into separate hills. Alterante upheaving and depression by subsequent subterranean agency have, in all likehood, 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 has been a common observation in 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 raviné on the face of Gerzavia has been rapidly enlarging towards the valley beneath; masses of the conglomerate or solidified mud have been brought down by torrent into the Loire, filling their beds, and rendering them almost useless to navigation. Fragments of basaltic rock from Gerzavia 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 frizzled 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 pays 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 Vichy. There we found a 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 Petillantes. The sensation is, to say the least, startling. Once the bubbling is heard the sound reaches all the house, and 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 maid 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 on a frame, and divided into two stories. The upper story, the ground floor, and the subsur, 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 water droplets, we perceive that, scattered all over the place, there is, like the pieces of medals, and other objects, 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 hair 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 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 bone. 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 curiosities that were likewise much to please the 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 depot for them in Paris. The greater number are mounted by their purveyors in the 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 Gif is an American annual of great typographical elegance, and embossed with many beautiful engravings. It contains an article, which, for several reasons, appears to us so remarkable, that we leave aside several of our ordinary contributors in order to make room for an abridgment of it. The writer, Mr. Edgar Allan Poe, is evidently an acute observer of mental phenomena; and we have to thank him for one of the most striking 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, knowing that the former will adopt a particular line of policy to circumvent A. The Pursuaded 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 treisième, No. 33, Rue Dunois, 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, M. St. Loeur G—.

We gave him a hearty welcome. The predilect 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 stolen from the royal apartments. This is a person who perjured 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 compagnon, 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 bowdler. During its perusal, she was suddenly interrupted by the entrance of another exalted individual, from whom especialy 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 exposed, 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 complexion 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 subject. At length he rises to 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. But the damage to the bond had been done; months past, by his negligence, or his want of attention, or his carelessness, had been lost to the person to whom it was sent. Yet, at this juncture, he tramples upon the letter, frowns, and gives the impression of very extreme anger. 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 letter 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."

But 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, if 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, and 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 cabinet or closet in the house. For three months, a night has not passed, during the greater part of which I have not been engaged. The consequence is that it has been a pastime in the hotel when I am there. As a matter of honour, I am 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, for neither is the letter on the person of the minister. He has been twice waked, as 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 had accurate notes. The fourth floor was some time not escaped. 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 leg replaced. The bottoms and tops of bed-plates areemploied in the same way."

"But could not the cavity be detected by sounding?"

"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 ginlet-dust, or saw-dust, for example, would have been as obvious as an apple. Any disorder in the gluing—any unusual gapping in the joints—would have sufficed to insure detection."

"Of course you looked to the mirrors, between the boards, under the beds, and between 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 carpet?"

"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-survey 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, Dupin, 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."
from even to odd, as did the first simplicton; 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 wicked, or how weak, or how clever, or how otherwise, 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 Rochefoucauld, to La Bongive, to Machiaveli, and to Campanella.

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

"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-adumbration, or rather through non-adumbration, 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 not all this quick and sound, 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, too, that such recherches nooks for concealment are adapted only for ordinary occasions, and would be adapted 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, predicted and prepared for; 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 police eyes, when the reward is of magnitude, the qualities in question have never been found known to fail. In another instance, 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 mistadvised; 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 fact and prevent its being known. I was very precise in the rack, and 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 police modes of action. He could not have overlooked, I thought, the fact 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 abences 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 police 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 nooks of a hotel were as accessible by the minister as the most secret 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—, I 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 the fact 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 occupation of the host.'

'I paid especial attention to a large writing-table near which he sat, and upon which lay confusely 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 figliere 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 some 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 completely, and was addressed, in a diminutive female hand, to D—, the minister, himself. It was thrust carelessly, and, as it seemed, contemptuously, into one of the compact compartments of its house, very precisely was it entered, and 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 police modes of action. He could not have overlooked, I thought, the fact 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 abences 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 police 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 nooks of a hotel were as accessible by the minister as the most secret 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—, I 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 the fact 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 occupation of the host.'

'I paid especial attention to a large writing-table near which he sat, and upon which lay confusely 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 figliere 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 some 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 completely, and was addressed, in a diminutive female hand, to
her in his power. She has now him in her—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 *fauxis demensus Abserti*; but in all kinds of climbing, the young Kanallan was finding that it was far more easy to get up than to come down. In the present instance I have no sympathy—at least not 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 addressed by me in these 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—of, 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 was well acquainted with my manuscript, and I just copied into the middle of the blank sheet the words—*

*Un dessin si feste, S'il n'est digne d'Atre, c'est digne d'Atre.*

*They are to be found in Cebillon's "Atre."*

---

**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 special 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 condescensions 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 proceed to make fire. 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 reader 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 formulate by which these affinities are expressed; explains the atomic theory; considers the relations of heat, light, electricity, and gravity to chemical forces; and draws, 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 unsuit ed to the pages of a miscellaneous journal—some of the more interesting facts and discoveries, which, while they serve to establish the universality of the vital principle, 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 elements from simple ones. 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 upon which, before it can proceed. 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 peculiar under the power of the chemist; he can resolve them into their primitive elements, transform and transposes 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 action 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 at that instant as they were before; but putrefaction, and other forces 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

* * *

*Noted in Numbers 20:9 and 21:1 of our former series.*

---