, which is situated on a still considerably elevated plateau, with, however, some eminences rising around about it. On one of these, the high ground of Mont-Cornador, stands the church of St.-Nectaire, an interesting monument of Roman architecture. Close by are the ruins of an ancient château, formerly belonging to the family of Senectaire, which, notwithstanding a slight transformation of the word into a saintly form, has, in contradiction to the legend of a certain St.-Nectaire, evidently given its name to the village.

Mont-Cornador, designated by the name of Upper St.-Nectaire, overlooks a valley of a wild aspect, which has, from its position, appropriately been called Lower St.-Nectaire. This valley, bounded on the right by bare and arid hills, and on the left



by others clothed with pines of sombre green, little resembles the verdant vegetation and variegated foliage which elsewhere cover the eminences enclosing the principal springs of Auvergne. Beyond the rugged bounds with which nature has surrounded this village, there are, however, picturesque spots and smiling landscapes, conveniently accessible in every direction.

Out of the depths of Mont-Cornador, and from the rocky sides of the valley below, along its entire extent, issue numerous bubbling mineral springs, which mark their course by the yellow ferruginous deposits they leave behind them. They differ considerably in their temperature, and somewhat in the quantities of their ingredients, but resemble each other completely in the nature of their qualities.

Of these sources, eight only have been utilised for medical purposes ; the rest, some thirty in number, are expended in the formation of a series of remarkable petrifications, within a range of grottos extending to a considerable distance under Mont-Cornador. This process is turned to a profitable account with much tact and taste, by the transformation of various casts of art into a state of petrification. The exhi-



bition of these grottoes, and the sale of their products are a source of considerable emolument to the locality and have obtained for it a wide-spread reputation. It may be interesting briefly to describe the process by which these transformations are effected. The water is made to flow to a certain distance through wooden troughs, in order to deposit in its course a proportion of its iron, and so to diminish its colouring power. Then, regulated by a mechanical contrivance, it is made to fall in an attenuated stream from a certain height upon the objects placed beneath it for petrification. The carbonate of lime which is held in solution by the predominance of carbonic acid gas, parts with this gas in its fall, and is deposited in minute crystals on these objects, and forms around them a brilliant and polished coating which permanently preserves their shape. These coarser petrifications, however, present to the eye diminutive crystals, which constitute the calcareous covering, brilliant in appearance, but wanting in the more exact and delicate outlines of the moulds submitted to the process. To obtain this latter result, moulds made with a portion of sulphur, bearing the forms of higher art in *bas-relief*, are placed under the



influence of this mineral stream, which in due time produces a polish, hardness, and transparency so admirable, as to obtain for them a well-deserved notoriety.\*

These waters are medically administered at three principal establishments—les bains de Mont-Cornador, on the heights, and les bains Mandon, and de la Boette, in the valley below. The source Pauline has lately been utilised for the special employment of vaginal injections, by means of the ascending douche.

The sources in the valley contain, in a litre of the waters, two grammes of bicarbonate of soda, and two grammes sixty-six centigrammes of the chloride of sodium, with considerable proportions of carbonate of magnesia, lime, iron, and an appreciable amount of arsenite of iron and soda. The source of Mont-Cornador is somewhat less richly impregnated with these properties. These waters, therefore, are chloro-bicarbonates and ferrugineous, and among the most highly mineralised of all the springs of Auvergne; holding in solution, per litre, seven grammes fifty centigrammes of saline material. Richly endowed as these waters are with alkaline carbonates,

\* *Les Eaux Thermo-minérales d'Auvergne.*



the predominating amount of chloride of sodium, and the addition of iron and arsenic, gives them a therapeutic action, differing from that of the class of waters characterised mainly by their preponderance of free alkalis.

Hence, although they have been likened by some to the water of Vichy in their properties, they resemble in their curative effects much more closely those of Mont-Dore and Bourboule, between which and those of Royet they really hold an intermediate position. Practically, indeed, it has been found that the forms of disease, over which they exercise the most complete control, are not those treated with the greatest success at Vichy. There is no doubt, however, that their abundant alkaline principle performs an important part in mitigating certain symptoms in diseases which are yet, however, in their essential nature, principally benefited by the other properties of these waters. In this sense it materially adds to their value. The temperature of these sources varies from  $18^{\circ}$  to  $45^{\circ}$  C., and may therefore be used both internally and by baths and douches at varied natural temperatures, suitable to their object, an advantage of no small importance in their employment.



*The following is an Analytical Table of these Waters, made by M. Lefort in 1829.*

Sources	Mont Cornador	Boette	Mandon
Temperature . . . . .	39° C.	35° C.	38° C.
Fixed principles . . . . .	6.515	7.064	7.580
Carbonic acid gas, free . . . . .	0.946	0.860	0.530
Carbonates of soda . . . . .	2.000	1.951	2.088
"    potash . . . . .	0.064	0.047	0.040
"    magnesia . . . . .	0.438	0.468	0.481
"    lime . . . . .	0.648	0.659	0.706
Chloride of sodium . . . . .	2.146	2.763	2.414
Sulphate of soda . . . . .	0.130	0.160	0.178
Arsenite of soda . . . . .	traces	traces	traces
Silicate . . . . .	0.104	0.112	0.103
Iron . . . . .	0.012	0.011	0.009
Alumen . . . . .	0.017	0.023	0.020

These waters show their physiological effects upon the system, by increasing and regulating the appetite, and facilitating digestion. At first they somewhat diminish the action of the bowels. They produce a certain degree of thirst, and act much more powerfully on the kidneys than on the skin. Used with the baths at their full temperature, they have a very decided and beneficial effect upon persons of a lymphatic temperament. They produce and maintain an increased activity of the circulation and of the general organism, which Dr. Allard \* seems to think is liable

\* *Eaux thermo-minérales d'Auvergne.*



to become over stimulating to the heart, and a too powerful excitant to the nervous system; that, indeed, their uninterrupted continuance might lead to other indications of the supersaturation of the hydro-mineral influence in the system.

Dr. Dumas Aubergier, however, the present able inspector of the station, refutes this notion by an appeal to the experience of some two thousand cases, which, by judicious management in the administration of these baths, he has been able to conduct throughout their entire course, without being interrupted by any untoward circumstances.

The therapeutic action of these waters has been found highly advantageous in the treatment of chronic articular and muscular rheumatism. In sciatica, and indeed in all forms and states of neuralgia, it has been regarded as a speciality. In these cases the employment of the baths and douches at their most elevated temperature has, as a rule, been attended with the most prompt and decided benefit.

Dr. Vermère, who for upwards of twenty years was the medical inspector of these springs, regards them as being very successful in arresting the progress of incipient scrofula. This opinion has since been con-



firmed by the increasing number of strumous cases which seek and obtain the benefits of these baths each succeeding season. By the same authority they are recommended for the relief of certain forms of mucous irritation of the trachea and bronchial tubes, induced by a latent rheumatic or scrofulous taint in the system.

Professor Nivet, in his remarks on the curative properties of the springs of St.-Nectaire, recommends them especially to patients of a relaxed tone of constitution and fibre, and of a lymphatic temperament. In chronic congestion of the uterus, he considers they improve the vascular condition of this organ, and dissipate, by their tonic and re-constructive action, the state of chloro-anhemia which accompanies it.

He also advises their use in amenorrhea and atonic leucorrhœa, in catarrh and sub-acute inflammation of the urinary organs and passages, in gastro-enteralgies not complicated with existing gastro-enteritis, and in chronic congestions of the liver and spleen.

M. Rotureau, in his tables of the mineral waters of France, compares the springs of St.-Nectaire to those of Carlsbad, and the classification of such an authority on the subject is well worthy of depen-



dence. It is true that the temperature, and in some items the mineralisation, of these two varieties of waters do not accord so exactly as the comparison would indicate. He admits this himself, indeed, in certain particulars, while he associates in the main their most important and characteristic qualities, on which depend their most energetic therapeutic action. He points out, in completing his observations on the properties of the sources of St.-Nectaire, that though in some respects, there is but a distant, in others there is a striking, resemblance between these waters and those of Carlsbad. Their thermality is not the same, and their gaseous composition and fixed matters differ slightly from the waters of St.-Nectaire, which contain only a trace of sulphate of soda, whilst those of Carlsbad are composed of a notable quantity of this salt. Both the one and the other, however, are richly endowed with the elements of bicarbonates and chlorides, and in about the same proportion. The effects of these predominant properties on the human organism, which have obtained for these, the most important of the springs of Bohemia, their highly established reputation, are consequently a no less well-founded



recommendation in favour of the waters of St.-Nectaire.

The establishments at St.-Nectaire are small, and very humble in their construction and internal fittings. That of Mont-Cornador is much better appointed than the other two. Each, however, is sufficiently furnished with the means of administering the waters at the drinking fountains, and by baths, and horizontal and ascending douches at varied temperatures.

They are supplied also with an apparatus for the employment of carbonic acid douches, here also a speciality in certain neuralgic affections and acutely painful muscular rheumatisms. Notably, there are eye douches, with a fine jet for the application of carbonic acid in indolent congestions and chronic inflammations of the conjunctiva and eyelids, whether arising from a strumous habit or other morbid constitutional conditions. This treatment is combined with a course of bathing, and has been attended with very considerable success.

The supply of these waters seems to be boundless. Along the course of the village, there is scarcely a spot where, to quote Dr. Allard's expression, a stroke



of the pickaxe would not give birth to a new source. In numerous places, indeed, these springs spontaneously bubble forth, and, with little labour and expense, would furnish many a site of ample space, for erections sufficiently extensive and commodious, to do justice to the rich hydro-mineral resources nature has here so bounteously provided.

There is reason to believe that great improvements will shortly be made at this station.



## ST.-MARGUERITE.

THE way from St.-Nectaire to Clermont-Ferrand conducts to the mineral springs of St.-Marguerite. They lie a little off to the right, near the river Allier.

Leaving St.-Nectaire, the road is skirted on the right by a rapid rivulet, sometimes seen, at other times hidden by rising and falling inequalities in the adjoining scenery. About a mile onwards, by a steep fall in its bed, it forms a picturesque cascade of considerable descent. Immediately afterwards the stream turns round the base of a low but remarkable-looking crater cone; the blackened ashes at its summit overlapping its red baked sides, serve still to retain in a complete state of preservation all the volcanic characteristics impressed upon it at the time its fires became extinguished.

From this point the landscape gradually loses its



highland features, and the route descends into a plain luxuriant with every kind of agricultural produce, the chief characteristic of the commune of St.-Maurice, in which the station of St.-Marguerite is situated.

The composition of these waters resembles generally that of St.-Nectaire; than which, however, they make a nearer approach to the alkaline properties of the springs of Vichy, in consequence of containing a larger amount of the bi-carbonate of soda, though a lesser quantity of the chloride of sodium. Their temperature is also below that of St.-Nectaire. They are therefore better adapted for the treatment of some of the semi-acute forms of disease, for which these waters are commonly prescribed. They differ still more greatly, in point of thermality, from the waters of Vichy, but on that account they possess the advantage of being better borne by feeble constitutions, and in cases characterised by unusual debility and subdued vital energy, they ought properly to be preferred.

The relatively reverse proportions of the two principal chemical elements, the bi-carbonate of soda and the chloride of sodium, in the waters of St.-Nectaire



and St.-Marguerite, are made manifest by a comparison of the analysis of the former (already given), with that of the latter, represented in the following table.

*Table of Analysis of the Waters of St.-Marguerite, by Dr. Nivet, in 1844.*

Temperature . . . . .	34° C.
Total quantity of fixed principles . . . . .	6·787 grammes
Carbonates of soda . . . . .	2·969 „
„        magnesia . . . . .	0·333 „
„        lime . . . . .	0·919 „
Chloride of sodium . . . . .	2·030 „
Sulphate of soda . . . . .	0·201 „
Silicate . . . . .	0·160 „
Iron . . . . .	0·049 „

These waters are found to be extremely successful in removing the chronic remains of gout and rheumatism, so apt to linger in a system greatly prostrated by their acute attack. They act very effectively in irritable conditions of the kidneys and bladder, from a tendency to excess of lithates in the urine; as they have a gentle laxative effect upon the bowels, they are beneficial in obstinate constipation and sluggish action of the liver. From their antacid properties they relieve gastralgia, and all the several forms of dyspepsia.

Dr. Calamy, who for some years made a study of



these waters, in a report to the Prefecture of Puy-de-Dôme, sums up his remarks by recommending them in chronic affections of the digestive organs and of the liver; in subacute nephritis and calcareous deposits, and in catarrh of the bladder, and neglected catarrhal affections in general. In muscular and chronic articular rheumatisms, he regards them as having a particularly decided effect.

The internal exhibition of these waters, which forms an important part of the treatment, is, under all circumstances, readily borne in full doses by the stomach; while the baths at their natural temperature are invariably tolerated, even in extreme conditions of debility and irritability of the system.

The establishment at this station is capable of considerable improvement. Formerly well known by the name of Vie de Comté, it was held in great repute. The superior accommodation, however, and more favoured situations of most of the other stations, have no doubt been of late years more attractive to patients; but in its place, and for its especial purposes, it still deserves, and ought to retain, all its pristine celebrity.



## MÉDAGUES.

IN the same neighbourhood on the right bank of the river Allier, in the commune de Joze, and near to Meringues are situated the springs of Médagues.

They are described by Drs. Allard and Boucomont as consisting of three principal sources which, from their approximation and similarity of mineralisation, might be readily united and made to furnish an abundant supply for a very large establishment. The soil from whence they escape forms part of an extensive alluvial deposit, which covers all the district east of the Limagne, and consists of a mingled *débris* of granite, quartz, and basalt.

The waters of these springs were analysed in 1845, and the following is a table of their composition :—



Temperature . . . . .	15.5° Cent.
Free carbonic acid gas . . . . .	1.070 per litre
Total of fixed principles . . . . .	5.565
Carbonates of soda . . . . .	1.459
„ potash . . . . .	0.013
„ magnesia . . . . .	0.245
„ lime . . . . .	2.299
Chlorides of sodium . . . . .	0.090
„ magnesia . . . . .	traces
Sulphate of soda . . . . .	0.078
Arsenite . . . . .	0.044
Silicate . . . . .	0.055
Iron . . . . .	0.034
Organic matter . . . . .	traces
Alumen . . . . .	0.001

They are colourless and transparent, and give a very decided odour of bitumen. They disengage a considerable amount of carbonic acid gas. Their flavour is at first acid and piquant, and afterwards alkaline. They effervesce and sparkle like champagne, and on very impressible temperaments produce a slightly intoxicating effect, very evanescent, however, and causing no inconvenience. They contain a notable gelatinous matter of an unctuous character, which gathers and agglutinises the hydro-oxide of iron and calcareous matter they meet with, so as to encrust in a remarkable manner the vegetation over which they flow. These waters are purgative and diuretic, and are used with great advantage in



chronic gastralgia and gastro enter-algia ; in congestions of the liver and spleen ; and in chronic affections of the urinary passages, and of the generative organs. The bituminous element contained in their composition makes them especially beneficial in the treatment of chronic catarrh in its worst forms. They are principally used internally, and the permanent nature of their composition fits them especially for transportation. In the neighbourhood and for some distance round about, they have a high reputation, and are greatly appreciated. They require only to become better known to obtain a much more extensive field of circulation.

The road from these stations onward to Clermont-Ferrand passes through a well-cultivated plain, always in sight of, and sometimes approaching the foot of the range of hills which form the immediate boundary of the highland district of Puy-de-Dôme.

The slopes of these eminences are dotted here and there with the white-walled and red-roofed edifices of several considerable-sized villages, forming a series of views on the way, very pleasing in their effect. The whole rout to Clermont conveys the impression of a cultivated, well-populated, and thriving country and people.



## CHATELGUYON.

IN an opposite direction from Clermont-Ferrand on the railway rout to Paris, and near to the town of Riom, the first station on the line, are situated the springs of Chatelguyon.

On the one side this village, numbering 2,000 inhabitants, looks down upon vine-clad slopes, descending into the plain towards Riom; and on the other up to a chain of mountains covered with heather and dark patches of pine woods.

The character of the scenery, variegated by this remarkable contrast, is peculiar and striking, while the historical records of the locality invest it with a no less particular interest of another kind. The ruins of the castle of Chazeron perched on high, and the once menacing, though now mutilated donjon of Tournoël, tell plainly enough the story of their feudal influence, over the destiny of the neighbourhood, when the valorous, but turbulent Guy Comte



d'Auvergne, occupied the chatel, and thus established the name of the place.

At the outskirts of the village runs the Sardon, a shallow rivulet, into which flow freely and naturally currents of mineral waters from the sources along its margins, marking their point of juncture, and for awhile their course, by the bubbles of carbonic acid gas they disengage and send to the surface. For some distance the stream is so highly charged with mineral properties as to have become, by a tolerated privilege, a gratuitous means of medication to the villagers.

The springs are so numerous, and so abundant in quantity, as to expend themselves in a great measure in waste.

Some of the most important sources only have been utilised, but they are more than sufficient for the supply of the principal establishment of the station, which under the able direction of M. Brosseau is admirably administered. It is quite complete in all its appointments. The bathing department is well constructed and commodious, and provided with the several varieties of douche apparatuses, and with piscines. The baths are fed from below with a con-



stant current of fresh water. A pipe and stop-cock is attached, connected with a heating apparatus. By these means the temperature of the baths can be readily exalted for special purposes. The piscines are also furnished with an overflowing stream of water. A lesser establishment has lately been built, which being supplied with water at a lower thermality, is often preferred for drinking, and sometimes for the same reason recommended to bathers in certain forms of disease and states of constitution.

The temperature of these waters varies from 30° to 36° Centigrade, but they completely resemble each other in their mineralisation. The following is an analysis of their chemical composition :—

*Table of Analysis of the Waters of Chatelguyon.\**

Temperature . . . . .	35·5° to 36° Cent.
Carbonates of magnesia . . . . .	0·345 grammes
„ lime . . . . .	0·063 „
Chlorides of sodium . . . . .	1·874 „
„ magnesium . . . . .	0·989 „
Sulphate of soda . . . . .	0·610 „
Arsenite . . . . .	traces
Silica . . . . .	0·096 „
Iron . . . . .	0·048 „
Alumen . . . . .	0·070 „
Free carbonic acid gas . . . . .	1·550 per litre
Total quantity of fixed principles . . . . .	7·281 „

\* Source, Brosson. By M. Gonod in 1859.



According to M. Barse, the amount of carbonic acid			
gas is . . . . .	.	.	0·755 per litre
He also found of sulphate of soda . . . . .	.	.	1·700 „
And Dr. Nivet of the same . . . . .	.	.	0·585 „
M. Chevelier found of sulphate of magnesia . . . . .	.	.	0·093 „
And of sulphate of potash . . . . .	.	.	0·111 „

These later supplementary investigations seem to explain more satisfactorily the aperient character of these waters.

M. Chevelier has found a very appreciable quantity of arsenic in these waters. Their specific gravity is 1·005. A litre of the water contains nearly three-quarters of a litre of free carbonic acid gas; that is to say, the gas is lodged amongst the molecules of the water without increasing the volume.

According to M. Barse, there are more than 3 grammes, 627 milligrammes of salts soluble in ordinary water; and 1 gramme 535 milligrammes of insoluble salts in each litre.

These waters are colourless, inodorous, limpid, and sparkle as they are poured into the vessel. They have a strong saline taste, resembling glauber's salts. Left at repose for some days in the open air, they become covered with a pellicle, which on agitating them, is precipitated in flocculi, forming a yellow



deposit at the bottom, ferruginous in its nature. The same kind of deposit marks their track as they flow from their sources, and is found in the canals through which they run.

These springs have been given a general place among the acid-salines, a vague and seemingly not very appropriate classification, as it confounds them with a host of others, altogether different in the nature of their medicinal properties.

They possess a very decided purgative property, which the proportions of their saline ingredients would not seem sufficiently to explain. M. Rotureau, indeed, and most probably on that account, has expressed a doubt of this aperient action, which has been equally entertained by the authors of the *Dictionnaire d'Hydrologie*. Experience, however, in the employment of these waters has long since confirmed and established the fact. In some cases, a single glass in the morning suffices to act freely on the bowels ; in others, two or three, or more are required to obtain the same effect ; but, administered in sufficient doses, this purgative action may be invariably depended on.

Dr. Aguilhon, formerly and for twenty years in-



spector of the station ; Dr. Deval, his predecessor ; and Dr. Chaloin, the present medical superintendent, all regard the waters of Chatelguyon as possessing, in the highest degree, and more than any other waters in France, this purgative property.

The therapeutic action of these waters is digestive, deobstruent, diuretic, laxative, and purgative.

These several effects are determined by a special and exact adaptation of the doses to their object.

Dr. Chaloin describes their action on the functions of the system by the terms ' general ' and ' special excitation.' \*

A very brief employment of these waters augments the powers of nutrition and assimilation, and in this way excites to increased activity the functions of the entire economy. The pulse is slightly accelerated, and becomes stronger and fuller ; the respiration more frequent ; the muscular movements more free and energetic ; and the secretions more abundant.

Chronic diseases, under this general excitation, are apt to be temporarily recalled into a certain sub-acute state of activity ; but this is regarded as a

\* *Étude sur les Eaux minérales de Chatelguyon.*



more favourable condition for the subsequent remedial effect of the treatment. Under the influence of this reaction, the morbid inertia of the implicated structures is in a measure overcome, and the inherent vital powers regain, to a certain extent, their normal energy.

The special excitation of these waters is exerted along the tract of the intestinal canal. The gradation of their operations takes place in the following order. Their most moderate effect is simply to accelerate the peristaltic movement of the alvine tract. In a further degree, they excite the follicles and glands of the mucous surface of the intestines, and induce a gentle relaxation of the bowels. Carried to their fullest extent, they produce copious purgation. Under proper supervision they may, of course, be made to accomplish either or all these effects, according to the nature and stage of the ailments they are intended to treat.

Internally administered, they exercise a special influence over the several forms of gastro-enteric disorders, known by the general term of dyspepsia. They promptly relieve gastralgia, eructations, flatulent distensions, and other morbid symptoms which



characterise an embarrassed and languid condition of the digestive process. A sufficiently lengthened course of their treatment rarely fails to overcome habitual costiveness, and the obstinate state of constipation caused by atony of the muscular fibres of the intestines, or diminution of the biliary and mucous secretions.

They are powerfully deobstruent when the action of the baths at their full temperature is, at the same time, combined with proper doses of the waters.

Great benefit has been derived from them in abdominal plethora tending to hemorrhoids; engorgements of the abdominal and pelvic organs, with torpidity especially of the liver, with or without jaundice; and of the spleen after miasmatic fevers. In incipient scrofulous enlargement of glands, both external and internal; and in chronic congestion of the neck and body of the uterus.

In uterine diseases the ascending douche is appropriately added to the other means of treatment.

Dr. Chaloin recommends their employment in neglected catarrhs of the trachea, bronchi, and bladder; in gravel; in chronic articular rheumatism;



and in what he terms an herpetic diethesis imposed upon the skin by a morbid condition of the digestive functions; in which, the action of these waters on the secretions and coats of the intestines produces an alterative effect, and relieves the cutaneous surface.

The springs of Chatelguyon have long had a reputation in the neighbourhood for the cure of sterility; and Dr. Chaloin thinks this popular tradition is not altogether without a creditable foundation. He affirms that he himself has met with a sufficient measure of success in the treatment of these cases, to induce him to place considerable confidence in its further trial. He proposes to make a special study of this subject, and should his expectations be supported and confirmed by future experience, a most important addition will be made to the already well-established character of these springs.

The environs of Chatelguyon abound in pleasant promenades and agreeable drives, presenting everywhere in view the most remarkable contrasts of scenery. On the one hand, the cultivated slopes and plains, animated with all the social and agricultural activity of a civilised community; on the other, the distant, wild and severe, through picturesque high-



lands, peering down in all the silent and solitary grandeur of undisturbed nature.

The climate of Chatelguyon is most favourable for invalids. The heat of summer is tempered by the breezes which descend from the mountains, while it is protected by the same means against occasional cold winds from the north. The village affords good hotel and private accommodation for visitors.



## CHATEAUNEUF..

AT the north-western boundary of the department of Puy-de-Dôme, in a lovely valley, embosomed amidst the topmost eminences of this extremity of the mountain chain, are situated the thermo-mineral springs of Chateauneuf.

Distant some fifteen miles from Riom, they are reached by a route which winds its way steeply up and down, but always on the ascent, and gains, by degrees, range after range of the upland country. At each stage of the journey the scenery becomes, on every side, more and more wild and severe in its character, till, passing through the village of St. Pardoux and mounting a considerable acclivity, the valley of Chateauneuf comes suddenly into view, lying at the foot of an amphitheatre of wooded descents, surrounded with a rich verdure, and skirted by the meandering stream of the Sioule.

The unexpected vegetation of this charming spot is the more striking, from its contrast with the barren and dreary highlands through which it is approached.



Deeply seated as is this luxuriant glen, it is still some 1,200 feet above the level of the sea, and enjoys all the advantages of a rarified atmosphere, with the shelter afforded it by its peculiar situation.

In addition to the beauty of its site and the salubrity of its air, its springs are richly endowed with mineral elements. Four of its sources have been utilised for medicinal purposes, but their appointments are of a very primitive character. They consist simply of plainly constructed baths, douches, and piscines, adapted to and sufficing for the wants of the immediate neighbourhood, to which their benefits have hitherto been almost entirely confined. The quality of these waters, and the loveliness of the locality, ought, however, to obtain for them an extended notoriety. Better known, they will undoubtedly become more esteemed, and in course of time, take their proper place amongst the thermomineral springs of Auvergne.

The temperature of these springs varies from  $15^{\circ}$  to  $37.5^{\circ}$  Cent., and this difference in thermality divides them into two groups, which are situated at some distance from each other, on the left bank of the Sioule, and are separated by a steep and considerable eminence.



The waters of the Grand Bain Chaud, which supply the warm baths and douches, occupy the ground floor of the principal edifice, and those of the Bains de César, placed above them under the same roof, furnish the piscines at a lower temperature. This establishment is situated beside the river in its downward stream, while its upward course around the hill before mentioned, leads circuitously to the sources of le Petit Rocher, and de la Rotonde. These, from their colder temperature, are properly adapted for internal use. The mineralisation of these springs is very similar to that of Royat, as will be seen by the following synopsis of their chemical elements.

*Analysis of the Waters of Chateauneuf, by M. Lefort, 1854. Le Grand Bain Chaud.*

Temperature . . . . .	37·5° C.
Total amount of fixed principles . . . . .	4·549
Carbonates of soda . . . . .	1·288
„ potassa . . . . .	0·551
„ magnesia . . . . .	0·212
„ lime . . . . .	0·401
Chloride of sodium . . . . .	2·146
Sulphate of soda . . . . .	0·130
Arsenite of soda . . . . .	traces
Silicates . . . . .	0·104
Iron . . . . .	0·012
Free carbonic acid gas . . . . .	0·945
Alumen . . . . .	0·017



The waters of Chateauneuf belong to the soda chlorio-bicarbonate ferruginous class. In this respect they approach in character those of Royat, and partake of their remedial properties. They are specially beneficial in all forms of chronic rheumatism, whether articular, muscular, or neuralgic. It is usual, in these cases, to employ the combined action of the baths and warm douches. From their temperature, and the constitution of their ingredients, they may be used daily without intermission, even where there is considerable general debility and nervous irritability of the system.

They are equally efficacious in the treatment of lingering gouty arthritis, in its several forms; and in certain dermatous disorders consequent upon the retrocession of ill-developed and low-toned rheumatic and gouty symptoms. In these conditions the disappearance of the cutaneous affection is sometimes followed by a return of the antecedent disease, which, in its turn, however, readily yields to a continuance of the treatment. At other times, these latent morbid elements are apparently neutralised in the system and eradicated, during the same curative process. It is the practice, in these cases, to



recommend, with the baths, the internal use of the waters, which are taken at the fountains of the colder springs. In this manner they have also been exhibited with great advantage in affections of the genito-urinary passages; especially in vaginal mucous discharges, and simple congestion of the uterine orifice. In the latter case, the ascending douche becomes a useful adjunct to the rest of the treatment. The colder waters drunk at the distant springs du Petit Rocher and de la Rotonde, have been prescribed with the most beneficial effects in the various forms of dyspepsia. The invigorating walk over the intervening hill, amidst the fresh breezes which blow around it, conduces greatly to fit the patient for the benefits of the waters, and adds in no slight degree to their efficacy.

The waters of Chateauneuf, from their thermality and force of mineralisation, are particularly well adapted to cases of a nervo-lymphatic temperament and hyper-æsthetic nature. The peculiar state of susceptibility, common to patients of this class, frequently prevents them undergoing a complete course of mineral treatment of a higher power and temperature. At this station, however, they would



find the treatment suitable for their condition, and capable of being readily borne. The salubrious but tempered climate, and magnificent scenery of the locality, have a physical and moral influence on persons of this description, highly favourable for the action of the waters.

To the more able and adventurous, the crests of the surrounding heights offer a grand and glorious prospect; while the route over the mount in the valley, already more than once alluded to, provides a carriage drive, which presents, at every turn of its winding ascent, a new view; each a picture in itself, only to be surpassed in beauty, by the effect of the whole scene from the summit.



## CONCLUSION.

THERE are several other thermo-mineral sources in Puy-de-Dôme, and many in Cantal, having a high local reputation, but which do not come within the limits and object of the present work.

The most important, however, have been sufficiently described to place before the public the abundant, rich, and varied resources of this district, as well as its general advantages.

Some of these springs agree exactly in their qualities, and almost as completely in the quantities of their mineral and gaseous elements, and degree of temperature, with certain of the most celebrated German Spas.

As examples, may be quoted the very close analogy between the waters of Royat and Ems; and St.-Nectaire and Carlsbad. It is, therefore, but just to claim for them an equal position in the estimation of their remedial powers.



Many of the sources closely approach, in the nature of their mineralisation, those of Vichy; and though, from their lesser alkalinity, they are not so well suited for the more acute condition of diseases, they are yet, on that account, more appropriate for the larger class of atonic and chronic cases, which, after all, furnish the greater number of patients able to take advantage of a course of mineral treatment.

Others, such as the springs of Puy de la Poix and Bourboule, stand alone in the rich supply of their particular mineral elements. The sulphurous waters of the Pyrenees alone resemble, but in a greatly diminished degree, those of Puy de la Poix; while the waters of Bourboule, in their arsenical properties, even admitting the high qualities of those of Mont-Dore, are still without a rival in the hydro-mineral world.

The right of working most, if not all these stations, has lately been conceded to an Anglo-French Company, by the authorities of the several communes in which they are situated.

Hitherto, unfortunately, the panic in the money market, which has for the present paralysed the



action, and created a distrust of all share speculations, is stated to have delayed the operations of the Company. Awaiting, no doubt, a more favourable opportunity, they will be able to satisfy the public that it is an object well worthy of support. Certain it is, that these sources possess the highest possible mineral qualities, fitted for immediate use; and the largest natural capacities, ready for future development. The establishments have hitherto been, and continue to be, in successful and remunerative employment. They merely require to be expanded. The workable material is provided without limit and without expense; it only needs to be further utilised. Enlarged buildings for bathing, and increased accommodation for visitors, alone are wanted, and as these would promptly repay the means invested, and in all probability found more than one future Vichy, with all its splendid prospects, the object seems to offer most reliable pecuniary advantages to the capitalist.

The means of supply at most of the sources is abundant and inexhaustible. At some of the stations the waters spring forth in exuberant profusion through all available outlets, and run off to waste.



In all, very little artificial aid would serve to amplify their resources to any required extent.

Formed under the soil of a country once the scene of a series of blazing volcanoes, it is probable, that retired within their present subterranean confines, these fires have retained a closer and more direct intercourse with the surface than is the case with the internal incandescence generally ; and hence that they possess an unusual activity and facility in the transformation of the elements of the contained earths and metals, into a condition suitable for their solubility and transmission. The unceasing changes resulting in certain constant and exact chemical compositions, and the invariable degree of temperature of the water in which they are dissolved ; the entire process, indeed, of hydro-thermal mineralisation, is as remarkable as it is interesting. For centuries it has been going on, and ever since it has engaged the attention of scientific observers, at almost every source under notice, the temperature and quality of the waters have been found to remain unchangeably the same. There seems a permanency in this order, so long and well established, which is probably destined to continue to the end of time,



unless some other volcanic convulsions take place to alter the present geological construction of the district.

Meanwhile, in a moral as well as a natural point of view, it is impossible not to recognise and admire the all-wise and gracious providence of God: which, out of the depths of this seething cauldron of molten matter, and atmosphere of steam and gases—even amidst their turbulent chemical action and reaction on each other—has evolved the affinities of an orderly process of thermo-mineralisation beneficently ordained, and medicinally adapted, to the wants and benefits of mankind.

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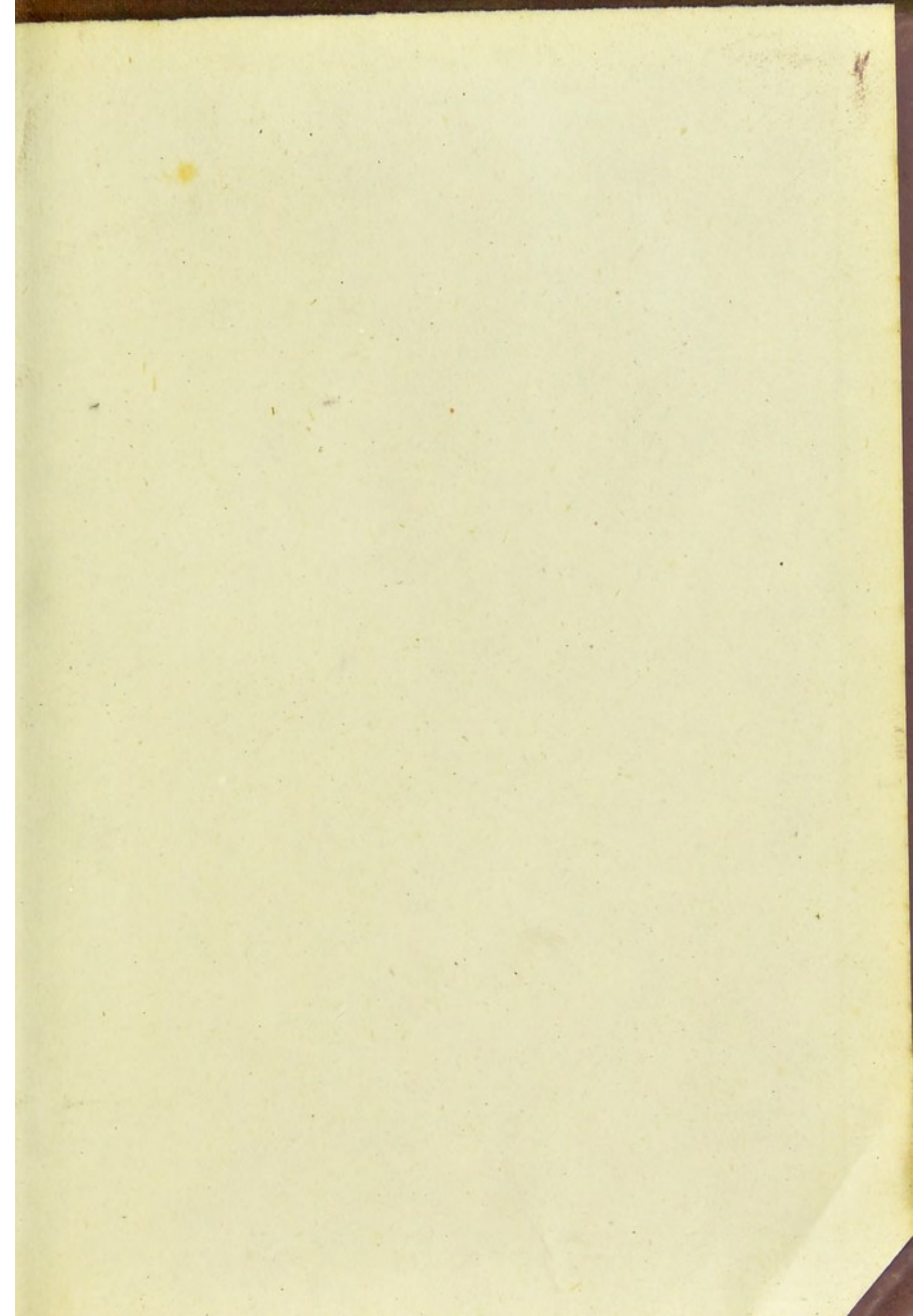
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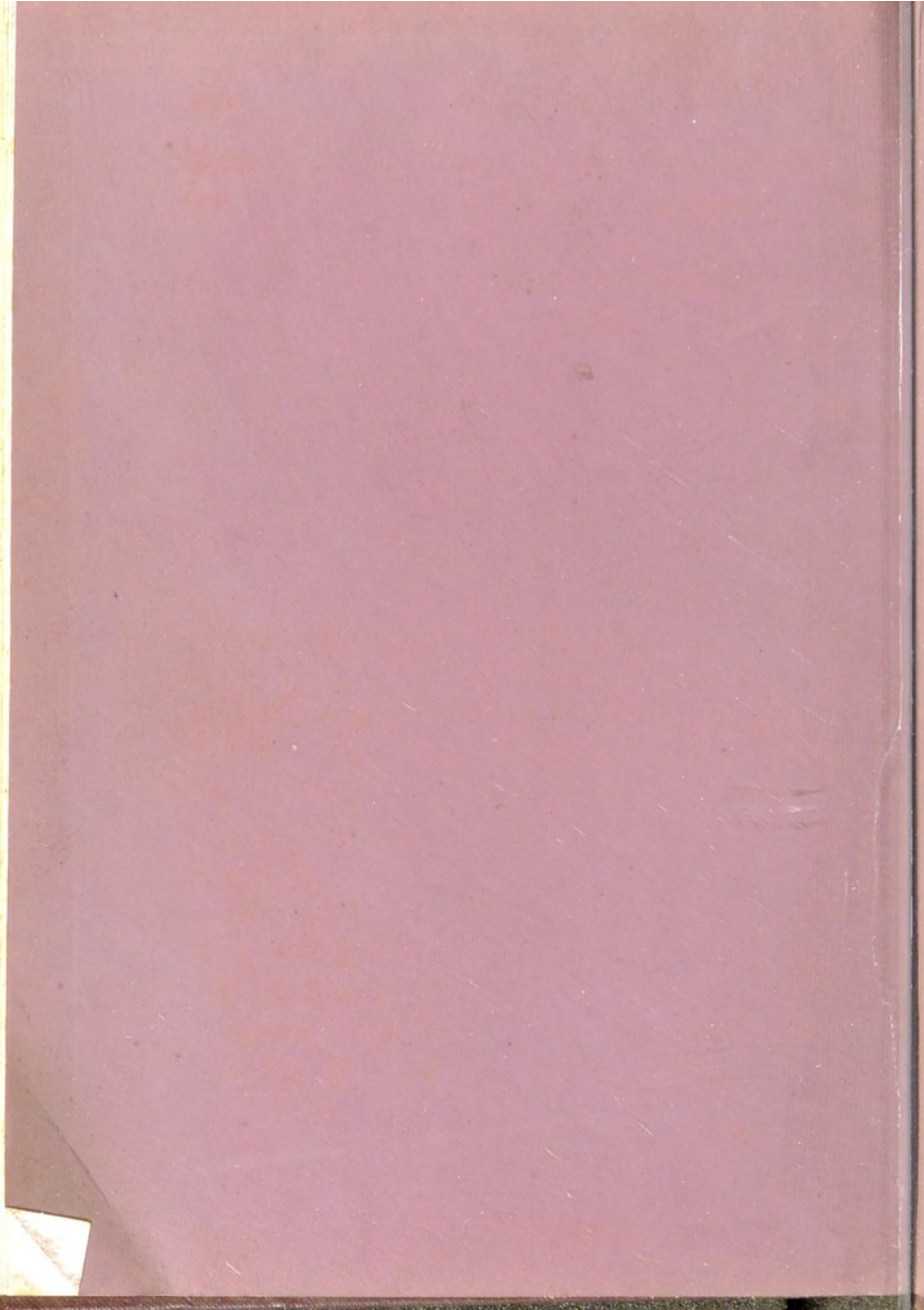














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