12. *A VISIT TO NORTH SPAIN AT THE TIME OF THE ECLIPSE.*

BY FRANCIS GALTON, F.R.S.

A DIRECTION was given to my summer rambles by the desire of witnessing the solar eclipse of last June, and by the fact that the path of its totality, where nearest to England, lay across a country which I ardently longed to visit. The result was, that I applied for permission, and obtained it, to form one of the party of astronomers who, under the leadership of the Astronomer-Royal, were taken by H.M.S. *Himalaya* to Spain.

The *Himalaya* is truly a noble vessel, and we were right imperially treated. Those whose experience has been drawn from coasting passenger-steamers, in English or Mediterranean waters, would hardly credit that anything floated comparable in spaciousness and luxury to this magnificent ship. And she is as fast and as easy, excepting a tendency to roll, as she is spacious and comfortable; for we steamed out of Plymouth Sound on a Saturday forenoon, so steadily, that I hardly knew we were moving; and on the Sunday night we were going at half-power, because we were too near the Spanish coast, whose bold outlines lay in full view on the early Monday morning.

It was therefore with one of those feelings of contrast so often enjoyed by travellers, that I, with my eyes still toned to that dim English daylight in which we had just bade farewell to our shores, found myself paddling up the Bilbao river in a small shore-going craft, under a full flood of southern

sunshine, by the side of suburbs and quays crowded with people—where every incident, shape, colour, and sound, assured me that I was in a new country, and amidst a civilization that was neither English, French, nor Italian, nor resembling that of any other country I knew, but something wholly peculiar.

At Bilbao, the plans of that section of the *Himalaya* party, which had there been landed, were discussed and arranged. Different groups, of two, or three, or four persons, undertook to occupy different stations, with the purpose of scattering the observing power of our party as widely as possible over the path of totality. I joined myself to two friends—Mr. Atwood and Mr. Charles Gray—and we accepted one of the more distant positions, near Logroño. My friends were prepared to observe the "Red Protuberances," and I, for my part, had hoped to make some experiments on the heat radiated by the Corona, though, afterwards, an accident to my instrument compelled me to alter my plans.

The thoughtful arrangements for our comfort on landing, and the energy with which Mr. Vignolles fulfilled the self-imposed duty of host and guardian to our large party, were such as made us feel an almost painful debt of gratitude. I and my friends were billeted as guests in a capital house, belonging to a Spanish merchant, who tended us like infants. Even a packet of tea, provided by Mr. Vignolles, was in readiness for our use. Our luggage was looked after, our money was changed, our plans were settled, introductions to the authorities at Logroño were given to us, and every difficulty was smoothed away as soon as it was discovered. Not less do we owe to the leadership of the Astronomer-Royal, and to the trouble he took in originally organizing the expedition. It is a matter of congratulation that he has undertaken the part of historian to the eclipse, and that we shall soon learn the whole value of the results that have accrued from it, by means of a comparative analysis of the numerous observations that were made upon each separate phenomenon of that strange and magnificent meteor.

For my part, I do not profess to do more in this place than to give a brief account of two or three appearances which made considerable impression on me at the time, and which do not seem to have been so fully, if at all, observed by others, either in the present eclipse or in previous ones, and which I am glad of an opportunity of putting upon record. To these I will recur. At present, I will endeavour to describe a few of my general recollections of that rapidly improving part of Spain which I had the opportunity of seeing. I think I may be excused for doing so, although my stay was a very short one, because I have not found any book that gives a recent, and at the same time what appears to me to be a fair account of this portion of the Basque provinces. They are usually described as different from Spain only in being less Spanish, and by having a strong infusion of the Basque mountaineer element; yet I found it, as the Germans would say, thoroughly "selbst-standig," and with none of the airs of an outlying province of a larger and vivifying central kingdom. Bilbao is becoming exceedingly wealthy; the provinces to which it and Santander are the outlets, are being cut into by railways. There is every sign of abundant local activity; no beggary, or apparent poverty, or listless indolence: added to all this, there is a remarkable picturesqueness in its social life. In short, this portion of the Basque provinces did not appear to me as I had been led to expect.

Almost the first thing that arrested my attention on Spanish land was the chiaro-oscuro tint of everything I saw. It was especially remarkable in the soil and in the buildings. There was an abundance of bright colour, but it seemed to have none of that garish effect which is so remarkable under a French sky. The exquisite mellowness and depths of shading surpassed anything I had previously seen, and explained at once the possibility and the truthfulness of Murillo's treatment. It also showed me that the universal black dresses of the upper class of either sex were in no way incongruous or dismal when seen through a Spanish atmosphere, and with Spanish surroundings. The eye soon becomes used to a new

influence, and while I always recognised its effect, I afterwards tried in vain to recall the vividness of that first impression of novelty. However, the converse effect struck me forcibly when I left Spain for France, and found myself at Bordeaux. There is a well known and strongly contrasting influence of this nature to be seen when crossing the hills above Villafranca, which separate Mentone from Nice; the east side of this very natural, though not the actual, frontier between two great kingdoms being thenceforth wholly Italian in its colours and its aspect, and the west side as French as it is possible to conceive.

It is evidently the lowermost stratum of air that has the greater power in giving a mellowness of light, or an apparent depth of blueness, to the sky. One sees this unmistakeably in those Italian valleys that lie south of the Alps, where a blue, low-lying haze, which a little hill-climbing surmounts, floods the strath and mellows the view. So, again, a man standing at Chamouni and looking south over Mont Blanc, proclaims that the sky is decidedly Swiss, that it is hard and pale blue; while another man, who is stationed on the opposite side of the mountain, at Cormayeur, and looks north, asserts that the sky is soft, and deep blue, and eminently Italian; yet, in each case, whatever sky the observer sees above the mountain's crest, is on the opposite side of it. The Swiss man sees an Italian firmament, and the Italian man a Swiss one. Hence it is manifest that the characters of these aërial tints do not reside in the stratum that lies above the level of high mountains. The peculiarity of the Chamouni, or Cormayeur sky, is caused by the quality of the atmosphere that dwells in the Chamouni, or Cormayeur valleys, and in no way by that which spreads aloft in the higher regions.

It was a great delight to me to find that the Spanish ways of life appeared thoroughly characteristic, and wholly uncopied from other nations of modern Europe. There is a common cant phrase used sometimes in respect to France, and sometimes to England, of "advancing in the van of European civilization." Yet, however flattering to our vanities,

it would be a matter of deep regret if European civilization should ever become so far one and indivisible, that nations, whose instincts and geographical conditions of life are different, should make it a point of fashion or of education to live on the same model. One longs to see a freer development than exists at present, of the immense variety of aptitudes and peculiarities that are found in the human race, and are fostered by different geographical circumstances. Let us, at least, hope that a united Italy may develop a vigorous and high-class, but an autogenous form of social life. If she did so, it would be as welcome to the majority of educated Europe, as a new face and a new mind to a small provincial society. Yet an exception to this statement must be made on behalf of the French, to whom any hope of the kind would be wholly unintelligible. They are strangely unconscious of their own monotony, and seem honestly convinced of the doctrine they subscribe,—that all which is not Frenchified is pagan, that there is but one path of perfection, and that the panacea for afflicted aliens is French influence and the Code Napoleon.

With feelings very different from theirs, it was an inexpressible pleasure to me to witness a busy, thriving nationality, utterly distinct, as I have already said, from any I had seen before, and, moreover, of a character which strangely fitted into my peculiar tastes. Every wheel of life in these northern parts of Spain, so far as a stranger can judge by what goes on in the streets before his eyes, appears to move freely, while the whole forms a machine absolutely different from any other in Europe. Nothing in common use seemed borrowed from other countries. The dresses of the men, women, priests, porters, and muleteers, were peculiar and not ineffective. The cattle were mules and oxen, and did their work excellently—better, I dare say, under a driver of Spanish temperament than a horse would. The animals and the men are notoriously well matched; indeed, the skill of the muleteers, the mastery they showed over their art, and the ingenuity and novelty of their harness and pack-saddle appliances, were an endless astonishment to me. The street

architecture was peculiar and exceedingly imposing, with its large, square, well-glazed balconies and numerous awnings. Every act of the people was original—their gait, their implements, their way of setting to work. I looked into many shops—such as tinkers', blacksmiths', potters', and so forth—and came to the conclusion, speaking very broadly, that if any of their patterns were introduced into England, or that if any of ours were made to replace theirs, the change would involve decided incongruity, and lead to questionable improvement. Another subject which struck me at once, and with which, up to the last moment of my stay in Spain, I became no less charmed, was the graceful, supple, and decorous movement of every Spanish woman. It was as constant a pleasure to me to watch their walk, their dress, and their manner, as it is a constant jar to all my notions of beauty to see the vulgar gait, ugly outlines, mean faces, bad millinery, and ill-assorted colours of the vast majority of the female population that one passes in an English thoroughfare. The hideous bonnet is still wholly absent in these parts, and, in place of it, every Spanish woman, of every class, has her dense, black, uncovered hair divided with a straight, clean, white parting down to the forehead, and beautifully smoothed on either side.

Taking it all in all, I felt myself as one dropped in a thoroughly new land, with an infinity to learn and observe. Yet I did not feel any strangeness in its ways, but imagined I could accommodate myself with ease and pleasure to the every-day matters of Spanish life, so far as I could judge from what lay on the surface. The marked orientalism of the place captivated me. I enjoy oriental life, even under the drawback of knowing that the natives are ready to spit at me as an unclean dog of a Christian; how much more, then, should I be at ease where I was only liable to be cursed as a Protestant heretic. The nurses sing oriental airs to the children; the colours of the peasantry are Moorish in hue, pattern, and harmony, yet Spain is no mere Moslem country in its appearance. Among many others, there are two notable points of

difference in its favour—the one, that unveiled women form more than half of the population in the streets; and the other, a consequence of non-seclusion of the sex, that the houses are enlivened, as I have already observed, by their large projecting windows and numerous balconies.

We were treated with marked courteousness wherever we were recognised; but another minor welcome delighted me the most, by its evident sincerity. It was this: I have always noticed that a stranger is soonest discovered and objected to by children and by dogs. Now, it was a fact, which I do not recollect to have experienced elsewhere, that although I was dressed like an Englishman—for instance, I usually wore a light-coloured shooting-coat, while all the Spaniard upper classes wear black, and the lower ones national costumes—yet, whenever I explored side streets and came unexpectedly upon groups of children or scattered curs, they one and all treated me as a fellow-countryman, and hardly ever raised a cry of terror or a bark of antipathy. I fairly fell in love with Spain at first sight, and have continued constant in my admiration ever since.

Let me devote a paragraph to the Public Promenade. I had never realized that truly Spanish institution until I saw it. A large half-deserted square, or suburban garden, fills towards night with a well-dressed swarming crowd, that hums with low conversation. All the spare population of the town takes part in it. They walk in ranks of three or four, the two sexes never intermingled in the same group, and they pace rank behind rank, on a broad gravelled path, under the warm starry sky, between low trees. The promenade leads down the walk, round at the end, and back again. The ascending and descending stream almost touch each other, that everybody may have one good view of everybody else in each round. Conversation seems to be carried on merrily, but in a well-bred, gentle tone of voice. All ranks except the lowest take part in it, and all have the air of ladies and gentlemen. It is a very pleasing exhibition to a stranger, the more so, as there is no gendarmerie or beadledom. These great crowds seem to

keep order for themselves; there is no appearance of military or police.

I saw few beautiful faces in the north of Spain, but I rarely saw a mean one. The men were all moulded in a high type, especially the peasantry. It was an absolute grief to me, when I left Spain, by way of that fashionable watering-place, St. Sebastian, to see the inferiority of physique, manner, and address, of the upper classes of Madrid society, who congregate there, to those of the Basque peasantry I had so lately travelled amongst. How remarkable is this in many oriental —I do not mean Indian—and semi-oriental countries! With us, the higher classes, speaking generally, have the higher make of body and mind, and by far the nobler social tone; they form a true aristocracy in our land, to whom Scriptural depreciations of the Syrian wealthy in respect to the Syrian humble are singularly inapplicable.

I have no fault to find with the inns in the only three towns where I stayed—Bilbao, Vittoria, and Logroño. (I do not reckon St. Sebastian as a genuine north Spanish town.) The lodging and cooking were not only equal, but considerably superior to that in the large towns of France, not on any regular line of tourist traffic—superior, for instance, to that in Nantes. There was no disagreeable quantity of garlic, or of anything that was unusual, in the food; and much of the common wine was exceedingly good. Some of the eatables—for instance, the sugary biscuits, like hardened froth, or fine pumice stone, but white and soluble, which all the world consumes, dipping them into chocolate or water—are excellent. The chocolate is really good; far better—I wonder why—than what I can get elsewhere. As for the solid articles, I don't care to enter into details: suffice it, that I found them toothsome and digestible, which English inn dinners are not. If the inns were dirty, yet the bed linen was clean, and the towns, from end to end, were remarkably free from dirt and bad smells. It is not doing justice to these parts of Spain to talk of them as being extraordinarily backward; as for mendicancy, it does not seem to exist. I had with me a recently

published number of the "Journal of the Statistical Society," —that for June, 1860—in which is an exceedingly interesting account of the recent progress of Spain. The conclusion of the writer is, that her exports and imports had doubled between 1850 and 1856, and were steadily increasing (the last published census being of 1857), and that whatever tests may be applied to the stated fact of her rapid advancement, the result is uniformly favourable. I would strongly recommend all who care to learn the actual state of modern Spain, to study this paper.

The road from Bilbao to Vittoria is full of interest. Besides the history of the great Peninsula struggle, which gives some memorial to nearly every village, brook, and road, there is abundant intrinsic charm of landscape and wayside incident. One interesting phenomenon of physical geography, on which, by the way, our eclipse prospects were intimately dependent, was a subject of continual inquiry and remark. It was the rapid change from a humid sea-coast climate at Bilbao, on the north face of the Pyrenees, to an arid soil and a clear blue sky on the south of them. It is the old story. The cold mountains condense a large part of the moisture in the Atlantic winds; therefore, whatever air has passed over the mountain-tops is comparatively dry and cloudless. The valley of the Ebro is literally parched, and would be utterly barren if it were not for an elaborate system of field irrigation—elaborate, I mean, in its extent and comprehensiveness, but simple enough in its details.

We had naturally sought information with eagerness, from the moment of our landing, about the relative sunniness of different places on the calculated path of total eclipse—it was an all-important question to us—and I heard that, as a rule, travellers to the interior left Bilbao under an overcast sky, that they ascended the mountains in fog and rain, that the clouds broke long before reaching Vittoria, and that from Logroño onwards the sky was cloudless. I do not know that anybody has examined into the proportionate effect of this nature produced by mountains, with reference not only to

their height, but to other geographical conditions. There seems to be considerable variation that is difficult to account for; for instance, not to travel further than our own country, the west wind is far wetter than the east wind, but the district at the eastern foot of the Westmoreland hills is little, if at all, drier than that on their western, notwithstanding the enormous quantity of rain that falls upon the latter. I believe the average distribution of cloud and blue sky, as distinct from rain and drought, to be far less uniform over any given district than is commonly supposed. In a country like England, a difference of a few miles makes a considerable alteration in the average character of the sky. Clouds collect over clay soils, and are dispersed over chalk. In fact, I endeavoured once, but failed from an absence of anything like a sufficient number of recorded facts, to compile, for my amusement, a sun and cloud chart of England, the intensity of shading to represent the average amount of cloudiness. I, however, collected enough matter to make me believe that there was, as I have stated, great inequality in this element of climate. Thus, with all the faults of a London atmosphere, the clearness of its sky at a late hour of the night, or rather at a very early one of the morning, is probably unsurpassed in all England; but in this case Sir J. Herschel has well described the cause.*

Until our arrival at Vittoria, my two companions and myself were almost as helpless as babies in the art of expressing our wants. Spanish is so obviously a language that one ought to know, from its resemblance to Latin, &c. —the mere light of nature enabling one to read it with reasonable fluency, after the rudimentary matters of grammar

* See the invaluable article by Sir J. Herschel on *Meteorology*, in the late edition of the Encyclopædia Britannica. It is, so far as I know, the only worthy exposition of that science, as a whole. I have always wondered it has not already been re-printed in an easily accessible form, and that it does not become a text-book at our Universities, and other places of advanced education. Meteorology is a branch of physical science which seems peculiarly well fitted for a University subject, especially when treated in so condensed yet comprehensive a manner as it has been by Sir J. Herschel.

have been once mastered, and a few minor words learnt—that I felt quite ashamed of myself at my inability to frame an intelligible sentence. What made the matter worse was, that the Spaniards I accosted did not seem hopeful about the possibility of understanding me. The power of impressing on a foreigner, of whose language you know but little, that it is within his power to comprehend you if he only chooses to try, is a *sine quâ non* to success in conversation. With mutual faith, abundant interchange of ideas may be carried on through the medium of an abominably broken dialect; without it, a fairly good vocabulary may be absolutely useless. French was an unknown language to hotel servants, diligence-office keepers, and all that genus. I heard of exceptions to this rule, but saw only one or two instances myself. However, after our second day at Vittoria, the spell of dumbness was broken by the effective assistance of a railway inspecting engineer, whose invaluable services had been made available to us through the kindness of Mr. Vignolles, and he henceforth managed all our little difficulties and wants.

This gentleman was one of a class who form an influential element in the districts where railroad-making, under English superintendence, is being carried on. A line of railway is undertaken by a contractor, inspecting engineers are appointed, each to a particular section of the line, a few miles in length, to see that the contractor does his work fairly. They live in strange out-of-the-way Spanish villages, lodging with some Spanish family, and spending all the day in riding about the line. Now and then, it is possible for them to take a few days' holiday at Vittoria or Logroño, or at the reputed Paris of these parts, Bilbao. They have exacted fixed charges at the hotels, introduced some good dishes into the bills of fare, and in one case, at least, where accommodation was bad, had established a respectable person in a new inn to the convenience of the travelling public. They are all of the class of young rising engineers, receiving considerable salaries, and looking forward to some future time when they themselves shall be contractors and wealthy men, in Europe,

Australia, or America, or wherever a good opening may then happen to exist.

It is of course impossible for a Protestant to forget for one moment that he is a reputed Heretic, and that on however good terms he may be with a Spaniard, there is an essential difference between them, which any accident may unmask. I was curious to know how far this feeling would affect the somewhat intimate relationship which must necessarily spring up between a lodger and his hosts. I understood from our friend the engineer that, as a general rule, there was no appearance of meddling intolerance, the Englishman being considered as an unaccountable sort of animal, and allowed to go his own gait; the more so, as an Englishman's probity and energy has a name in these parts of Spain. Yet little circumstances constantly arose to show how easily this thin crust of forced indifference might be broken through. The death of a Protestant, and the question of his burial, is sure to create a difficulty. Our friend told us that he every now and then received a serious, but kindly lecture, from some elderly female, pointing out to him the danger of his heretical ways, and the certain future that threatened him, and far more frequently, that semi-serious allusions were thrown out to the same purport.

I made many inquiries about the honesty and the morality of the Spanish peasantry, and being assured from different sources that it is very high, much higher than in England, I believe it. However, the use of the knife is rather common.

We hired a carriage at Vittoria, and passed, by a little used mountain road, over the Sierra de Tolonio to Logroño, beyond which our proposed station was situated. The crest of the Sierra formed the northern boundary of the valley of the Ebro, and we felt much anxiety to witness the reputed blue sky of the new country, for hitherto the weather had been capricious and frequently overcast. When we attained the ridge, and had descended clear of the clouds that lay on it, the largeness and aridity of the view took me by surprise. The valley was almost as tawny as an African wady, and some forty miles in

breadth, running in ample sweeps between lines and groups of mountains that towered in wild disorderly masses, flanked with some noble crags, and garnished with a few isolated peaks. It was a first-class view, deserving to rank among the best ten or twelve of those with which I am acquainted. There are three views, more or less, of this description, to which I habitually refer myself as convenient standards of comparison, and which I usually quote, as the finest that I know. Their similarity lies in the amplitude of the mountain shoulder whence the view is taken, in the vast unbroken sweep of rich country extending from its foot, and in the completeness of the picture, owing to its limits being framed with natural objects, and not passing out of sight in an untidy, indistinct haze. These views are—1. That from the hills above Trieste. 2. From below the cedars of Lebanon, over the plains of Tripoli; and 3. From our own Devil's dyke, near Brighton. The sweep of the valley of the Ebro is little inferior to any of these.

The Spaniards, at least in the northern provinces, seem mad upon road-making; here and there were pieces of our present way tended with incommensurate care. It debouched by no less than three roads down into the valley. One was a bad one; then came another, with grand zigzags and parapets, as good as could be desired: but, not contented with this, a third road, also with zigzags, cutting across the second one at many places, was newly constructed. The hill side looked a labyrinth of roads from their curious intercrossings. Our driver, as he spun down hill, was constantly puzzled which turn to take, and the mules were pulling in opposite directions, at many awkward corners. We saw some ascending waggons in similar indecision, passing up different ways. Everywhere the road-makers seemed to revel in funds, though they certainly do not apply them equally.

On reaching the plain, our way led us through a village, called La Guardia. It was perched up on the top of a detached conical hill, burrowed with wine-vaults, in a situation that dominated the plain. It was battlemented with ancient walls and towers, and suggested the very ideal of its

name. Here we had to stop to bait—it was eleven miles short of Logroño—and our proposed station was twenty miles on the other side of that town, on the opposite boundary of the Ebro valley, on a broad hill-top, inaccessible to carriages on account of some broken bridges, and deficient in buildings where our instruments could be housed and got into order. But La Guardia was fully as well situated both as regards the path of the shadow, and the stations of the other observing parties. House room for our instruments was there, the view of the plain towards the south-east, along which the black skirt of the shadow of totality would sweep when the sun reappeared, was uninterruptedly visible; and, lastly, the clouds clung about the high hill-tops, while all the sky above us was bright and clear. A few words sufficed to show that we equally appreciated these advantages, and we sallied forth, up the principal church-tower, among the clock and bells, about the tumble-down ramparts, and everywhere where we could hope to select the best station, to the wonderment of the natives, who did not at first comprehend the object of our proceedings. The result was, that we ventured to transmit a civil message to the owner of a house that rose high, and had a flat top, used for clothes-drying, and partially roofed over. It proved to be tenanted jointly by a priest and doctor. They cordially and most courteously welcomed us. We clambered up the little stone staircase that led to its roof, knocking our heads and grating our elbows, and found the place exceedingly well fitted for our wants. Our hosts put it at once at our full disposal. They gave us tréssels into which we could screw the telescope-stands, tables, and chairs. We then went to a carpenter, who took in hand some little matters that were wanted by us, and did them, as I find foreigners usually do on such occasions, with an intelligence and quickness of apprehension rarely seen in an English mechanic. Finally, we locked up our precious instruments, in an empty room, to await the day preceding the eclipse, when we were to return to mount them in readiness, and to make a few prefatory observations. La Guardia was not a

place to stay at with comfort—it was a mere village; besides, we had letters of introduction to Logroño, so we went on there and established our quarters, taking Spanish lessons, bathing in the Ebro, buying trifles, and prying everywhere.

Logroño was the most thoroughly national town we saw, and I have carried away a great affection for it. The streets and arcades are busy in the morning; besides business, there is a good deal of church-going. I was vastly interested in the movements of the ladies' fans at church. All the world knows that Spanish fans are in perpetual motion, and betray each feeling, real or assumed, that passes through the mind of its bearer. I felt convinced I could guess the nature of the service at any particular moment by the way in which the fans were waving. The difference between a litany and a thanksgiving was unmistakeable; and I believed that far minuter shades of devotion were also discernible.

In the afternoon, the military were paraded, and the bands played in the square. Of course, all the spare population went to see them; but what amused us especially, was the part taken by the nurses and the children, both here and at Vittoria. They came in hundreds, scattered among the crowd. The instant the music began, every nurse elevated her charge, sitting on her hand, at half-arm's length into the air, and they all kept time to the music by tossing the babies in unison, and slowly rotating them, *in azimuth* (to speak astronomically), at each successive toss. The babies looked passive and rather bored, but the energy and enthusiasm of the nurses was glorious. At each great bang of the drummers a vast flight of babies was simultaneously projected to the utmost arms' length. It was ludicrous beyond expression.

The environs of Logroño greatly pleased my particular taste. The land is utterly arid when in a state of nature, but wherever a runnel of water can be led, pumped up from the Ebro, there is fertility; consequently, the charms of an oasis are always present: there is the air of the desert, with abundance of neighbouring verdure to cheer the eye. I could not understand how it was, that not a single country residence

had been anywhere seen since Bilbao. The landscape was exceedingly varied, and in all cases exhibited the appearance of a most liveable country. I had been everywhere looking for "gentlemen's seats," like the Yorkshire servant of Eothen's companion, when riding across the Balkan; yet I saw nothing but peasantry—hard-working men, who seemed only to want a good pattern of agricultural implements, and modern agricultural knowledge, to become first-rate small farmers—or else muleteers and others riding on gaudy saddle-cloths, so gaudy, that one which I bought at Logroño, of the common pattern and material, is now amongst the most showy pieces of drapery in my drawing-room. It is woollen, woven in bands of colours, and absolutely Moorish-looking.

The day before the eclipse, we drove to La Guardia, to arrange our instruments. It was there I discovered a disaster which had befallen mine. I had taken an actinometer (Herschel's), and on exposing it to the sun, found something had gone wrong. It proved that the enclosed thermometer-stem had broken. I candidly confess that a rising feeling of exultation accompanied this discovery; I was not now necessarily obliged to spend the precious three minutes of the eclipse in poring on an ascending column of blue fluid in a graduated stem, and noting down the results by a feeble lamp-light, but I was free to enjoy in full the whole glory of the eclipse. I should here say, that there is something very faulty in the mechanical arrangement of these very important instruments. Negretti and Zambra, who are the makers of them, tell me, that in no instance have they ever sold one that was not, sooner or later, returned for repair, the enclosed thermometer being broken.

It now became necessary to fix on some other limited class of observations; and I decided upon sketching the Corona, and also on endeavouring to determine the exact colour of the eclipse light, about which there had been discrepancy of opinion. For the first, I required merely my naked eye, pencil, paper, and a lantern. I happened, however, to possess a small theodolite telescope of the lowest power, very

conveniently mounted, that would enable me to isolate any portion of the Corona I chose, and thus to guard against the possibility of optical illusion from adjacent appearances. For experimenting on the eclipse light, I happened also to have with me a tiny box of twelve colours, which I had selected some years ago, after numerous trials, as being those which were most distinct each from the other, that I could obtain. Whenever I wanted to paint upon a map different marks, meaning different physical features, or travellers' tracks, I used these colours. I accordingly painted a sheet of paper in squares, numbered very legibly, and proposed observing them from time to time during the eclipse, and to note whenever any of the twelve became mutually indistinguishable; then it would always be in my power, as I supposed, to reproduce this effect by light passing through glass, of a colour to be determined by after trials. After I had found a piece of glass that produced the required effect, its colour, when looked through, would be the average of that thrown down by the sky at the time of the eclipse. My colours were as follows—I especially mention their names, because I can recommend the selection to any person who wants a box for purposes similar to those for which I originally procured mine, and about which I took a good deal of trouble:—Violet carmine, Vandyke brown, Prussian green, Hooker's green, Emerald green, Orange chrome, Cobalt, Vermilion, Crimson lake, Olive green, Burnt sienna, Indian yellow. Nine of these, including most of the greens, strangely enough, are very distinguishable by candle-light.

Mr. Atwood and Mr. Gray had large telescopes, and chiefly devoted themselves, as I have said, to the Red Protuberances. We arranged our lanterns and watches in convenient positions, and rehearsed the proceedings of the morrow. The weather was far from being as satisfactory as we had expected. The clouds hung about the mountains, while La Guardia was comparatively free; so we felt reassured as to the wisdom of our choice, although exceedingly anxious as to the prospect of the precious three minutes of the eclipse, next afternoon,

finding us under a favourable sky. The wretched weather of this summer has afflicted even Spain, but we returned to Logroño in hope.

The morning of the eventful day broke grey and unpromising—wind north, and therefore over the Sierra de Tolonio—drifting clouds from its summit, where an abundant reservoir of them lay piled. The drifted clouds were low cumuli, with few indications of blue between them; however, the sky improved as the day advanced, and when we had reached La Guardia, the clouds were settled into rounded forms, with large blue spaces in their intervals. The wind gradually died away, and our massive enemies moved very slowly and undecidedly, sometimes in one direction, sometimes in another. We had a good view of the beginning of the eclipse; after that, a succession of clouds passed before the sun, hiding it from time to time, and making us sorely anxious; but about twenty-five minutes before totality they gave place to our wishes, and the welcome crescentic sun shone perfectly clear from out of a good English blue sky—perfectly clear, I say, but not so deep a blue as we had previously seen in the magnificent atmosphere of the Ebro valley. There was, doubtless, vapour in the air, which the chill of the eclipse might possibly convert into a thwarting haze, or a source of accidental and puzzling appearances; nevertheless, from this time onwards, we had no trouble, the blue space above head enlarged rapidly and continuously, and the evening closed with a constant sunshine.

Crowds of people were clustered at the foot of our tower, and about a dozen spectators were on the roof-top by our side. They carefully and courteously respected the portion we occupied, and added to our pleasure by their shrewd remarks and manifest interest in our proceedings. My notes were as follows:—Eclipse commenced at 1h. 50m. by my watch. 2h. 15m. Light sensibly diminished. 2h. 22m. No apparent difference; my colours unchanged. B—— thinks the landscape is becoming fainter. 2h. 35m. Light still more peculiar; the colours as before. The people on the roof remark the colour of the sky to be darker. I doubt it. The

spots on the sun, as seen through a telescope, appear decidedly darker. We all agree in this. 45m. The light certainly appears more yellow, but the country is yellow, and is now everywhere in full sunlight. My colours just as distinguishable as ever. 50m. Indian yellow, cobalt, and emerald green are lower in tone. I can distinguish all twelve colours perfectly. Light much fainter. 55m. Light far fainter. I made a hole in a paper screen, and watched the crescentic image of the speck of sun-light that shone through it on the floor. The shadows were very dark and sharp. Air cold. 58m. The numerous pigeons of the place began to fly home, fluttering about hurriedly, taking shelter wherever they could. There was something of a hush in the crowd.

At *about* 3h.—I forgot to note the exact watch time, I am sorry to say—totality came on in great beauty. The Corona very rapidly formed itself into all its perfectness. It did not appear to me to *grow*, but to stand out ready formed, as the brilliant edge of the sun became masked. I do not know to what I can justly compare it, on account of the peculiar whiteness of its light, and of the definition of its shape as combined with a remarkable tenderness of outline. There was firmness but not hardness. In its general form, it was well balanced, not larger on one side than the other. It reminded me of some brilliant decoration or order, made of diamonds and exquisitely designed. There was nothing to impress terror in the sight of the blotted-out sun; on the contrary, the general effect of the spectacle on my mind was one of unmixed wonder and delight. A low buzz of voices arose among the crowd at the foot of the tower, like what is heard when an exceedingly beautiful firework is displayed at a *fête*. The Corona-light sufficed abundantly for writing rough notes and for seeing my colours. Oddly enough, the *burnt sienna* and the *vermilion* alone ceased to be distinguishable from each other. Indian yellow had greatly lost brilliancy. I made a rough sketch of the Corona—it was too manifold in its details and too beautiful in its proportions for me, bad artist as I am, to do justice to it in the short time the spectacle lasted—yet

the drawing which I made, and which is given here, is to my mind a fair diagram of this splendid meteor. I drew it without taking any measurements to guide me, but simply

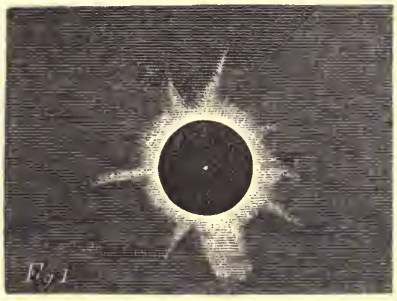


Fig. 1

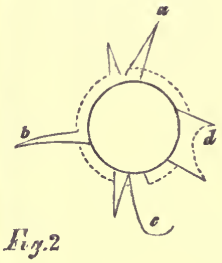
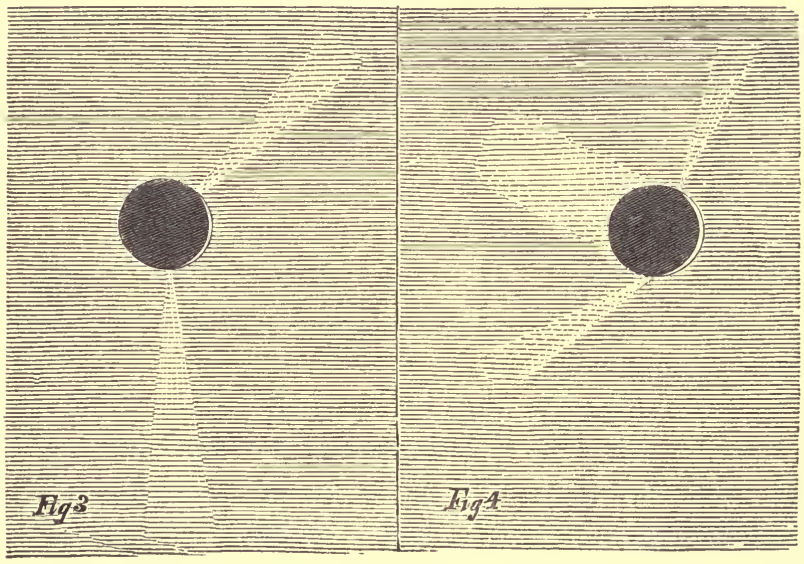


Fig. 2

as I would sketch any ordinary object. The uppermost part is that which was uppermost when I drew it. I used no lantern, and required none; there was a sufficiency of light. The principal facts were, firstly, that the long arms of the Corona, fig. 2, do not radiate strictly from the centre, neither are they always bounded by straight lines. The upper edge of *a* was truly tangential, that of *d* and of others, nearly so; *c* was remarkably curved, and so was the lower edge of *b*, though less abruptly; it was like a finch's beak, and remarkably defined. Secondly, the shape of the Corona was not absolutely constant; speaking generally, it was so; but in small details, it appeared to vary continually, by a slow diorama-like change. There was no pulsation or variation of intensity, visible in its light: I was particularly impressed by its solemn steadiness.

It seemed scarcely possible to believe that the light of the Corona was other than the rays from the sun, made visible in some incomprehensible manner round the edge of the moon, the appearance being eminently suggestive of a brilliant glistering body, hidden behind a screen. The nearest resemblance I can think of, to express my meaning (not that I am to be understood as supposing the remotest analogy between the causes of the two appearances), is the effect of a jet of water, playing from behind against some obstacle, and throwing an irregular halo of spray around it, on all

sides. That a reasonable foundation may exist for ascribing the Corona to some diversion of the ordinary rays of the sun, however unintelligible the cause of this diversion may be, and not to a luminous atmosphere surrounding the sun, was powerfully impressed on me by certain appearances that were observed when totality had passed: they were these. Four or five minutes after the reappearance of the sun, Mr. Atwood called attention to remarkable luminous radiations, like sunbeams slanting through a cloud, and proceeding in narrow but long brushes from the cusps of the sun. They changed their angular directions, and even their shapes with such rapidity, that I was almost bewildered in a first attempt to draw them. If I looked down on my paper to draw a few strokes, the appearances had become changed when I again raised my head. Nevertheless, between 3h. 11m. and 3h. 13m. I managed to make three sketches; the two that were most characteristic are here very fairly represented. After 3h. 13m.



the light of the emerging sun was too strong to admit of further observation. The brushes were perfectly distinct and unmistakeable, they were best seen by holding up the hand so as to mask the sun, and they were perfectly visible through the telescope when it was so turned as to exclude the sun.

There was no mistake whatever about their existence. I trust the attention of observers of future eclipses will be directed to them, both before and after totality. Now, whatever may have been the cause of the brushes, would also, I should guess, be competent to create the greater part of the Corona: the two appearances being of identically the same genus. It will be observed that the brushes in Fig. 3 enclose an angle of about 130°, on the side of the emergent sun, and that this same angle had changed to about 195° in Fig. 4, to say nothing of the new appearance of a central bar of light. The angular change of the brushes was continuous, so long as I had an opportunity of looking continuously at them.

I have since often looked for, and have only just seen (Sunday, February 10th), an almost precise representation of these appearances, in the case of a small black snow-laden cloud sailing before the sun. When the clouds are in any way transparent, though some indications of these brushes may be observed, their effect is proportionately feeble, and if the sun be masked by an object at no great distance, the effect does not occur at all. The common artist representations of the sun about to rise over a distant hill, show that these appearances are generally recognised. Now I can hardly understand what I have described, on any other supposition than that of sunbeams being reflected from off the back of the cloud at a very acute angle athwart the line of sight. They would illuminate the haze of the atmosphere through which they passed, and being seen exceedingly foreshortened, would be the more apparent. But here I stop. I do not comprehend why the wisps of light should be projected from the cusps of the uncovering sun, and therefore have an apparent movement of revolution. Still less can I understand why the moon, which is presumed to have no atmosphere of any description, capable of being illuminated by passing rays, should exhibit this appearance so beautifully. When I shall have seen wisps of light, as in Figs. 3 or 4, coming from a cloud, but shaped in any way like those of Fig. 1—convergent and not divergent, curved

and not straight—whether owing to irregular distribution of the adjacent haze or other less intelligible reason, I shall hardly resist feeling satisfied that the Corona is mainly due to the same description of cause that produces them, whatever that cause may really be. There may, in addition, be some luminous effect produced by an enveloping atmosphere of light round the sun, seen beyond the edges of the eclipsing moon.

The skirt of the shadow of totality sweeping over the country to the south-east, did not impress me as I had expected; there happened to be the shadow of a broad distant belt of clouds near the horizon, in which the eclipse-shade merged, and the skirt was never well defined. Our range of vision in that direction was immense. We could see but little, and I looked for nothing, towards the north-west.

The lightening of the landscape was rapid: even at 3h. 16m. everything looked to my eyes as almost natural. At the time of totality, the sky did not appear to me to descend. The sky was quite yellow near the horizon, but I remarked the absence of light, rather than the colour of the light; and a strangeness, rather than a mournfulness of effect. A couple of gusts of wind preceded totality.

As to my colours: after a good deal of trouble, I find I can reproduce the exact effect that I witnessed, by placing them in a closed box having a dark ceiling, and admitting a faint white light at a low angle. I then view the colours, also at a low angle, through a piece of dull yellow glass. All these details seem essential to effect: they are, in some sort, the equivalents to a yellow sky near the horizon, and gloom above head.

Thus was completed the object that had brought us to Spain, and we drove down the hill of La Guardia amid cries of "Viva Ynglaterra!" for we had become exceedingly popular in the town, thanks to the kind way in which our hosts had introduced us everywhere, and we increased the triumph of our departure by scattering coppers among the ragamuffins who had collected to see us go.

It was a marked instance of the local nature of sunny

weather, that the people at Logroño could not credit we had been so fortunate in our day. At that town, nothing of the eclipse had been seen; and a party from the *Himalaya*, Mr. Pole and Mr. Perry, who were stationed on a hill-top near it, and in full view of us, though some ten miles off, were greatly annoyed by clouds; they, too, could with difficulty understand our good fortune.

The instances are as many in this eclipse as in others, of discrepant observations and of important things forgotten. My fault was not noting the moment of totality. It would have been of service in calculating the extent to which the sun had emerged, and the exact position of its cusps at the time when Figs. 3 and 4 were drawn, in order to find out whether these brushes of light were exactly or not, in a line of prolongation of them. One very unlucky piece of forgetfulness is rumoured to have been made by an eminent photographer, not of the *Himalaya* party. He went, partly on commercial grounds, excellently provided with instruments, and all the way overland, on purpose to photograph the eclipse. Everything was prepared, the day was glorious, the totality came on, and the slide of the camera was carefully inserted. When all had passed, and the slide was opened in the dark chamber, alas! the operator had forgotten to put his *plate into the slide!*

Gray and myself did not return by the *Himalaya*, but went to St. Sebastian, and ultimately spent a part of the summer together, in the Pyrenees—I having in the interim joined my wife at Bordeaux, and taken her with me.

The valley of the Ebro is separated from the Pyrenees by a belt of broken country, almost untraversed except by horse-roads, along some few of which, invalids are taken as they best can go, to the baths of Panticosa, &c. and occasionally across the Pyrenees, by one or other of the horse-passes, to the French watering-places of Eaux-bonnes, Luz, Cauterets, or Luchon. This belt I did not traverse. The northern part of it was very familiar to my eyes, owing to the numerous mountain-tops, beginning with the diligence-road by St. Se-

bastian, and ending with the Canigou, near the Mediterranean, whence I looked down upon it. The part adjacent to the main chain, including the small republic of Andorre, is very little traversed or known. On the French side, the plain is prolonged up the valleys, to the very bases of the mountains; but the Spanish side is far more tossed and tumbled.

Here that remarkable madness of mountain climbing, to which every healthy man is liable at some period of his life, and which I had always believed myself to have gone through once for all, in a mitigated form, began to attack me with extreme severity. I will spare the reader the details of the direction which my malady took, because none of the Pyreneean mountains are sufficiently high to afford a field for feats, though glorious for actual enjoyment. Yet they are of no despicable elevation or grandeur: there are plenty of 10,000 feet, and three of 11,000; while the ruggedness and steepness of their sides is fully equal to those of any other chain. I do not know where a worse piece of climbing is likely to be found than about those mountains, one of whose bases is well known as the "Grand Chaos," being crossed by the road from Luz to Gavarni; and there are few steeper hill-tops anywhere, than the Pie de la Pique, near Luchon, and the Fourcanade (which latter I had not an opportunity of attempting). I like, too, the absence of fir and pines, and the varied forest foliage that replaces them. The climate is more southern than that of Switzerland, being finer and gloriously hot. Again, when one is tired, a vast deal may be done on horseback along the numerous bridle-paths, that lead to many admirable points of view. One drawback is that the guides are rather a poor set, ignorant of the country, unable or unwilling to carry weights, and bad walkers. There are not half a dozen in all Luchon with whom I would care to be accompanied, yet Luchon is the destination of 2,000 yearly visitors.

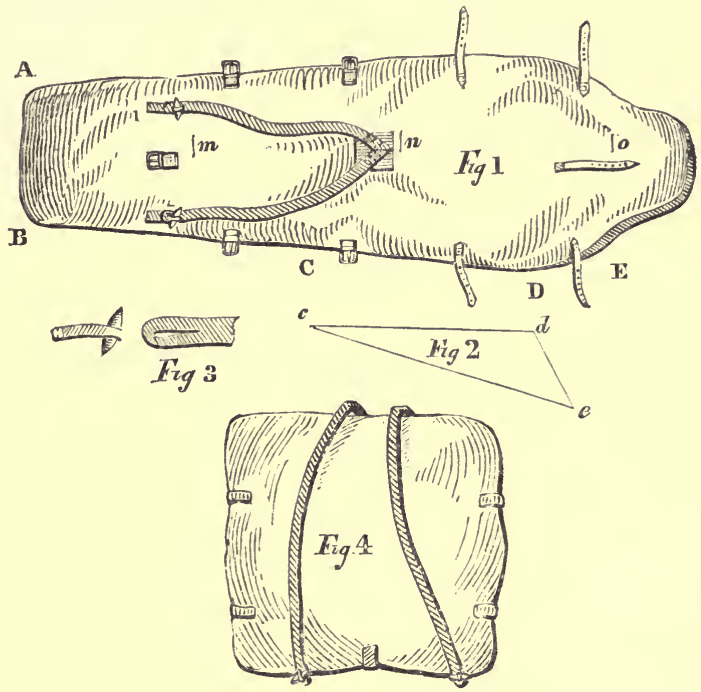
The French give a bad name to the Spaniards of the Pyreneean chain; and as the accommodation of the country is, for the most part, villanous, and the language a *patois*,

and there is nothing to do but to climb and shoot chamois, and explore the beauties of a new country, they do not care to penetrate there. There is no lack of chamois. Bears exist; in fact, I saw one just shot, but the brute had been tracked and mobbed. A single sportsman would have had small chance of finding him. There are abundance of eagles, and a few ptarmigan. The Spanish side is doubtless a wild land, and is not to be explored except by persons prepared to sleep in châlets or cabins, and to cook for themselves. It was always most annoying to me when I had clambered, for some hours, to a distant peak, that the absence of accommodation and means of bivouac drove me prematurely to return. I had long been convinced that the only way of exploring the interesting mountain tracts that still remain almost unknown in Europe, such as these Spanish Pyrenees, Dauphiné, the Savoy Alps, the Carpathians, the northern parts of Turkey and Greece, and so on, is for the traveller to take some means of making himself independent of beds, and, to a certain degree, even of a roof. But what those means should be, I could never determine. Alpine travellers seem wholly unversed in the art of comfortable bivouac. I hardly know a single instance when the nights spent by them on the hill-sides have not been recorded as nights of discomfort, and often of misery. Let those who doubt it refer to "Peaks and Passes." This is an old opinion of mine, and one which has set me widely to inquire about facts bearing on the subject. Saussure's experience is not much to the point, except in showing that a tent will stand in any weather; witness his hurricane on the Col du Géant. The brothers Schlagintweit also used tents, and they drove sheep for food. Dr. Rae's Arctic equipment is exceedingly interesting; he relied on snow houses, built with great neatness, for protection against the weather: so did Sir Leopold M'Clintock. I have, indeed, a selection of that energetic officer's travelling-gear; sledge, cook's apparatus, and tent-poles,—which he and Captain Allen Young used in their search after the fate of Sir John Franklin, and were afterwards so good as to give me. But none of these pre-

cisely meet the want I feel. The travelling-gear should be light and convenient for carrying on the back, and require no previous practice in its use. Each man should be independent of his neighbour; for the close proximity of snoring and flea-covered guides is a nuisance. Finally, the bedding must be capable of withstanding a night of severe weather,—wet, snow, and tempest.

These desiderata were well fulfilled by a contrivance I became acquainted with during the very close of my stay in the Pyrenees, when, I am sorry to say, it was hardly in my power to give it a fair trial. I must, therefore, speak from hearsay and the experience of others. I found a large class of men who were liable, at any hour, in any weather, to be ordered off to any place in the mountains, there to keep watch for two or three days; while everything was so systematized, that they simply had to take down a sort of large knapsack from their shelf, certain specified articles of dress, and a sufficiency of bread, meat, and wine, and were ready in a minute to be off to their post. These are the French douaniers, who go in twos, to watch any pass where a smuggling attempt may happen to be expected by their chief; and the contrivance which makes it possible to do so, is a sheepskin sleeping bag, of a kind I am about to describe, which folds up in the simplest manner possible, and is secured by five small straps. When so folded and secured, it shapes itself into a large, but military-looking knapsack, weighing seven pounds and a half. The bag is shown bottom upwards in Fig. 1. It is open from D to the end, and its coffin shape makes it fit a man without any superfluous space. Fig. 2 represents a gusset inserted between the top and bottom faces of the bag, of which the edge *c d* is sewn to the upper edge from C to D, and *c e* is sewn to the lower edge from C to E. This is very important, in order to give sufficient space to the breast and arms. The peculiar shape of the gusset gives an exceedingly cozy lay to the machine, about the back and sides. It is easy to spring in a moment out of a bag thus constructed, there being no

embarrassment whatever at the sides or shoulders. In folding it up—the bag, of course, lying on the ground, with its upper side uppermost, and not as shown in the drawing—is folded



at *m*: again, first at *o*, and secondly, at *n*. Then it assumes the appearance of Fig. 4 (which, unluckily, has been drawn on rather too large a scale). Next, the straps are buckled to the corresponding buckles, the arms are slipped into the straps, and off walks the douanier, with his house on his back. Fig. 3 represents the fastening actually used for the knapsack straps, shown on a smaller scale in Fig. 1. I strongly suspect it is the best for these rude purposes. The left-hand part is a piece of wood, round which a thong is sewn. This makes the button. Two or three button-holes are cut in the corresponding knapsack strap. From the time when a man is lying fully dressed, shoes and all, inside one of these bags, to that when he has begun to march off with it, strapped upon his back, need not exceed ninety seconds. It is an invention, as I was informed, of about twenty-five years standing, and has,

alone, rendered it possible to watch this mountain frontier with regularity and strictness. The Spaniard Customs' men, on their side, use cloaks, and cannot approach to the effectiveness of the French. The French douaniers seemed to speak with great fondness of their bags. They make them themselves, and they last many years. It is easy to buy one that has been more or less used, at a cost of about fifteen shillings. The average stature of a Frenchman is so much less than our own, that I did not meet with one large enough to shelter my shoulders and neck, and I did not care to make an imperfect experiment. For my own part, I abominate sheepskin, and bearskin, and buffalo robes, and carosses of all descriptions. They have great merits for rough work in a dry climate, but much wet reduces them to a miserably soppy state, and it is impossible to keep furs pure and moth-free without continued use. I much prefer some sort of waterproof, whether oiled linen or mackintosh, as an outside, and blanketing or home-spun cloth, within. It is heavier, and much more expensive, but I believe far the better of the two. I have had one made with a double blanket bag within ; this can be withdrawn, and simply laid on the waterproof for indoor use ; again, one can lie under one or two blankets at pleasure, according to the heat of the weather: from the slight trial I made, I should fear the heat of the sheepskin bags on a warm night. If I have another bag, I shall use *coarse* plaid, or home-made Welsh cloth instead of blanket. A soft weight strapped on the back is undoubtedly oppressive, and I think it is open to question, whether the bag would not be carried easier if it were attached to a wicker-work frame, placed between it and the back. Neither wind nor wet can hurt a sleeper inside his mackintosh cover. They are not oppressive to sleep in, as a slight half-unconscious fidgetting will pump out the used air, and re-supply it with fresh. Besides, the skin of a man who has been perspiring all day in a rare air, is incomparably more quiescent at night than that of a sedentary citizen. During the day-time the bags are of use, for the douaniers sit with them pulled up to their waist, when the weather is wet

or cold. At night they take off their shoes, but nothing else, and wrap a small cloak round their heads and shoulders. The sheepskin is that of the beautiful merino sheep; it is double at the feet and legs, and also in the small of the back; those are the places where the cold is most felt.

Numerous travellers have used sleeping-bags, and there is no novelty in the fact of their rain-proof capabilities, but the way of folding them into a knapsack in place of carrying them in a cumbrous roll, is new and well worthy of record: so also is the fact that the high snow regions may be securely braved in one of them. Of course an Alpine man would prove his sleeping gear on low heights before risking himself on higher ones. The addition of a light tent, like an half-opened book, with one end closed by a triangular piece, and the other closeable with flaps, would give increased security against tempestuous weather. Such a tent, made of calico or holland, need not exceed six pounds in weight, and could be supported by aid of two alpen stocks.

Next, as to food. That usually taken by mountain climbers is assuredly far from the best. In the first place, the guides, the hotel-keepers, and, in part, the tourists themselves, think the occasion should be one of feasting. They take all kinds of absurdities. They also commit another mistake in the opposite direction by confining themselves to cold things, which agree with few stomachs: if they take warm things, it is chiefly tea or coffee. Now tea, hot or cold, is exceedingly refreshing in the middle of the day, and, to a certain degree, in the evening; but its influence in producing restlessness and sleepless nights, is powerfully increased by the conditions of an ordinary Alpine bivouac, viz. excitement, snoring guides, hard bed, pure air, and fleas. I believe all beyond a very small quantity of tea, coffee, and the rest of that genus, to be a mistake, in night bivouacs. This year, at first unknowingly, and afterwards experimentally, I made abundant experiments on this subject, making a good deal of coffee, chocolate, or tea habitually, in the middle of my longer walks, and in a couple of night bivouacs. I myself sleep through almost

anything, but I felt its influence when I thought about it, and my companions complained of it.

I will venture to give two tables of rations, such as can be bought in any foreign market-place, calculated on Dr. Christison's principle, as containing 30 oz. of real nutriment per man, per day; of which 7½ oz. is nitrogenous, and 22½ carboniferous. When bread is mentioned, I should advise solid stuff, such as the peasantry use, not dinner rolls. (I say nothing about eggs, for I do not know their practical dietetic value.)

A.			B.		
	Ounces.	Grammes.		Ounces.	Grammes.
Bread	32	900	Bread . . .	22	620
Cheese . . .	6	170	Lean Meat .	22	620
Butter	4	110	Butter . . .	6	170
Sugar	2	60	Sugar . . .	3	80
	—			—	
2 lbs. 12 oz. =	44		3 lbs. 5 oz. =	53	

Allow 4 oz. in addition, for pepper, salt, onion, tea, and a little milk.

The meat may be carried in either of three ways:—

1. Roasted or baked, but underdone; it may then be eaten without further cooking, or else it may be cut into slices, and *broiled* over the embers of a fire.

2. Ready cut into slices, to be *fried* in butter, in a frying-pan.

3. Ready chopped into lumps, the size of a walnut, to be thrown into boiling water, which must be removed in two minutes from off the fire, and afterwards be kept gently simmering, for half an hour. This makes broth and *boiled* meat, and is the most congenial sort of food to a man's stomach after hard work. The receipt is Liebig's.

A soup maigre, very good after much perspiration, is concocted in five minutes by boiling water, with slices of onions, and adding salt and pepper, and plenty of slices of bread, just before taking it off the fire: this is commonly used in the Pyrenees.

The frying-pan may be small, and like a very large soup-ladle, but is not wanted, except for No. 2, and for making omelets. The same vessels in which the meat, butter, &c. is packed (loaves of bread require no envelope), do well for fetching water, and for boiling purposes, while their lids serve as plates, or cups. They should be of thin tin, cylindrical, eleven inches high, and four and a half in diameter; they might be slipped, end to end, in a long woollen bag, and lie at the top of the knapsack. Their lids ought to be fitted much like the tops of pill-boxes, with rings, that shut flat, to take hold by. The handles of the vessels should be of wire, like bucket-handles, but two to each tin, for the convenience of holding them steady, when pouring out their contents. When not in use, they should fall closely back against the sides of the tin. A large spoon is almost necessary. For the convenient making of tea, place, before starting, a quantity of it, with its corresponding sugar, in a muslin bag; drop this, when you want to use it, in a tin of boiling hot water: let it stand the usual time, then pull out the bag, and the tea is made. Throw the bag away.

Finally, butter is carried conveniently in small tin or zinc boxes. Pepper and salt should be wrapped in rag, not only in paper, which always tears; it should also go in a small tin box. Milk, for tea, in a phial.

Now, as three days' rations of A. weigh about 8 lbs. and of B. 10 lbs., and reckoning 10 lbs. for the sleeping-bag, and 1 lb. for the tin vessels, or from 19 to 21 lbs. in all, it is evident that, allowing for wine carried in mackintosh or leather bags (which is an excellent way of carrying it, after the bags are once well seasoned for use), spare stockings, and a few fancy extras, 25 lbs. gross weight ought to suffice a man for three entire days. A practical English pedestrian would carry this up hill for half a day without suffering: a native porter would think nothing of it. I therefore conclude that a man with a couple of guides so equipped, and with the occasional help of a porter, might push his expeditions with ease and leisure to places he now can barely reach, even with severe exertion.

Also, that he can use the shelter of any cabin, or wretched inn, without fear of damp, and with the comfort of his own bedding. Perhaps some volunteers, mad upon bivouacking, may be inclined to try these bags. They would, I really believe, if carried in carts, or by an assistant peasantry, be no unimportant equipment for home campaigning against an invading army, and could be used with, or without, tents or house accommodation.