way ourselves had we not been persuaded that the last face of rock was an absolute precipice. Jakob, however, proved, when in search of his axe, that this portion was comparatively easy. We think that the arête might be gained by ascending the hanging glacier before spoken of, which falls into the Ventina Glacier close to its lower extremity. Should he prefer a climb along the upper arête, we believe that much time might be saved by making for the notch or col at the head of the Ventina Glacier, and then turning, or scaling, the snow-peak on the right hand. When once on the ridge a broad saddle-back of snow leads up to the first summit, and from this point he would probably follow our course. By this means he would avoid the crevasses, rocks, and slope over which we consumed more than five hours.

We can imagine no finer expedition in the Alps than one which would include an ascent of the Disgrazia by its northern face, leaving and returning to Pontresina by passes at the head of the Mortaratsch and Rosegg Glaciers; and we beg, in conclusion, most strongly to recommend it to the attention of members of the Club who may find themselves in the Engadine.

On the Health and Training of Mountaineers.

By T. Clifford Allbutt, M.A., M.D. Cantab., &c.

THE strong impulse towards mountaineering which has shown itself of late years may receive various explanations, but no doubt the chief one lies in this, that it supplies a healthful and a fascinating pursuit in the place of those other sports which are gradually passing out of the reach of ordinary men. English country sports are every year becoming more difficult of attainment, and less fitted for recreation when attained. Our modern tendency to gather in large and busy towns makes country life at once more needful and less accessible, and as land is enclosed and cultivated the growing demand for country sports is met by constantly diminishing opportunities. Hence, while fox-hunting, shooting and fishing are more necessary and more eagerly sought after, these sports are year by year becoming more artificial and very much more costly. But few young men can pretend to spend three hundred a year upon fox-hunting, and not much fox-hunting can be had for a smaller outlay. Cover-shooting is an idle, cruel game which one would hope can have no attractions for members of the

Alpine Club. A moor in Scotland is not to be had by anyone less than a lord—cotton or other, or perhaps a rising Q.C.; and every salmon river in Europe is jealously guarded. Alpine climbing then comes in happily, as an outdoor sport requiring skill, courage and endurance, within the means of ordinary incomes, and having the infinite grace in it that it seeks the life of no living thing. That this glorious sport is opened out to the middle classes of Western Europe is then a matter of much thankfulness, and to fear that it will cease and its purposes be fulfilled when the last virgin peak has been scaled, is equivalent to saying that all travelling must end with the discovery of the North Pole. No saying could betray a more utter blindness to all the finer attractions which Alpine adventure ever must offer to men of spirit and sensibility. Indeed that annual migration which will have set in when these lines see the light is one of the most encouraging features of modern life, especially to those who at times may feel too sadly the inroads of modern self-indulgence and pretence.

That in the main Alpine climbing is beneficial, perhaps even 'The Times' will at this day scarcely care to dispute. It is sufficient for me to say, that of all the means in the hands of the physician for restoring tone to the jaded system, for purifying the blood, and for cheering the mind, an Alpine holiday is the best. It has been asserted, however, that mountaineering may be attended with dangers and evils so great as to counterbalance much of its good; and on the occasion of a paper on the Physical Aspects of Mountaineering, read by myself to the Clinical Society of London, in 1873, many of those present spoke decisively of harm which in certain cases had resulted therefrom. But indeed I often wonder that the harm done is so little. When year after year I see young men, who for eleven months have been engaged in business or professions, suddenly fling themselves upon the mountains with that recklessness which after all one loves to see in young Englishmen, I feel thankful that we are made of tough stuff. Let us see, however, how this noble ardour may be wisely regulated without being subdued.

The chief elements of healthy Alpine climbing are three.—1. Strength. 2. Condition. 3. Regimen. First, as to strength. There is no doubt that growing lads are far more liable to suffer from mountaineering than men of riper years. Boys and youths whose frames are not set may be allowed to make efforts, even severe efforts, provided that they are not straining or unduly prolonged. In youth we may look for agility and courage, but not for endurance or for straining

efforts. In my experience, physical prostration or disorder of the heart is more commonly set up in persons under twenty-one years than in their seniors. One lad among my friends, who was taken over a high pass or two by his father, though not obviously overwrought at the time, suffered from cardiac disorder for some time afterwards, and numerous cases of the kind are on record. Such persons once pressed beyond their strength may remain subject to languor, nervousness and palpitation for many subsequent years. I have seen the same thing in women, who may in this respect be classed with growing lads. I have seen many women broken down in health for a year or years by a few days' mountaineering in the company of active men. There are exceptions to all rules, but the rule here is, that no man should undertake a prolonged and arduous excursion until he has done growing, and that no woman should undertake it at all unless she be endowed with a masculine frame. Women and boys, on the other hand, if they have the requisite health, skill and training, may be encouraged to undertake difficult excursions on these conditions, that the labour is lightened by frequent and long intervals of rest, that it is not unduly prolonged—say not more than ten hours in all—and that it involves no great exposure to weather.*

But it is often quite disheartening to see the folly of those who thoughtlessly lead their younger companions into work for which they are unfit, and who may thus inflict upon them a long if not a livelong injury, and bring mountaineering into unmerited discredit. For instance, a few summers ago when I was at Evolena, a tutor, presumably an educated and intelligent person, took a lad of sixteen in somewhat bad weather over the Col d'Hérens, who had on the evening before the start hurried up on foot from Sion, at the end of a through journey from England. These are the gross errors my present paper is intended to correct. If we pass from youth to age, we have to deal on the contrary with frames which are fit rather for patient endurance than for rapid bursts or for feats of agility. When a man passes forty years of age he may still be equal to his sixteen hours' excursions; but as his frame, once too yielding, is now more rigid, if not too rigid, he must avoid quick work and take to plodding work. It is astonishing how well a man of sixty may still enjoy Alpine adventure if he takes things quietly and avoids a chill. The

* Many ladies undertake laborious excursions on the understanding that they are partly carried by their guides. For these cases I cannot lay down any law.

heyday of a man's climbing time is of course from twenty-five to thirty-five years of age. If he have a fine constitution and a fine frame, and obey the laws of condition and regimen, he may in these years do most things, and will not be checked by want either of agility, of push or of endurance. It is a serious question how far a man of this age and thus endowed may undertake anything whatever without fear of consequences. A long experience of Alpine and other athletic men leads me to believe that they may almost please themselves as to the work they do so long as they take frequent small quantities of food during the day and plenty of rest.

The heart is very liable to suffer in the lives of porters, bargemen, strikers and the like, but in them the labour is monotonous and continuous. I believe it does a man far less harm to climb the Matterhorn one day, and to smoke a pipe under a tree the day after, than to labour less severely but more continuously day after day, well or ill, cheerful or miserable, and without giving the body generous rest and feeding times between whiles. Some Alpine men, rather foolishly, press a number of hard days together, but even this probably fills only a fortnight, and the body has ample opportunity for subsequent repair. Still, at the same time, a strong man of eight and twenty or thirty should observe some moderation. I have in my books the notes of many cases of failing heart in the later life of men once devoted to bodily activity, for which failure I could find no adequate cause other than that labours, not in themselves perhaps too severe, but too incessantly undertaken, had told at last upon the vigour of that organ upon which hard labour chiefly presses.* I have noticed that although temperance, especially in the matter of alcohol, is of prime importance for a successful worker, yet that persons who are naturally small eaters run rather more risk of failure than those whose stomachs are more vigorous. A man who finds himself to be a small eater will do well therefore to undertake fewer excursions than others may do. He may do as much as others in a single day, but he must allow longer intervals for restoration.

Secondly, we have to consider *condition*. Some men are always in condition, their own energy and mode of life favouring them in this respect. But the majority of the members of the Alpine Club are engaged in busy occupations and live

* I should add that occasionally a valve of the heart is ruptured by a single violent strain, but this I think is not very likely to occur in Alpine climbing unless there be some fall or blow upon the chest.

in towns. How foolish are men so situated to rush to the Alps and climb as if they had been doing nothing else for a year! Physicians know well how often in this way men waste their precious holiday, and return home worse instead of better, for lack of appreciating that ten days at least are required for the average man to get into order for a first-rate excursion. As most men travel quickly through from England, the day after arrival should be one of idleness, and the first week one of gradually increasing exertion. When the muscles are called upon for unusual exertion they take the blood very rapidly, and if pressed unduly they take it at a more rapid rate than the heart can supply it; so that faintness or languor may come on instead of the looked-for increase of life and vigour. This is one way in which men may lose condition when they think they are training forwards; they may spend on the muscles more blood and force than they can spare. For those who can do so, it is far better of course to keep up some kind of vigorous and open-air exercise during the whole year. Many men are able to set off from Saturday to Monday; and most men can get away for a few days at Easter, Whitsuntide and Christmas. It is surprising how well a few short tours of this kind keep up practice. Finally, let all young mountaineers remember that ascents must be taken slowly. Nothing leads to more certain failure than rushing at one's mountains. There is a certain slow, steady tramp, to be learnt in a day by watching an experienced guide, which pays best in the end, and by which the prudent tortoise always wins the race. Inexperienced climbers, by too fast a pace at first, are tempted to the spoiling of their excursions, and, what is far more important, to the spoiling of their condition or even of their health.

Thirdly and lastly as to Regimen, under which head some words on outfit may be included. All old mountaineers know that clothing must be warm enough to resist cold, and that heat must take care of itself.* A suit of warm woollen makes it possible for the wearer to rest on the summit which he has won, not to mention the difference in bad weather between chilled bones and comparative comfort, between a slight cold

* I say all old mountaineers know this, but perhaps insufficiently. One great point is, that thick woollen clothes do not allow of so rapid an abstraction of heat when wet, so that one does not feel cold even if very wet. This hint I owe to my old friend and travelling companion, Mr. T. S. Kennedy, from whose great experience many more of my hints are originally derived. I may add in this note that the gaiters should be of the same woollen; stiff gaiters of leather or flax are very uncomfortable.

and a rheumatic fever. When walking in the heat the coat may be taken off, folded and fastened by two straps to two rings sewn to the waistband behind. Now that communication is so easy in Switzerland, neither our manners nor our comfort would suffer if we began to take more changes of raiment than usually we seem to do. For a hat, felt, sufficiently light in colour to turn the sun, is the best material; the brim may be what it pleases in front, but behind must be deep enough to shade the back of the head and neck. Veils or masks and spectacles are familiar armour; I would only say on this subject that a few drops of strong ammonia in a tumbler of water make the best lotion for the face at one's hotel, while in the snow cold cream is better than glycerine. Flannel is the only underclothing, the shirt being loose in the neck and with a turnover collar attached. The trousers should have an elastic band run in the waist, or be provided with two broad flaps behind, one of them bearing four buckles and the other four straps; this is to avoid the need of braces or of a tight leather strap. Knickerbockers are easier than trousers to walk in, but almost necessitate garters, which are very injurious to the veins of the legs. Long stockings may however be fastened by tapes and loops to the waistband. If the trousers be turned up to the knees and the socks long enough to save the legs from scorching, the pedestrian will find them as easy as knickerbockers. It is not too much to say that everything depends upon the boots and socks. A little saving here is often or always the worst economy, as a bad boot may mean corns, blisters or footsoreness, or it may burst or be cut to pieces on the first moraine.

Let the reader regard all advertisements with suspicion. It would seem to be as hard to produce a bootmaker as to make a poet, and the pedestrian has no choice but to go to the 'haute noblesse' of the guild; there are not more than six men in England, if that, who can make a walking boot—and they must be paid what they ask, which will be about one pound per boot more or less. For this the wearer will have seasoned supple leather and a boot in which he can walk six miles on the first day of wearing. The heels should be low and come well forward under the foot, the soles wide welted, not over thick, and the wrought iron nails should be clenched between the soles. The lacing should be openwell down the instep so that there may be the less tugging when the boot is damp or the feet swollen. The inner line of the foot should not slope towards the middle line, but should be cut straight forward, parallel to the great toe, and the boot should be

very wide forwards, so as to allow of the full lateral play of the foot. When measured for the boot let the buyer stand on one foot with his whole weight and have a line drawn round the expanded toes; that outline should be the outline of the coming boot.* One thing bootmakers, even the best, will not do—they will not make boots large enough. It is well, therefore, to be measured in two pairs of woollen stockings. For to walk easily a full-sized boot should be well filled up with a stocking far thicker than one sees on the feet of one's friends. The stocking or sock should be large enough, and should be knitted even with a doubled wool if the reader be lucky enough to know any good old woman who can knit them so without knitting too tight, for that makes the stocking too hard.† The best gloves are made of wash-leather lined with hare-skin, the fur inside. These should be made at home with a thumb poke and another for all four fingers. The best extra wrap is a waterproof Scotch shawl: it is light, will turn a lot of rain, and is useful for all sorts of things.

Of knapsacks I say little. So long as I can find five shillings to pay another man to carry my knapsack so long shall I decline to stoop my back to the burden. If a man wishes wantonly to add to his work he can find more lively and wholesome ways of doing it than by loading his back and contracting his chest with this unhealthy bondage. Those who must carry a sack will carry those invented by Mr. White most easily, but the carrying gear in them is so wretchedly made that it must be remade before starting. The money thus spent would pay for a good part of the porterage. Of staves none are equal to a good short ice axe, say 3 ft. 4 in. long over all; even modest mountaineers like myself should carry an axe. I often have left mine behind for fear of seeming too ambitious, but almost as often have regretted it. Many a pleasant scramble on a glacier has to be foregone for want of an axe, and many a man for want of it has been pounded within an hour or two of his inn.

As to diet, the sooner the pedestrian forgets all the mistaken traditions of the trainer the better, and the sooner he will be freed from what I may call the raw beefsteak imposture. That diet which suits us best in every-day life is best

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* It must be noticed that such an outline does not lead to a *broad-toed* boot; such a boot, however comfortable, would be most inconvenient in rock climbing.

† Alpine men who do not care to pay makers like Fagg of the Haymarket will do well to get their boots in Switzerland, where excellent and cheap mountain boots are to be had.

for any work, and a time of stress is not a time to annoy the stomach with strange food. The body needs a mixed diet, and it is probable that sugar and fats are as useful in yielding muscular force as meat. The beautiful honey of a Swiss breakfast table is not without its moral.* It is another error to suppose that muscular labour requires far more food than mental labour. Many a man who gives full fling to a mountain appetite eats too much. Whatever be the case on off days, it is certain that on climbing days the food taken should be small in bulk and easy of digestion. On rising early when the powers of life are low, a little warm milk, tea or coffee, with a crust of bread, is sufficient. Breakfast should be taken within three hours of the start, at a quiet stage of the work, and a short rest should follow it. During the day small frequent meals are to be preferred to larger and rarer ones. Nothing is better than a few sandwiches in the pocket to be eaten seriatim in quiet moments, and a few bits of chocolate or a handful of raisins contain a good deal of potential energy. A bowl of milk is a very precious thing if half an hour's comparative quiet can be had for its absorption. There are absurd prejudices abroad against milk, all based upon ignorance and blindness.† The man who says one minute that milk 'takes the legs away,' will be seen a minute later pulling at a flask of 'kirsch.' Now, if there be one thing in training more certain than another, it is that all alcoholic drinks during work are distinctly injurious. Claret and water may be so weak as to do a harm which is barely perceptible, but I have seen many a 'tuchtiger Herr' the worse for a long pull even at red wine.‡ Spirits are simply poison to the climber, and indeed, as Maclaren says, are to all young

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* The eviscerated loaf stuffed with honey is too well known and appreciated on the trail to need further commendation.

† There are some persons no doubt who are unable to digest milk. Those who are so unfortunate must, of course, refrain from it; for others there is no food so refreshing and so perfectly efficacious.

‡ I ought perhaps to say that men who are small eaters and have but moderate digestive powers are, I think, the better for a little weak alcohol with their food. Moreover, it is needless to say that a man who has been in the habit of drinking wine all his life cannot omit it altogether and at once without some discomfort, unless he be a vigorous eater. In any case, however, half a tumbler of claret filled up with water is amply sufficient for anyone, and this should not be required more than twice in the day. The use of tobacco affects men so variously, I must leave the question of its use to each to decide for himself. I am myself certainly better without it, but other men seem to be the better for its moderate use.

healthy men as 'vitriol to steel.' Cold tea is not very nice to my thinking, and when fine mountain water is to be had what more can a man want?* Brandy, except as a remedy against diarrhœa, may be left at head-quarters; its use in exhaustion is but little. If far from home, to drink it is but to call forth an outburst of energy which leaves the store behind less than ever, so that the second collapse is worse than the first; and its use in cold and exposure is a terrible, often a fatal error. By promoting the flow of blood to the surface it promotes the quicker radiation of its heat, and the chilled blood chilling the inwards dulls them with the stupid sleep of death. A little wine may be taken, if required, when work is over, but nothing can be less reasonable than the prevalent fashion of priming the stomach with wine to receive a large evening meal after the day's labour. After a hard day the vital powers are not ready to provide for this additional task, and if there be no immediate indigestion there is a needless weariness on the morrow. After hard work let the evening meal be small and simple, and the next morning's breakfast will be the more keenly enjoyed. Should the return be late, it is unwise to dine or sup at all. Let a basin of warm milk or soup be swallowed, and bed be sought early. During more tranquil sleep the bountiful fluid will feed the veins without an effort. Should there be much weariness and the warmth of bed be at hand, a small spoonful of cognac may be added to the drink. On returning earlier, say at 3.0 or 4.0 P.M., from a long excursion, it is best to take some very light food at once (lemonade and a crust, Ed.) and a good rest. After that bathe and change and take a moderate dinner. If the weariness be honest fatigue only, and not exhaustion, there is no restorative like a brief cold bath, such as one may enjoy so deliciously at Cormayeur or at Chamonix. Morning tubs are not very conveniently to be had in Switzerland; a good wash all over with soap and tepid water, when convenient, is to be

* Twenty years ago water-drinking was unknown, and men if forbidden wine, beer and spirits would hold up their hands in amazement and ask what on earth they were to drink. Water was supposed 'to lie cold on the stomach.' Mr. Kennedy says that the manufacture of ginger-beer should be encouraged in Swiss innkeepers, for they can charge half a franc for what would only cost them a penny, and would need no carrying up on mules. Besides, it would improve the Chamonix porter much if everybody insisted on giving him two bottles of ginger-beer for his day's refection instead of two bottles of wine. The fact is, Mr. Kennedy might make the ginger-beer question the subject of a special communication to the Club.

preferred. The feet should always be washed well with soap and warm water on returning from the walk. Blisters, if they form, must be pricked at the edges and allowed gently to empty themselves, but these and foot-soreness may generally be prevented by soaping or tallowing the foot and the inside of the stocking before starting, by pouring brandy or whisky into the boot when the feet feel heated or sore, and by declining to carry a knapsack. Hard corns must be pared down after soaking the foot for half an hour in warm water, and the root dug out with a blunt point; soft corns must be pulled out with tweezers, and a little greased lint be placed between the toes. In-growing toe-nail must be seen to by a surgeon before leaving England, but if discovered abroad, the nail must be scraped very thin longitudinally in its middle third, the entering edge raised, and a cushion of oiled lint inserted under it.

Frostbite has two stages—the livid stage, which is easily curable, and the stage of tallowy whiteness with shrinking and insensibility of the feet, which is not so simple. Some persons are more liable to frostbite than others, and the use of alcohol disposes to it. With care the part may be saved even in the second stage. The great point is, to call back the blood without producing inflammatory reaction. The application of heat produces this at once, and the result is probably gangrene. So it is right to begin rubbing the part gently with snow, and then to make a step forward with cold water and brisker rubbing. This operation must be conducted in a cold room or out of doors, if possible, away from the wind. The same precaution must be observed in case of insensibility from cold. To carry the sufferer into a warm room and administer hot bottle outside and inside is fatal kindness. Gentle rubbing with soft woollen in a cold room should be used first, and a little very weak warm wine and water administered when swallowing power returns. The patient should next be put into a cold bed in a cool room. Some idiots are in the habit of poisoning these sufferers with injections of tobacco-water. Sprains are another of the common troubles of mountaineering. The great rule is to give a sprain thorough rest, until the more active symptoms are gone by. During this time hot fomentations should be assiduously kept up, and the limb somewhat elevated. Mere stiffness, after the inflammation has subsided is best treated by hand-rubbing morning and evening, and no exercise should be taken until the stiffness has passed away. Bruises and flesh wounds rarely require anything more than rest and cold water dressing. Arnica is of little value, and its use is not free from danger.

Mountain sickness is often felt especially by untrained men during the first days of a tour even at moderate elevations (10–13,000 ft.). There is no certain cure for it known except turning back, a remedy not popular with Englishmen; but a short halt and, if possible, a doze of even five minutes will often suffice to remove the disagreeable sensations. For that sickness and diarrhœa to which some persons are liable when abroad, it is well to take of carbonate of soda twenty grains, syrup of ginger and tincture of rhubarb, of each a teaspoonful, three or four times a day for two or three days. If the diarrhœa still continue, some prepared chalk, bismuth, and charcoal (say, fifteen grains of each) should be taken as often in water; and to this again in a more obstinate case ten to thirty grains of laudanum may be added. When attacked by diarrhœa on the march I have sometimes stopped it by a longish pull at neat cognac. The brandy must be good and half a wine glass at least will be required, and may have to be repeated. Many travellers find constipation, on the other hand, to be their enemy. The great secret here is not to let the function get behindhand. To fall in arrears and then fire big guns is a very bad plan; keep things gently forwards by taking two or three grains, or less, of rhubarb with meals; and if anything more be required take in the morning a little Pullna or Hunyadi water, or a dose of Lamplough's saline or 'citrate of magnesia.'*

In conclusion, all athletes should be well aware of the dangers of going too suddenly out of training. Violent changes of the equilibrium of the body are dangerous in either direction; and as the mountaineer should slowly get into harness, so slowly must he loosen the girth of his loins and descend the delectable mountains with lingering feet.

Saxifrages. By Charles Packe, F.L.S. Part 2.

αἷμα ῥόδον τίκτει, νιφάδες δὲ τάδ' ἄνθεμα λευκά.

In a paper in the February number of this Journal, I have endeavoured to sketch the distribution in Europe of one division of Saxifrages, those whose leaves are distinguished by crustaceous pores. I propose now to go through the rest of the family whose leaves are more or less tender, and not pitted by crustaceous pores; though conscious that in a paper of this

* This latter is very useful in assuaging feverishness during hot days on the snow.—Ed.