facilities of observation peculiarly advantageous, and a disposition to take advantage of these facilities to advance the knowledge of this interesting subject. For a number of years I have resided in the immediate neighbourhood of some of the best spawning streams of the river Nith, and during the spawning season I have devoted more attention to the operations of the salmon than most men under any circumstances have an opportunity of doing. Finally, I may state, that I shall continue to take specimens of the young salmon from my ponds, at stated periods, until they assume their migratory dress, when I shall embody my observations in another paper on the subject.

---

1. *On the Erratic Blocks of the Jura.* By M. Agassiz.—2. *On the Production of Crystals of Insoluble Substances by Artificial Means.* By M. Gaudin.—3. *On the Operation of the Earths in the process of Vegetation.*—4. *On the Algæ which communicated a Red Colour to the Waters of some Salt Marshes.* By M. F. Dunal.

1. *On the Erratic Blocks of the Jura.* By M. Agassiz.

Last year I spent several months in the neighbourhood of the Alps, for the purpose of studying the glaciers, and of examining the observations of MM. Venetz and Charpentier on the great *moraines*, which are found at distances more or less considerable from the existing glaciers; and I have convinced myself of the accuracy of the facts adduced by these observers.

I have not been less struck by the polished appearance presented by the rocks on which the glaciers have moved, an appearance which is still to be remarked in all the valleys, whose flanks are covered by ancient *moraines*, at whatever distance they may occur from the existing glaciers. Thus the flanks of the valley of the Rhone are entirely polished, even to the banks of the lake of Geneva, more than a day's journey from the glaciers, wherever the rock has been sufficiently hard to withstand the action of the weather. At the sight of this phenomenon, evidently produced by the glaciers which extended to the plains of Switzerland, and which, when they retired,

left on their edges these concentric dikes of rounded blocks termed *moraines*, I remembered that the northern slope of the Jura, which faces the Alps, also presents polished surfaces, known to us by the name of *laves*, and to which I had hitherto paid but little attention. On my return to Neufchâtel, I hastened to examine more attentively these polished surfaces, and I have ascertained that they are completely independent of the stratification of the beds, and of the direction of the chain of the Jura; that they extend along the whole surface, following its undulations, passing equally over the *Neocomian* and the Jurassic formations, and presenting a polish as uninterrupted as the surface of a mirror, wherever the rock has been recently exposed. These surfaces are sometimes even, sometimes undulated, often traversed by furrows more or less deep and sinuous, but which never occur in the direction of the slope of the mountain. On the contrary, these furrows are oblique and longitudinal; in short, they have a direction which at once excludes the idea of a current of water having been the cause of the erosions. Besides, we remark, on the surfaces that are well preserved, fine lines, similar to the markings that would be produced by a diamond point on glass; and which follow, in general, the direction of the oblique furrows. To any one who has seen the Alps, it is evident that it is the ice which has produced this polishing. It is over an extent of more than twenty leagues to the east and west of Neuchâtel, that the northern slope of the Jura presents this aspect, that is wherever it has been examined in this point of view, and nevertheless these facts have remained unknown to the present time.

As we find the erratic blocks of the Jura reposing on these polished surfaces, the question naturally presents itself, Whether, as M. Charpentier had admitted, the glaciers had really extended to the Jura range, pushing before them blocks of alpine rocks, and polishing the surface on which they moved? A constant fact opposes this idea, an idea, indeed, which M. Charpentier has already abandoned, viz. that the erratic blocks of the Jura are angular, while the blocks of the *moraines*, constantly pushed by the movements of the glaciers and rubbed against one another, are always rounded. This is also the case with blocks of the most recent *moraines*, with those which ac-

company existing glaciers; now, if the erratic blocks of the Jura had been pushed by great glaciers to a distance so considerable as that of the Jura, they ought to be much more rounded than those of the *moraines*. The same ought to have been the case if the erratic blocks had been transported by currents of water, whatever may have been their depth or rapidity. By this last hypothesis, it is impossible to explain how the lakes situated between the Alps and the Jura were not completely filled up, especially as we can demonstrate that they existed prior to the transport of the blocks. Very recently it has been attempted to reconcile these various phenomena by admitting, that the transport of the angular blocks was effected on floats of ice moved by currents of water; but facts which I have observed on the Jura, and which had not been previously noticed, oppose this explanation. The erratic blocks of the Jura do not repose immediately on the polished surfaces; wherever the rolled pebbles which accompany the large blocks have not been disturbed by subsequent causes, we find that they form a bed of some inches sometimes of several feet in thickness, on which the angular blocks repose. These pebbles also are much rounded, even polished, and are so arranged that the larger are at the surface, and that the smaller, which often pass into a fine sand, are at the bottom, immediately on the polished surface. This order of superposition, which is constant, is completely opposed to the idea of transport by currents; for, in this latter case, the order of superposition of the rounded pebbles would be the reverse. The presence of a fine sand at the surface of the polished rocks also proves, that no powerful cause has acted on the surface of the Jura since the period of the transport of these alpine rocks; and it is without doubt to the pressure of this sand on the polished surfaces that we are to attribute the fine lines engraved on them, and which would not have existed if that sand had not been moved by a current of water; for neither our torrents, nor the water of our lakes when violently agitated, produce any thing at all analogous on the *same* rocks, even when they are charged with sand. I do not doubt that most of the phenomena attributed to great diluvial currents, and especially those recently described by M. Selfstroem, have been produced by ice.

It would be of great importance to ascertain if, towards the poles, and in general where erratic blocks exist, the surface which supports them is polished as in the Jura; if every where the large erratic blocks at a distance from the chains of mountains whence they were derived are angular like those of the Jura, and if, finally, they repose every where on a bed of rounded pebbles which are smaller the nearer they are to the polished surfaces. If the academy could obtain information on this subject from M. Dumont d'Urville, regarding the countries which he is about to visit, a great step would be made towards the determination of one of the most important questions in modern geology.

2. *On the Production of Crystals of Insoluble Substances by Artificial Means.* By M. GAUDIN.

I have now the honour of submitting to the examination of the academy (French Academy of Sciences) various specimens of insoluble salts, in the form of very perfect microscopic crystals, obtained by a process which I deem applicable to all these substances, and capable of supplying them in crystals of all dimensions. The process consists in placing certain solutions in an artificial atmosphere; as, for example, by placing under the same receiver a cup containing moist carbonate of ammonia, and a glass filled with a weak solution of any salt of lime, barytes, lead, &c. At the end of some hours, there is deposited upon the sides of the glass, crystals of a very pure carbonate, of these several bases, as may be seen in the specimens which accompany this communication.

With regard to crystals composed of elements which are scarcely or not at all volatile, other arrangements must be had recourse to. Thus, I have obtained the sulphate of barytes, for example, by putting under the same receiver a flask of fuming hydro-chloric acid, and a glass containing water, sulphate of lime, and carbonate of barytes.

Solutions of a salt of pure lime generally afford crystals under the form of primitive rhombohedrons, or the principal modifications of that form; whilst the solutions of aragonite simultaneously give crystals in the form of Iceland spar, and in the form of carbonate of barytes; and, what is very singular, a solution of

common chloride of calcium, apparently free from barytes and strontia, has afforded, on the same glass-rod, (which I herewith transmit), on the one side, the form almost exclusively of carbonate of barytes, and on the other, the form of Iceland spar, a result which I did not at all expect, since the glass-rod in question was marked with micrometric divisions, on which I expected to see rhomboids which would be capable of doubling the traces made by the diamond.

The carbonate of barytes supplies crystals which are altogether peculiar; they assume various fantastic forms and arrangements, and look more like a plant than a mineral salt.

I have for some time been engaged in preparing *symmetrical* crystals, that is to say, such as have no attachment or adherence, and formed, consequently, in a liquid or gaseous medium. With this object I have carefully studied the phenomena presented by the snow during the last winter. Since that time I have obtained crystals of sulphate of tin, similar to those we find presented by snow, and which were formed in a whirlwind of the vapour of sulphur. I have also recognised in the white marble of the Pyrennees microscopic crystals of silica. These two kinds of crystals, of which I send specimens, are, as will be seen, beautifully perfect, and those of the silica will, I trust, one day help us to elucidate the origin of primitive limestones. I also transmit crystals of carbonate of lime and carbonate of barytes, which are likewise symmetrical: these I obtained by pouring into a boiling solution of carbonate of ammonia a solution of a salt of lime, or of barytes, and then agitating the mixture.

I now produce all these crystallizations by pouring into a tube the length of the finger a saline solution, and placing in the upper part of it, before corking, a small portion of cotton moistened with the substance intended to form the artificial atmosphere. Finally, to render these and all other microscopic observations less fatiguing, I have thought of adapting a lens of a short focus to a stopper pierced with a hole, which receives the tube, and in which it is made to glide at pleasure. Diametrically opposed to the lens is a hollow conical mirror, which, by its upper portion, reflects the light upon that part of the tube we desire to examine. In this way we may, with the elbows on

the table, readily examine much in a short time, and for a long time, too, without the least fatigue. I conceive that this is by much the most simple and useful microscope.

As I am not near the termination of my labours on crystallization, I have thought it right, in the mean time, to publish a few of the results I have obtained. I purpose shortly to present to the Academy additional new crystals made in a similar manner, and at the same time a microscope made on the principles to which I have adverted.

3. *On the Operation of the Earths in the Process of Vegetation.*

The following is an abstract of a paper on this subject, lately communicated to the French Academy of Sciences by M. Pelletier. Resting his opinion on the observations of agriculturists and chemists, and more particularly on the analyses of various soils made by Chaptal, Davy, and himself, the author admits that a fertile soil must be formed of silica, alumina, and lime; that the fertility diminishes as one of these three earths predominates; and that it is almost null when the mixture presents only the properties of one of them. But why, and how is this mixture of three earths, with the addition of oxide of iron or magnesia, a necessary condition of fertility? "This question," says M. Pelletier, "has not yet been satisfactorily answered. The physical constitution of the soils, their hygroscopic properties, their power of being more or less strongly heated by the solar rays, are circumstances to which a certain influence may reasonably be attributed, but which, nevertheless, appear to be only secondary causes. It seems, on the contrary, evident, that the mixture of the different earths which compose the soil, acts on vegetation by an electro-chemical force, whose influence has been recognised in other circumstances, but which has not hitherto been pointed out as connected with the subject now under consideration."

M. Pelletier remarks, that in a fertile vegetable soil the silica, lime, and alumina, must exist in a state of simple mixture; that if these substances were combined the soil would be sterile; and that, in a mixture of these three earths, the fertility would cease, if the combination were to be effected instantaneously. "For," says he, "in a mixture of silica, alumina, and

lime, there exists a force which must tend to combine these substances; the silica and alumina are electro-negative bodies in respect to the lime, and in their presence the lime must acquire the opposite electrical condition. Thus, according as exterior movements, which are foreign causes, place the molecules at a greater or less distance, and group them in different manners, electrical piles are established, the degrees of tension will vary, discharges will take place, and the soil will be as it were animated. The electric fluid which pervades it will excite the radicular stomata, and the absorption of the fluids proper to the nourishment of the vegetable will take place; and the radicular fibres impregnated by humidity will become charged conductors for transmitting electricity to the plant, an electricity which is certainly as necessary to life as light and heat.

M. Pelletier afterwards considers certain practical operations in agriculture for improving soils, such as the mixture of beds of earth of different kinds, the use of marl, the exposure of marls to the air, tillage, and the use of lime; and he endeavours to deduce from his theory an explanation of the useful effects produced by these operations. He then examines why, at great depths, where he thinks that the oxygen of the air and the carbonic acid cannot penetrate, the radicles of the old trees can find carbonic acid, which, when absorbed, furnishes the carbon necessary for the nourishment of the vegetable. He admits, seeing the tendency that silica and alumina have for combining with lime, that there is a reaction of these two earths on the calcareous carbonate, a combination, a formation of a silicate, and a disengagement of carbonic acid. Thus, then, according to M. Pelletier, at certain depths, and under influences hitherto but little known, the silica would decompose the carbonate of lime, while at the surface of the earth, and under the influence of external agents, the silicates would be decomposed by carbonic acid.

2. *On the Algæ which communicate a red colour to the waters of some salt marshes, by M. F. Dunal.*

We often perceive in the reservoirs of salt-works, termed *tables*, water of a beautiful rose colour with a violet reflection, or water having a ferruginous orange-red tint, at the edges of

which we observe a scum of the same colour. Water thus coloured is very dense (25 to 26 degrees of Baumé), and is just at the point of depositing crystallized marine salt; but this phenomenon is by no means so common as it is believed to be, and, to use the expression of the salt-makers, it only occurs in old water. Very often the *tables* crystallize without our perceiving in the water any trace of red matter. Thousands of quintals of salt have been collected this year in the salt-works of Bagnas de Villeneuve, and at that of Peccais, and scarcely any coloured salt has been met with. The red colour of salt-marshes had been attributed to the presence of a small *branchiopode* the *Artemia salina;* but M. Dumal has visited several salt-works where that crustaceous animal existed in innumerable quantities, and where the water, nevertheless, remained limpid and colourless. The *Artemia salina* observed in these waters was not at all red; the young individuals had a greyish colour, and those more advanced in age a rose tint, approaching the colour of rust. When the water is concentrated by evaporation, the crustaceous animal acquires a red colour, but the water itself is not at all tinged. We cannot attribute the red colour of the water of salt-works to the dead remains of the Artemia salina; for, at the salt-works of Bagnas and of Peccais, MM. Dunal and Legrand observed a considerable quantity of the dead animals half decomposed, which had a milky appearance.

Not being able to assign the presence of the *Artemia salina* as the cause of the coloration of the water, M. Dunal began to investigate the phenomena with attention. On taking some water from the upper part of a pool, which seemed filled with a liquid of a beautiful rose colour, or rose tinged with a violet reflection, M. Dunal only obtained a colourless liquid; but, when he plunged his vessel to the bottom, he brought up some coloured matter. This substance, when submitted to the microscope, presented to M. Dunal numerous spherical globules, which were extremely small and hyaline, and seemed to be a true *Protococcus*, to which he has given the name of *Salinus*. This small plant is developed at the bottom of the water, and its beautiful rose or violet colour is reflected through the whole of the liquid which covers it. In other reservoirs where he did not find the *Protococcus*

salinus, M. Dunal discovered another substance of a deep orange-red colour, which appeared at the surface of the water. On being submitted to a magnifying power of 200 times the diameter, this substance exhibited a union of numerous individuals of a species of the genus *Hæmatococcus*, one of the simplest of the family of the Algæ, and which is characterized by its red *seminules* or globules. It is worthy of remark that it is another species of the same genus, the *Hæmatococcus Noltii*, which gives the colour to the peat-bogs of Schleswig. The *cellules* of the *Hæmatococcus* observed by M. Dunal, and which he names *Salinus*, are spherical or elliptical, at first of an orange-red, and afterwards of a ferruginous colour. In the laminæ of crystallized salt, M. Dunal observed long reddish threads. These were produced by the *Hæmatococcus salinus* imprisoned in the crystals of salt; and these crystals being dissolved, the plant is reproduced in a state of perfect preservation. In the middle of the salt-work of Bagnas, M. Dunal has sometimes seen floating a red substance, which assumes the elongated form of a mass of Confervæ. The *Hæmatococcus salinus* was at that place mixed with another rudimentary alga, which is merely a simple hyaline tube, without ramification or articulation, terminated by a point, and perfectly empty. This is a species of *Protonema*, to which M. Dunal gives the name of *Salina*. Although this botanist mentions a *Protococcus salinus* and a *Hæmatococcus salinus*, yet he thinks that these two pretended species, which, according to the divisions generally adopted, it is necessary to range under two different genera, are one and the same plant, which, when young, is a *Protococcus*, and when more developed is a *Hæmatococcus*.

The salt assumes the tint of the different vegetables it encloses; it is orange-red, or of the colour of rust, when it contains the Hæmatococcus, and of a beautiful rose-violet tinge, when it includes the Protococcus. A delightful violet odour is exhaled by these coloured salts, and is retained for a year, when they are heaped up in prismatic masses termed *Camelles*. The colouring matter formed by the *Hæmatococcus*, full of globules of an orange-red tint, stains the hands strongly. M. Dunal gives no details regarding the *Artemia salina*, as M. Andouin has already announced that he is investigating that *branchiopode*.

Account of a Visit to the Falls on the Shiráwatí River in Canara. By the Rev. Dr Wilson of the General Assembly's Mission, and Dr Smyttan of the Medical Board, Bombay. Communicated by Dr Wilson to the Rev. Dr Brunton, Professor of Oriental Languages in the University of Edinburgh, F.R.S.E., &c.

On the afternoon of the 15th February 1837, we sailed from Honáwar* in a light native boat, our baggage following us in another, to Garsapa, which is about sixteen miles due east. The scenery on the banks is most beautiful, and in some places grand. Hills, generally of a considerable size, with their superior rock of laterite, which prevails, more or less, in the low part of the country, approach the edge of the water; and they are covered with vegetation, luxuriant and varied, except where the common bambu (*Bambusa arundinacea*) predominates. It was late when we reached our destination: and it was later still when our horses, which had been led by a circuitous route through the jungle, arrived. Their keepers and the guides maintained that they had been greatly alarmed by the appearance of wild beasts on the way. The sepoys in charge of the travellers' bungalow informed us that they are numerous in the more open parts of the forest, which is not unlikely. Mr Mattley, of the Civil Service, afterwards shewed us the last annual government returns connected with the ferine warfare carried on in the Nagar districts above the ghâts. Ninety-two men and 901 cattle had been reported as carried off and destroyed, while rewards had been given for the skins of 100 tigers, 136 chitás, four wolves, and twenty-six bears, which had been killed by the natives. In some parts of the forest wild oxen and *sámbárs* abound. We started one of the latter. It seemed to me, from its great size and dark colour, to be the *Cervus Aristotelis* of Bengal, and not the *Cervus equinus*, which, as mentioned by Colonel Sykes, abounds in the Dakhan. Its antlers, a pair of which we had examined at Honáwar, are very large and heavy.

* Corrupted by the English and Portuguese into Onnore.

Near Garsapa are the ruins of an ancient town, which our time did not permit us to examine. We started early next morning, and commenced the ascent of the Malikalí Ghat, which, except in a few places, we did not find so difficult as we expected. The forest, which consists of the most lofty trees, on which we observed many troops of monkeys, of the species *entellus*, sporting themselves, is on each side of the path dense and impervious. From an eminence, where, for a few yards, there is an open space, and where travellers generally halt for a little, the view is so magnificent, that a description of it in the plainest prose would have all the effect of the most elevated poetry.

The rocks which we noticed on our way were principally of mica-slate and unmixed hornblende, as at Halíalí, at which we concluded our march for the day, of sixteen miles. On the trees and bushes near the bungalow in which we were sheltered, we observed many birds, principally of the passerine order, which were new to us. Among these, the *Platicornis princeps* particularly attracted our attention, by its glossy black and brilliant scarlet colours, and its dazzling flittering in the sun. In our neighbourhood there were some gardens of a considerable size, and well watered, for the rearing of betel-nut trees and pepper vines, to which they afford support, and which twist around them. They yield a good produce, and belong to Háiga Brahmans, the most important agricultural class of men in that part of the country. They seem to me to correspond with the Bhátelás of Gujarát, who, though probably not originally of the priestly order, had their present status conferred upon them as an inducement to their acceptance of Hinduism. Those with whom we conversed have the Canarese language vernacular to them, and only a slight knowledge of Hindustané. The only character which they read, is the Devanágarí.

On the morning of the 16th February we started for the Falls. Our road was in a south-east direction, and lay through a beautiful country, containing many cultivated fields, and correctly described by Dr Christie* as "combining the majestic appearance of a tropical forest with the softer character of an

* Jameson's Journal for September 1828.

English park," and noticed by my intelligent companion as not unlike some parts of the summits of the Nilgiris. We arrived at the bungalow of the Jog, the native name of the Falls, at nine o'clock; and, under the impression that they were not far distant, we repaired to them before we took breakfast, having a walk of three miles. Before describing our impressions connected with them, I shall quote in full the only printed account of them which I have read, and of the existence of which we were not aware till our return to Bombay. It will be observed that, though it is generally correct, we were enabled to extend our observation somewhat beyond that of the able writer.

"Upon approaching the Falls," says Dr Christie, "you emerge from a thick wood, and come suddenly upon the river, gliding gently among confused masses of rock. A few steps more, over huge blocks of granite, bring you to the brink of a fearful chasm, rocky, bare, and black; down into which you look to the depth of a thousand feet! Over its sides rush the different branches of the river, the largest stretching in one huge curling pillar of white foam, without interruption to the bottom. The waters are at the bottom, by the force of their fall, projected far out in straight lines; and, at some distance below the falls, form a thin cloud of white vapour, which rises high above the surrounding forest. The sides of the chasm are formed by slanting strata of rock, the regularity of which forms a striking contrast to the disorder of the tumultuous waters, the broken detached masses of stone, and the soft tint of the crowning woods.

"The effect of all these objects rushing at once upon the sight, is awfully sublime. The spectator is generally forced to retire after the first view of them, in order gradually to familiarize himself with their features; for the feeling which he experiences upon their sudden contemplation, amounts almost to pain. After their first impression has somewhat subsided, and he has become accustomed to their view, he can then leisurely analyze their parts, and become acquainted with their details.

"The chasm is somewhat of an elliptical form. At its narrowest and deepest part is the principal fall; and over its sides smaller branches of the river and little rills are precipitated, and are almost all dissipated in spray before they reach the bottom. The principal branch of the river is much contracted in breadth before it reaches the brink of the precipice, where it probably does not exceed fifty or sixty feet, but it contains a very large body of water.

"The falls can only be seen from above, for the precipices on both sides of the river afford no path to admit of a descent. Some gentlemen have attempted to reach the bottom by having themselves lowered by ropes; but no one, to my knowledge, has hitherto succeeded. A view of the falls from below would, I am convinced, exceed in grandeur every thing of the kind in the world. The spectator can, very easily, and with great safety, look down into the chasm to its very bottom. Some large plates of gneiss project, in an in-

clined position, from its edge; so that, by laying himself flat upon one of these, he can stretch his head considerably beyond the brink of the precipice.

"No accurate measurement has yet been made of the height of these falls. Some who have seen them declare, that their height reaches at least 1100 feet; others, that it does not reach 1000. I prepared a rope 900 feet long, attached a stone to one end of it, and let it slip over the edge of a rock, which projects several feet beyond the side of the precipice. When 500 feet of rope had been let out, the stone was forcibly drawn towards the principal cascade, which soon involved it among its waters, and snapped the rope. The stone at this time appeared to be about 200 feet from a small ledge of rock, which might be between 200 and 300 feet from the bottom. It is not improbable, therefore, that the height of the fall is not much short of 1000 feet."

I had determined to look upon the Falls, in the first instance, with the greatest philosophical coolness imaginable; and then, after taking a survey of the whole scene, to allow my feelings to run riot as they might please. When, after stepping over some forty or fifty yards of rough and mis-shapen rocks, I had approached the perpendicular cliffs over which the torrents of water are precipitated, as I was essaying to direct my curious vision into the tremendous abyss below, my eye caught my fellow-traveller prostrate upon the very edge of the rocks, with his head protruded beyond them; and I was so suddenly awe-struck, that I instinctively recoiled some yards from my position, and with difficulty would my nerves allow me to resume it. They were again violently agitated by one of our guides,—in a fool-hardiness which he intended should gain our applause, but which we did not commend,—walking upright for several yards along the margin, and tossing up his body, as if threatening to precipitate himself, along with the rushing waters. The dip of the gneiss, however, about five degrees landward, was no sooner observed by me, than I concluded that my centre of gravity would have a safe inclination, and, in the exercise of all my courage, I began to survey the awful chasm. My impressions it is utterly impossible to describe. I gazed in silent wonder, and not, I trust, without adoration of Him who "putteth forth his hand upon the rock, who overturneth the mountains by the roots, who cutteth out rivers among the rocks, and whose eye seeth every precious thing."

Owing to the advanced season of the year, we did not find much water in the bed of the river. At the point of the am-

phitheatre nearest us, there is a streamlet exactly of a yard in depth and width. It rushes to the termination of the rocks with great velocity, and meeting with not the slightest obstacle in its descent from it, it seems to shoot off like a rocket, and is apparently completely dissipated in vapour long before it has passed through its appointed space. The centre fall has a much larger body of water. In the first instance, it rushes for about three hundred feet over an inclined plane of about forty-five degrees, in a beautiful snow-white foam, and it afterwards descends perpendicularly into the basin below, with a thundering noise. The fall on the southern side, with about the same quantity of water as the preceding, is, about a hundred feet from its commencement, split into two by a projecting rock, but it meets with no other obstruction. It can be viewed in its whole descent with great advantage.

The report of a mass of stone which we threw over, was exactly *nine* seconds in reaching us; but it struck a ledge of rock before arriving at the bottom. We had no means of making for ourselves an accurate estimate of the depth of the fall. It has been lately ascertained by an officer of the Madras Engineers to be 1150 feet, nearly eight times that of Niagara! It does not appear to the eye to be of that extent. The bed of the river is more than a quarter of a mile in the direct line across; and about half a mile, when measured along the margin of the ellipse. In the monsoon the water rushes in every part over this, as we saw from marks on the banks, with a depth of at least thirty feet. The fall is consequently at this season unequalled in the world.

Our desire to descend to the bottom was intense; and though our guides dissuaded us from making the attempt, on account of its great difficulty, they admitted its practicability, of which we had been assured by several friends. After we had taken breakfast, and reclined for a little, our wishes changed themselves into a determination. We crossed the bed of the river, stepping over the rushing floods from rock to rock, not far from the edge of the cliff. On reaching the south bank, we passed through a few small rice fields and topes of jungle, and then commenced our steep descent not many yards distant from the fall, with a sight of which we were occasionally indulged as we proceeded. We had a

flight of steps rudely laid in some parts of our journey. In other parts we had to pass over the surface of almost perpendicular rocks, laying hold, for support, of the roots and branches of large creepers. We began to fear that our strength, much of which had been expended in the early part of the day, would really fail us; but, though ready to expire with fatigue, we reached the bottom. Here we rested for a little, and, after dispensing with the greater part of our dress, which was completely soaked with perspiration, we directed our course to the principal basin, scrambling over huge and shapeless masses of rock, which lay scattered in all directions. When we reached our destination, we found the reflected heat almost intolerable, and our thirst excessive. Before our muscles suffered any collapse, however, we entered the water, which proved most refreshing. After bathing, we treated ourselves to a new light dress, and we found ourselves comparatively comfortable, and prepared to enjoy the sublimities which we had descended to witness. Such a scene of wild ruin was never beheld by us. The disrupted rocks piled around us; the dark, frowning, and perpendicular sides of the mountains, which our eye, from our position, could scarcely scale; the boiling, deep, and roaring torrents at our feet; the clouds of spray and vapour in which we were enveloped; the western breeze reverberating in the hollow caverns which obstructed its progress; and the thunder of the falls; all seemed to proclaim that the elements of nature had conspired against us, and filled us with terrific awe! Their voice was, "Hast thou an arm like God, and canst thou thunder with a voice like him? Deck thyself now with majesty and excellency, and array thyself with glory and beauty. Cast abroad the rage of thy wrath, and behold every one that is proud, and abase him. Look on every one that is proud, and bring him low: and tread down the wicked in their place. Hide them in the dust together, and bind their faces in secret. Then will I confess unto thee that thine own right hand can save thee." An undying and beautiful rainbow in the perpetual clouds above us, was, nevertheless, the bow of promise, and might have reminded us of covenanted fidelity and love.

Our ascent was most arduous; and I thought I should never have been able to accomplish it. Our guides procured for us spe-

cimens of the granite rocks, which they struck off at different heights, according to our directions. From the bed of the river we ourselves procured several specimens of the superincumbent gneiss, which is finely stratified. From the banks we cut down some branches from cinnamon trees, the first which we had seen. We were grateful when we reached the bungalow in safety; and we were able next day to prosecute our journey to the ancient Banawásí, by way of the celebrated Chandragupti. The mountain on which the fort at this latter place stands is noticed particularly by Dr Francis Buchanan. Banawásí is mentioned by Ptolemy, and has a very ancient temple. Not far from it, we noticed a species of *Buceros*, which, as far as I am aware, is undescribed. It is called by the natives *Danchidi*. We heard the cry of the bird at a great distance, the large hollow excrescence above the beak acting as a sounding-board. We employed two natives to procure for us a specimen, but they were unsuccessful in their attempt to kill one. They gave us, however, two heads which they had in their houses. This bird, they said, lives principally upon fruit, and it is much relished as an article of food.

JOHN WILSON.

BOMBAY, 16*th August* 1837.

Description of several New or Rare Plants which have lately Flowered in the Neighbourhood of Edinburgh, chiefly in the Royal Botanic Garden. By Dr GRAHAM, Prof. of Botany.

Dec. 10. 1837.

Begonia parvifolia.

B. *parvifolia;* suffruticosa, glabra; foliis inæqualiter cordatis, lobatis, lobis subacutis, undulatis, sparce serratis, subglaucescentibus; fructibus trialatis.

Begonia parvifolia, *Schott.—Sprengel*, Syst. Veget. c. p. 408.

DESCRIPTION.—Whole *plant* glabrous. *Stem* suffruticose; branches red, transparent. *Petioles* (1–2 inches long) spreading, at length divaricated, channelled above. *Leaves* shorter than the petioles, ovate, unequally cordate at the base, delicate green above, pale and crystalline below, with prominent reddish veins, lobed; lobes subacute, distantly serrated, with a minute bristle in the base of each fissure. *Corymbs* axillary, on peduncles which are longer than the petioles, forked, bearing a male flower in the cleft, and one male and one female upon each division. *Bracteæ* subrotund, greenish-white. *Flowers* white; *male flowers* of two subequal entire and kidney-shaped petals, very rarely with a small one between these; stamens numerous, attached only at the base, fila-