

into separate hills. Alternate upheaving and depression by subsequent subterranean agency have, in all likelihood, helped to complete the phenomenon. That everything has been very much as it is—cold, hard, and fixed—here and in other parts of Auvergne for two thousand years, is beyond a doubt. Cæsar saw the country as it now appears to the tourist; nor does it seem that he was at all aware that the mountains over which he led his legions had once smoked and raged like Vesuvius.

Latterly, the ravine on the face of Gergovia has been rapidly enlarging towards the valley beneath; masses of the calcareous strata have been undermined by the torrents, bringing down with them the superincumbent matter and portions of the vineyards which decorate the lower flanks of the mountain. From this and other quarters, great quantities of rubbish are annually floated into the Allier, and thence into the Loire, filling their beds, and rendering them almost useless to navigation. Fragments of basaltic rock from Gergovia and its kindred mountains are daily rolling on their way down the beds of these rivers, forming, by their mutual abrasion, the gravel and boulders which in summer appear in long dry reaches on their banks. And thus, in process of ages, are massive mountains of lava frittered down to the pebbles beneath our feet. Is anything insignificant?

It would be reasonable for an inquiring mind to ask, if there be no expiring manifestations of the heat which once found vent in the volcanoes of Auvergne. The only existing symptom of this ancient combustion is found in the hot springs of Vichy, Royat, and Mont d'Or. The high temperature of these waters is, with probability, traced to the same agency which in former times produced the puits we had been visiting.

These hot mineral waters, however, are less singular than another kind of springs not uncommon in Auvergne, two of which, and by far the most remarkable, rise within the outskirts of Clermont. The day after our return from our mountain excursion found our party threading its way into the suburb of St Alyre, in quest of its famed springs; which we at length alighted upon within a private garden. These waters, which gush in considerable volume from the ground, are called Fontaines Petrifiante; but this is scarcely correct. Calcareous in their nature, they only cover with a yellowish fawn-coloured crust any object with which they are long in contact. Being conducted by artificial channels from their source, the water drops from them, and forms vast stalactitic aggregations of limestone. One of the masses, in progress of increase at the rate of two or three inches per annum, forms a substantial bridge across a rivulet. The formation of travertine is so ordinary a phenomenon, that it is no wonder, and I should not think of expatiating on the subject, unless for the purpose of showing my countrymen what may be done by ingenuity to make a spring of this nature useful in the arts, or, to speak in a language perhaps better understood, useful in turning the penny.

Led by a damsel, the naiad of the fountain, we are conducted through the garden to an erection of boards, a rude hut, into the roof of which we observe the water precipitated from its conduit. Opening the door, we perceive a house full of spray. The water, diverted into sub-rills, is dashed and splashed about on the floor, and on tiers of shelves, in a very odd sort of way, being permitted, after performing this service, to escape by a channel beneath. Looking through the spray from the multitude of cataracts, we perceive that, scattered all over the place, on the floor and on the shelves, there lie moulds of medals, and other objects, all in the process of receiving an incrustation. The spray falling in showers, deposits minute particles of the substance held in solution in the water, and which are so fine, that the water appears clear to the eye. In about three months a mould, an eighth of an inch deep, is filled with the deposit, and yields a cast as exact and beautiful as if cut from a piece of polished stone. The casts are of two varieties. Those produced by the spring to

which we were first conducted are of a yellow tinge, and as uniform in the grain as a piece of hone. The other spring, which dashes into a different receptacle, yields casts containing crystalline particles, and have a glittering mixed appearance; they are also less fine in their outlines.

After satisfying our curiosity with the operative part of the establishment, we entered by invitation the *salle de commerce*—a store for the sale of products of the springs. In this collection there was much trash, in the form of incrustated eggs, fruits, nests of birds, and various small animals; but there was likewise much to please a visitor of taste. The medals of classic figures, and heads of distinguished men, were particularly attractive. We bought a few of these elegant objects as trophies of French art. Vast quantities are disposed of in Vichy and the other watering-places of Auvergne; and, I believe, there is also a *dépôt* for them in Paris. The greater number are mounted by their purchasers as ladies' brooches. At the prices charged, from two to three francs each, it may be said that the sale of these curiosities, which cost the proprietor of the springs almost nothing, must be no unprofitable trade.

'THE GIFT.'

THE GIFT is an American annual of great typographical elegance, and embellished with many beautiful engravings. It contains an article, which, for several reasons, appears to us so remarkable, that we leave aside several effusions of our ordinary contributors in order to make room for an abridgment of it. The writer, Mr Edgar A. Poe, is evidently an acute observer of mental phenomena; and we have to thank him for one of the aptest illustrations which could well be conceived, of that curious play of two minds, in which one person, let us call him A., guesses what another, B., will do, judging that B will adopt a particular line of policy to circumvent A.

THE PURLOINED LETTER.

At Paris, just after dark, one gusty evening in the autumn of 18—, I was enjoying the twofold luxury of meditation and a meerschaum, in company with my friend C. Auguste Dupin, in his little back library, or book-closet, au troisième, No. 33, Rue Dunôt, Faubourg St Germain. For an hour, at least, we had maintained a profound silence, when the door of our apartment was thrown open, and admitted our old acquaintance, Monsieur G—, the prefect of the Parisian police.

We gave him a hearty welcome. The prefect sat down, and shortly disclosed a most perplexing case, in which his professional services had been in requisition. His story was this. 'I have received information that a certain document, of the last importance, has been purloined from the royal apartments. The individual who purloined it is known; this is beyond a doubt, for he was seen to take it. It is known also that it remains in his possession. The person on whom the theft was committed is a certain royal personage, a female, over whom the holder of the document has gained by this means a dangerous ascendancy—her honour and peace are jeopardised.'

'But this ascendancy,' I interposed, 'would depend upon the robber's knowledge of the loser's knowledge of the robber. Who would dare—'

'The thief,' said G—, 'is the minister D—, who dares all things—those unbecoming, as well as those becoming a man. The method of the theft was not less ingenious than bold. The document in question, a letter, had been received by the personage robbed while alone in the royal *boudoir*. During its perusal, she was suddenly interrupted by the entrance of another exalted individual, from whom especially it was her wish to conceal it. After a hurried and vain endeavour to thrust it in a drawer, she was forced to place it, open as it was, upon the table. The address, however, was uppermost; and the contents thus unexposed, the letter

escaped notice. At this juncture enters the minister D—. His lynx eye immediately perceives the paper, recognises the handwriting of the address, observes the confusion of the person addressed, and fathoms her secret. After some business transactions, hurried through in his ordinary manner, he produces a letter somewhat similar to the one in question, opens it, pretends to read it, and then places it in juxtaposition to the other. Again he converses for some fifteen minutes upon the public affairs. At length, in taking leave, he takes from the table the letter to which he had no claim. Its rightful owner saw, but of course dared not call attention to the act, in the presence of the third person, who stood at her elbow. The minister decamped, leaving his own letter, one of no importance, on the table. The power thus attained has, for some months past, been wielded for political purposes to a very dangerous extent. The person robbed is now thoroughly convinced, every day, of the necessity of reclaiming the letter. But this of course cannot be done openly. In fine, driven to despair, she has committed the matter to me.

'It is clear,' said I, 'as you observe, that the letter is still in possession of the minister; since it is this possession, and not any employment of the letter, which bestows the power. With the employment, the power departs.'

'True,' said G—: 'and upon this conviction I proceeded. My first care was to make thorough search of the minister's hotel; and here my chief embarrassment lay in the necessity of searching without his knowledge. Beyond all things, I have been warned of the danger which would result from giving him reason to suspect our design.'

'But,' said I, 'you are quite *au fait* at these investigations. The Parisian police have done this thing often before.'

'O yes; and for this reason I did not despair. The habits of the minister gave me, too, a great advantage. He is frequently absent from home all night. His servants are by no means numerous. They sleep at a distance from their master's apartments, and, being chiefly Neapolitans, are readily made drunk. I have keys, as you know, with which I can open any chamber or cabinet in Paris. For three months, a night has not passed, during the greater part of which I have not been engaged, personally, in ransacking the D— Hotel. My honour is interested, and, to mention a great secret, the reward is enormous. So I did not abandon the search until I had become fully satisfied that the thief is a more astute man than myself. I fancy that I have investigated every nook and corner of the premises in which it is possible that the paper can be concealed. Yet, neither is the letter on the person of the minister. He has been twice waylaid, as if by footpads, and his person has been rigorously searched under my own inspection.'

'Suppose you detail,' said I, 'the particulars of your search of the premises.'

'Why, the fact is, we took our time, and we searched *everywhere*. I have had long experience in these affairs. I took the entire building, room by room, devoting the nights of a whole week to each. We examined first the furniture of each apartment. We opened every possible drawer; and I presume you know that, to a properly-trained police agent, such a thing as a *secret* drawer is impossible. Any man is a dolt who permits a "secret" drawer to escape him in a search of this kind; the thing is so plain. There is a certain amount of bulk—of space—to be accounted for in every cabinet. Then we have accurate rules. The fiftieth part of a line could not escape us. After the cabinets, we took the chairs; the cushions we probed with the fine long needles you have seen me employ. From the tables we removed the tops.' 'Why so?'

'Sometimes the top of a table, or other similarly arranged piece of furniture, is removed by the person wishing to conceal an article; then the leg is excavated,

the article deposited within the cavity, and the top replaced. The bottoms and tops of bed-posts are employed in the same way.'

'But could not the cavity be detected by sounding?' I asked.

'By no means, if, when the article is deposited, a sufficient wadding of cotton be placed around it. Besides, in our case, we were obliged to proceed without noise.'

'But you could not have removed—you could not have taken to pieces *all* articles of furniture in which it would have been possible to make a deposit in the manner you mention. A letter may be compressed into a thin spiral roll, not differing much in shape or bulk from a large knitting-needle, and in this form it might be inserted into the rung of a chair, for example. You did not take to pieces all the chairs?'

'Certainly not; but we did better. We examined the rungs of every chair in the hotel, and, indeed, the jointings of every description of furniture, by the aid of a most powerful microscope. Had there been any traces of recent disturbance, we should not have failed to detect it *instantly*. A single grain of gimlet-dust, or sawdust, for example, would have been as obvious as an apple. Any disorder in the glueing—any unusual gaping in the joints—would have sufficed to insure detection.'

'Of course you looked to the mirrors, between the boards and the plates; and you probed the beds and the bedclothes, as well as the curtains and carpets?'

'That of course; and when we had surveyed every particle of the furniture in this way, then we examined the house itself. We divided its entire surface into compartments, which we numbered, so that none might be missed; then we scrutinised each individual square inch throughout the premises, including the two houses immediately adjoining, with the microscope as before.'

'The two houses adjoining!' I exclaimed; 'you must have had a great deal of trouble?'

'We had; but the reward offered is prodigious.'

'You explored the floors beneath the carpets?'

'Beyond doubt; we removed every carpet, and examined the boards with the microscope.'

'And the paper on the walls?' 'Yes.'

'You looked into the cellars?'

'We did; and as time and labour were of no importance, we dug up every one of them to the depth of four feet.'

'Then,' I said, 'you have been making a miscalculation, and the letter is *not* upon the premises, as you suppose.'

'I fear you are right there,' said the prefect. 'And now, Dupin, what would you advise me to do?'

'To make a thorough re-search of the premises.'

'That is absolutely needless,' replied G—. 'I am not more sure that I breathe than I am that the letter is not at the hotel.'

'I have no better advice to give you,' said Dupin. 'You have, of course, an accurate description of the letter?'

'Oh yes!' And here the prefect, producing a memorandum-book, proceeded to read aloud a minute account of the internal, and especially of the external appearance of the missing document. Soon after finishing the perusal of this description, he took his departure, more entirely depressed in spirits than I had ever known the good gentleman before.

In about a month afterwards he paid us another visit, and found us occupied very nearly as before. He took a pipe and a chair, and entered into some ordinary conversation. At length I said—

'Well, but, G—, what of the purloined letter? I presume you have at last made up your mind that there is no such thing as overreaching the minister?'

'Too true; I made the re-examination, however, as Dupin suggested; but it was all labour lost, as I knew it would be.'

'How much was the reward offered, did you say?' asked Dupin.

'Why, a very great deal—a very liberal reward—I don't like to say how much precisely; but one thing I will say, that I wouldn't mind giving my individual check for fifty thousand francs to any one who could obtain me that letter. The fact is, it is becoming of more and more importance every day; and the reward has been lately doubled. I would really give fifty thousand francs, every centime of it, to any one who would aid me in the matter.'

'In that case,' replied Dupin, opening a drawer, and producing a check-book, 'you may as well fill me up a check for the amount mentioned. When you have signed it, I will hand you the letter.'

I was astounded. The prefect appeared absolutely thunderstricken. For some minutes he remained speechless and motionless, looking incredulously at my friend with open mouth, and eyes that seemed starting from their sockets; then, apparently recovering himself in some measure, he seized a pen, and after several pauses and vacant stares, finally filled up and signed a check for fifty thousand francs, and handed it across the table to Dupin. The latter examined it carefully, and deposited it in his pocket-book; then, unlocking an *escritoire*, took thence a letter and gave it to the prefect. This functionary grasped it in a perfect agony of joy, opened it with a trembling hand, cast a rapid glance at its contents, and then, scrambling and struggling to the door, rushed at length unceremoniously from the room and from the house, without having uttered a syllable since Dupin had requested him to fill up the check.

When he had gone, my friend entered into some explanations.

'The Parisian police,' he said, 'are exceedingly able in their way. They are persevering, ingenious, cunning, and thoroughly versed in the knowledge which their duties seem chiefly to demand. Thus, when G— detailed to us his mode of searching the premises at the hotel D—, I felt entire confidence in his having made a satisfactory investigation, so far as his labours extended.'

'So far as his labours extended?' said I.

'Yes,' said Dupin. 'The measures adopted were not only the best of their kind, but carried out to absolute perfection. Had the letter been deposited within the range of their search, these fellows would beyond a question have found it.'

I merely laughed, but he seemed quite serious in all that he said.

'The measures, then,' he continued, 'were good in their kind, and well executed; their defect lay in their being inapplicable to the case and to the man. A certain set of highly ingenious resources are, with the prefect, a sort of Procrustean bed, to which he forcibly adapts his designs. But he perpetually errs by being too deep or too shallow for the matter in hand; and many a schoolboy is a better reasoner than he. I knew one about eight years of age, whose success at guessing in the game of "even and odd" attracted universal admiration. This game is simple, and is played with marbles. One player holds in his hand a number of these toys, and demands of another whether that number is even or odd. If the guess is right, the guesser wins one; if wrong, he loses one. The boy to whom I allude won all the marbles of the school. Of course he had some principle of guessing; and this lay in mere observation and admeasurement of the astuteness of his opponents. For example, an arrant simpleton is his opponent, and, holding up his closed hand, asks, "are they even or odd?" Our schoolboy replies "odd," and loses; but upon the second trial he wins, for he then says to himself, "the simpleton had them even upon the first trial, and his amount of cunning is just sufficient to make him have them odd upon the second; I will therefore guess odd;" he guesses odd, and wins. Now, with a simpleton a degree above the first, he would have reasoned thus: "This fellow finds that in the first instance I guessed odd, and, in the second, he will propose to himself, upon the first impulse, a simple variation

from even to odd, as did the first simpleton; but then a second thought will suggest that this is too simple a variation, and finally, he will decide upon putting it even as before; I will therefore guess even;" he guesses even, and wins. Now this mode of reasoning in the schoolboy, whom his fellows termed "lucky," what, in its last analysis, is it?'

'It is merely,' I said, 'an identification of the reasoner's intellect with that of his opponent.'

'It is,' said Dupin; 'and, upon inquiring of the boy by what means he effected the *thorough* identification in which his success consisted, I received answer as follows:—"When I wish to find out how wise, or how stupid, or how good, or how wicked, is any one, or what are his thoughts at the moment, I fashion the expression of my face, as accurately as possible, in accordance with the expression of his, and then wait to see what thoughts or sentiments arise in my mind or heart, as if to match or correspond with the expression." This response of the schoolboy lies at the bottom of all the spurious profundity which has been attributed to Rochefoucault, to La Bougive, to Machiavelli, and to Campanella.'

'And the identification,' I said, 'of the reasoner's intellect with that of his opponent depends, if I understand you aright, upon the accuracy with which the opponent's intellect is admeasured?'

'For its practical value it depends upon this,' replied Dupin; 'and the prefect and his cohort fail so frequently, first, by default of this identification, and, secondly, by ill-admeasurement, or rather through non-admeasurement, of the intellect with which they are engaged. They consider only their *own* ideas of ingenuity; and, in searching for any thing hidden, advert only to the modes in which *they* would have hidden it. They are right in this much—that their own ingenuity is a faithful representative of that of *the mass*; but when the cunning of the individual felon is diverse in character from their own, the felon foils them of course. This always happens when it is above their own, and very usually when it is below. They have no variation of principle in their investigations: at best, when urged by some unusual emergency—by some extraordinary reward—they extend or exaggerate their old modes of *practice*, without touching their principles. What, for example, in this case of D—, has been done to vary the principle of action? What is all this boring, and probing, and sounding, and scrutinising with the microscope, and dividing the surface of the building into registered square inches; what is it all but an exaggeration of *the application* of the one principle, or set of principles of search, which are based upon the one set of notions regarding human ingenuity, to which the prefect, in the long routine of his duty, has been accustomed? Do you not see he has taken it for granted that *all* men proceed to conceal a letter—not exactly in a gimlet-hole bored in a chair-leg—but at least in *some* out-of-the-way hole or corner suggested by the same tenor of thought which would urge a man to secrete a letter in a gimlet-hole bored in a chair-leg? And do you not see, also, that such *recherchés* nooks for concealment are adapted only for ordinary occasions, and would be adopted only by ordinary intellects; for, in all cases of concealment, a disposal of the article concealed—a disposal of it in this *recherché* manner—is, in the very first instance, presumed and presumable; and thus its discovery depends not at all upon the acumen, but altogether upon the mere care, patience, and determination of the seekers; and where the case is of importance, or, what amounts to the same thing in the policial eyes, when the reward is of magnitude, the qualities in question have *never* been known to fail. You will now understand what I meant in suggesting that, had the purloined letter been hidden anywhere within the limits of the prefect's examination—in other words, had the principle of its concealment been comprehended within the principles of the prefect, its discovery would have been a matter altogether beyond question. This functionary, however, has been thoroughly mistified; and the remote source of his defeat lies in

the supposition that the minister would do what he would have done himself—taken vast care to conceal the letter on account of its being so very precious. I went to work differently. My measures were adapted to the minister's capacity, with reference to the circumstances by which he was surrounded. I knew him as a courtier too, and as a bold *intrigant*. Such a man, I considered, could not fail to be aware of the ordinary policial modes of action. He could not have failed to anticipate—and events have proved that he did not fail to anticipate—the waylayings to which he was subjected. He must have foreseen, I reflected, the secret investigations of his premises. His frequent absences from home at night, which were hailed by the prefect as certain aids to his success, I regarded only as *ruses*, to afford opportunity for thorough search to the police, and thus the sooner to impress them with the conviction to which G—, in fact, did finally arrive—the conviction that the letter was not upon the premises. I felt, also, that the whole train of thought, which I was at some pains in detailing to you just now, concerning the invariable principle of policial action in searches for articles concealed—I felt that this whole train of thought would necessarily pass through the mind of the minister. It would imperatively lead him to despise all the ordinary *nooks* of concealment. He could not, I reflected, be so weak as not to see that the most intricate and remote recess of his hotel would be as open as his commonest closets to the eyes, to the probes, to the gimlets, and to the microscopes of the prefect. I saw, in fine, that he would be driven, as a matter of course, to *simplicity*, if not deliberately induced to it as a matter of choice. This conjecture was above or beneath the understanding of the prefect. He never once thought it probable or possible that the minister had deposited the letter immediately beneath the nose of the whole world, by way of best preventing any portion of that world from perceiving it.

‘But the more I reflected upon the daring, dashing, and discriminating ingenuity of D—; upon the fact that the document must always have been *at hand*, if he intended to use it to good purpose; and upon the decisive evidence, obtained by the prefect, that it was not hidden within the limits of that dignitary's ordinary search, the more satisfied I became that, to conceal this letter, the minister had resorted to the comprehensive and sagacious expedient of not attempting to conceal it at all.

‘Full of these ideas, I prepared myself with a pair of green spectacles, and called one fine morning, quite by accident, at the ministerial hotel. I found D— at home, yawning, lounging, and dawdling as usual, and pretending to be in the last extremity of *ennui*. He is, perhaps, the most really energetic human being now alive—but that is only when nobody sees him.

‘To be even with him, I complained of my weak eyes, and lamented the necessity of the spectacles, under cover of which I cautiously and thoroughly surveyed the whole apartment, while seemingly intent only upon the conversation of my host.

‘I paid especial attention to a large writing-table near which he sat, and upon which lay confusedly some miscellaneous letters and other papers, with one or two musical instruments and a few books. Here, however, after a long and very deliberate scrutiny, I saw nothing to excite particular suspicion.

‘At length my eyes, in going the circuit of the room, fell upon a trumpery filigree card-rack of pasteboard, that hung dangling by a dirty blue ribbon from a little brass knob just beneath the middle of the mantelpiece. In this rack, which had three or four compartments, were five or six visiting-cards and a solitary letter. This last was much soiled and crumpled. It was torn nearly in two across the middle—as if a design, in the first instance, to tear it entirely up as worthless, had been altered or stayed in the second. It had a large black seal, bearing the D— cipher *very* conspicuously, and was addressed, in a diminutive female hand, to

D—, the minister, himself. It was thrust carelessly, and even, as it seemed, contemptuously, into one of the uppermost divisions of the rack.

‘No sooner had I glanced at this letter, than I concluded it to be that of which I was in search. To be sure, it was to all appearance radically different from the one of which the prefect had read us so minute a description. Here the seal was large and black, with the D— cipher; there, it was small and red, with the ducal arms of the S— family. Here the address to the minister was diminutive and feminine; there the superscription, to a certain royal personage, was markedly bold and decided; the size alone formed a point of correspondence. But then the *radicalness* of these differences, which was excessive; the dirt, the soiled and torn condition of the paper, so inconsistent with the methodical habits of D—, and so suggestive of a design to delude the beholder into an idea of the worthlessness of the document; these things, together with the hyper-obtrusive situation of this document, full in the view of every visitor, and thus exactly in accordance with the conclusions to which I had previously arrived—these things, I say, were strongly corroborative of suspicion, in one who came with the intention to suspect.

‘I protracted my visit as long as possible, and while I maintained a most animated discussion with the minister upon a topic which I knew well had never failed to interest and excite him, I kept my attention really riveted upon the letter. In this examination I committed to memory its external appearance and arrangement in the rack; and also fell at length upon a discovery which set at rest whatever trivial doubt I might have entertained. In scrutinising the edges of the paper, I observed them to be more *chafed* than seemed necessary. They presented the *broken* appearance which is manifested when a stiff paper, having been once folded and pressed with a folder, is refolded in a reverse direction, in the same creases or edges which had formed the original fold. This discovery was sufficient. It was clear to me that the letter had been turned, as a glove, inside out, re-directed, and re-sealed. I bade the minister good morning, and took my departure at once, leaving a gold snuff-box upon the table.

‘The next morning I called for the snuff-box, when we resumed quite eagerly the conversation of the preceding day. While thus engaged, however, a loud report, as if of a pistol, was heard immediately beneath the windows of the hotel, and was succeeded by a series of fearful screams, and the shoutings of a terrified mob. D— rushed to a casement, threw it open, and looked out. In the meantime I stepped to the card-rack, took the letter, put it in my pocket, and replaced it by a *fac-simile*, which I had carefully prepared at my lodgings—imitating the D— cipher very readily by means of a seal formed of bread.

‘The disturbance in the street had been occasioned by the frantic behaviour of a man with a musket. He had fired it among a crowd of women and children. It proved, however, to have been without ball, and the fellow was suffered to go his way as a lunatic or a drunkard. When he had gone, D— came from the window, whither I had followed him immediately upon securing the object in view. Soon afterwards, I bade him farewell. The pretended lunatic was a man in my own pay.’

‘But what purpose had you,’ I asked, ‘in replacing the letter by a *fac-simile*? Would it not have been better, at the first visit, to have seized it openly, and departed?’

‘D—,’ replied Dupin, ‘is a desperate man, and a man of nerve. His hotel, too, is not without attendants devoted to his interests. Had I made the wild attempt you suggest, I should never have left the ministerial presence alive. The good people of Paris would have heard of me no more. But I had an object apart from these considerations. You know my political prepossessions. In this matter I act as a partisan of the lady concerned. For eighteen months, the minister has had

her in his power. She has now him in hers—since, being unaware that the letter is not in his possession, he will proceed with his exactions as if it were. Thus will he inevitably commit himself at once to his political destruction. His downfall, too, will not be more precipitate than awkward. It is all very well to talk about the *facilis descensus Averni*; but in all kinds of climbing, as Catalani said of singing, it is far more easy to get up than to come down. In the present instance I have no sympathy—at least no pity—for him who descends. He is that *monstrum horrendum*, an unprincipled man of genius. I confess, however, that I should like very well to know the precise character of his thoughts, when, being defied by her whom the prefect terms “a certain personage,” he is reduced to opening the letter which I left for him in the card-rack.

‘How? did you put anything particular in it?’

‘Why, it did not seem altogether right to leave the interior blank—that would have been insulting. To be sure, D—, at Vienna once, did me an evil turn, which I told him, quite good-humouredly, that I should remember. So, as I knew he would feel some curiosity in regard to the identity of the person who had outwitted him, I thought it a pity not to give him a clue. He is well acquainted with my manuscript, and I just copied into the middle of the blank sheet the words—

“—Un dessein si funeste,
S'il n'est digne d'Atrée, est digne de Thyeste.”

They are to be found in Crébillon's “Atrée.”

LIEBIG'S FAMILIAR LETTERS ON CHEMISTRY.

THE English public has again been favoured with a series of Familiar Letters on Chemistry by Dr Justus Liebig—at present by far the most popular cultivator of the science in Europe. His former series* was written for the especial purpose of exciting the attention of governments and an enlightened public to the necessity of establishing schools of chemistry, and of promoting by every means the study of a science so intimately connected with the arts, pursuits, and social wellbeing of modern civilised nations: the present publication† presents a general view of the study, its objects, extent, and applications, in order that the well-informed man, whether chemist or not, may know something of the means and methods by which we have obtained those acquisitions in the sciences, and those abundant resources in the arts, which enable us to supply the necessities of our social existence. And herein consists the chief value of these Letters. They contain nothing that may not be found in the ordinary elementary treatises; they teach no principles which could not be even more explicitly laid down in a student's text-book; but then they are the familiar condensations of a great mind, which make an impression all the deeper, and excite a reverence all the more exalted, because we feel the greatness of the source whence they proceed. We are placed, as it were, in conversation with the author, catch the spirit of his intention, and respect the simplest facts propounded, which, if coming from a less exalted source, would be apt to be overlooked or disregarded.

The plan of the Letters is as simple and intelligible as their style. The author sets out with a general consideration of chemistry, and of the rank to which it is entitled among the other sciences; treats shortly of chemical affinity and chemical equivalents, illustrating the symbols and formulæ by which these affinities are expressed; explains the atomic theory; considers the relation of heat, light, electricity, and gravity to chemical force, and shows wherein these forces differ from

what has been called the vital principle; and, lastly, discusses the transformations—fermentation, putrefaction, and decay—which take place in organic bodies when removed from the influence of vitality. We propose to glean from these subjects—otherwise unsuited to the pages of a miscellaneous journal—some of the more interesting facts and discoveries, which, while they serve to establish the almost universal power of chemistry, may awaken in the mind of the casual reader a desire to know something of its details and modes of procedure.

At present, by far the most popular department of the science is organic chemistry—the investigation of those laws by which the living organism can fabricate new compounds from simple inorganic elements. We say *elements*, for no single element is capable of serving for the nutrition and development of any part of an animal or vegetable organism. All those substances which take part in the processes of life are inferior groups of simple atoms, which, under the vital principle, combine into atoms of a higher order. A plant cannot resolve carbonic acid into other elements than carbon and oxygen: it may use the carbon as a component of its fibre, its resin, or its starch, but it cannot transform carbon into one or other of these, any more than can be done by the chemist. It must have the proper number of elements to operate upon, before it can arrive at perfection. Thus, the seed of a plant externally acted upon by heat, moisture, &c. begins to germinate; it strikes its roots into the ground, and expands its leaves in the atmosphere—these organs absorbing from the soil and air certain inorganic elements, which are transformed by the living organism into vegetable tissues, gums, resins, oils, &c. substances possessed of properties totally different from the original elements on which the plant fed. So, likewise, with animals; the food upon which they subsist is transformed by the vital principle into new and more complex compounds—as fibrin, blood, bile, fat, and the like. All these substances are peculiarly under the power of the chemist; he can resolve them into their primitive elements, transform and transpose them in a thousand ways; determine whence they were derived, and predict the state to which they shall return. The chemist, however, cannot construct vegetable or animal compounds from the simple elements: this requires the aid of a higher chemistry—the chemistry of life, whose mode of action he may unfold, but never successfully imitate. And even if it were that he could form blood, and bile, and fat—nay, that he could fashion a leaf, an eye, or an ear—yet he could never make that leaf develop itself and give birth to others, that eye to see, or that ear to hear. A clear comprehension of the metamorphoses which aliments undergo in the living organism, and of the action of remedies upon that organism, is all that the organic chemist aims at; and an immense step will be gained when he has reached the knowledge of these transformations, and of the causes by which they are produced.

After the extinction of the vital principle, all organic compounds begin to change their forms—in other words, to ferment, putrefy, and decay. The vital principle is a force which, so long as it exists, holds them together; and even when this is extinct, unless acted upon by external forces, these bodies would remain in the same state as at that instant when vitality was arrested. If we can prevent them from being acted upon externally, they may be preserved indefinitely—if not, decay proceeds; and it is from a thorough knowledge of the laws regulating the processes of fermentation and decay, that so much practical benefit has accrued to baking, brewing, wine-making, bleaching, meat-preserving, and other economical processes. The ultimate results of fermentation and decay are to reconvert the elements of organic bodies into that state in which they exist before they participate in the processes of life. Complex organic atoms of the highest order are, by fermentation, putrefaction, and decay, reduced into combinations of a lower

* Noticed in Numbers 620 and 621 of our former series.

† Familiar Letters on Chemistry. Second Series. By Dr Justus Liebig, Professor of Chemistry in the University of Giessen. London: Taylor and Walton. 1844.