

## MOUNTAIN SICKNESS.

At the meeting of the Royal Geographical Society on April 11th Sir M. Grant-Duff made the formal announcement that one of the Royal medals had been conferred on Mr. Edward Whymper. The distinction has been well earned, for the account which he has given of his expedition to the Andes of Ecuador contains much matter of high scientific importance. His object in that journey was not only to ascend the highest summits and determine their altitude by direct observations, but also to study the effect of very low atmospheric pressures on the human frame. Very conflicting statements have been made on this head, but the general experience of Alpine climbers has been such that it has come to be generally believed that no ill effects are experienced at the highest altitudes to which the Swiss mountains attain. De Saussure, however, found himself unable to make observations on the top of Mont Blanc with his accustomed speed and ease. The Schlagintweits, at a much higher elevation in the Himalayas, suffered from headache and exhaustion.

The late M. Paul Bert made a number of laboratory experiments by shutting himself up in a metal cylinder within which the atmospheric pressure was reduced until on two occasions it stood at levels as low as on the summit of Chimborazo and Mount Everest. M. Bert found that the most constant effects were nausea accompanied by the expulsion of gas from the stomach and rectum, dizziness, and a rise in the pulse rate. He concluded that these effects were due to a diminution of the tension of the oxygen of the air and in the blood, which tended to produce a condition of asphyxia, and that they might be prevented or minimised by inspiring oxygen. Mr. Whymper objects, justly as it would seem, that these experiments were not continued long enough to prove that man could exist at very high altitudes, since the low pressures in M. Bert's experiments were only maintained for a few minutes.

Mr. Whymper found that he and his two guides were first affected on attaining the height of 16,664 feet (16,500 inches), on the slopes of Chimborazo. They had passed from the sea level to that elevation in fourteen days, and had risen 7,770 feet during the day they were taken ill and the preceding day. They do not seem to have made any exertions out of the common, for the mules were got up as high as this camp. Within an hour, however, all three, Mr. Whymper, a practised mountaineer, and his two guides, mountaineers by birth and training, were all ill as they had never been before. Their symptoms were intense headache, and an inability to satisfy their "desire for air except by breathing with open mouths." The throat was parched, and thirst intense, but water could only be taken in sips; "before a mouthful was down we were obliged to breathe, and gasp again, until our throats were as dry as ever"—a very graphic description of the *besoin de respirer*. In addition there was a feeling of general illness, and a distaste for food without actual nausea. The symptoms reached their maximum quickly, remained intense for several hours and then began to decline. Recovery took place more rapidly in the guides than in Mr. Whymper; the former were well in thirty hours, but the latter suffered more or less for three days. All considered that they were feverish, and Mr. Whymper found his temperature to be 100.4° when first taken, twenty hours after the commencement of the attack. After these acute symptoms had passed off they did not recur on the expedition to the summit of the mountain (barometric pressure 14.100 inches = 20,545 feet), but progress was slow, the paces became shorter and shorter, and it was found that it was necessary to breathe through mouth and nose while in movement. It is proper to add that an Englishman of the party, who had lived long in Ecuador and had frequently traversed the high ground to Quito, did not experience any of these symptoms but he did not proceed much beyond the camp where the others were seized with illness.

On Cotopaxi, at an elevation of 18,000 to 19,000 ft., there was the same slight difficulty in breathing, and Mr. Whymper and one of the guides had headache, but none of the party were incapacitated, although they remained there for twenty consecutive hours with the barometer at 14.750 inches.

Mr. Whymper appears to have proved further—and this is, perhaps, the most important result of his observations—that the amount of work which can be done at low pressures is

diminished. The exertion is felt to be the same, but the result is less. This appears to have been proved by the rate and general behaviour of the guides, and by an interesting experiment which Mr. Whymper made on himself by comparing his rate of walking on a level road at Quito with his rate in London. The difference in pressure was about 8 inches, and the pace was slower and the amount of fatigue greater at the lower pressure. To the question whether man can become habituated to very low pressure, Mr. Whymper returns a guarded answer in the affirmative. On again ascending Chimborazo, six months after the first ascent, the intervening time having been spent at considerable altitude, there was no such collapse as on the earlier occasion, and the travellers did not even suffer from headache. Further, from a very elaborate study of the rate of ascent on various occasions, he concludes that there was distinct improvement, but that they were "inferior to those which we should have attained over the same ground at higher pressure."

The effects noticed were thus of two classes: transitory and permanent. The permanent effects were clearly due to the relatively smaller amount of oxygen in given volumes of air; this necessitated greater rapidity of respiration and a wider range of respiratory movement in order that the decrease in the density of the air might be compensated by the inspiration of a larger volume. The rapidity of the pulse was notably increased during the acute attack, but later it did not appear to be distinctly faster than normal when at rest, but was unduly quickened on exertion. As to the transitory effects, their explanation is not quite clear; Mr. Whymper believes that they "were due to the expansion (under diminution of external pressure) of gaseous matter within the body." As has been stated, Mr. Whymper noticed an elevation of temperature in himself on the occasion of the acute attack on Chimborazo, and on that occasion only; the temperature when he was recovering was 100.4° F. in the mouth. On other occasions at high altitudes the temperature was either normal or subnormal—on the summit of Chimborazo, on the second ascent, as low as 96.3°. It may be, therefore, that the high temperature on the first occasion was not directly due to the low pressure, and it may be noted that the travellers had recently passed through a fever region. Mr. Whymper's observations are undoubtedly of great interest, and were evidently carried out with great care and freedom from bias. His book<sup>1</sup> will well repay perusal.

## ROYAL COLLEGE OF PHYSICIANS.

A largely attended meeting of the Comitia was held on Monday, April 11th, at 5 P.M., the chief business of the day being the election of a President for the ensuing year, as by law directed.

A reply from the Home Office to the Address of the College to the Queen on the lamented death of His Royal Highness the Duke of Clarence and Avondale, K.G., was read, stating that the address had been very graciously received by Her Majesty.

A letter was read from the Secretary (Dr. Semon) of the British Committee of the Virchow Testimonial Fund, offering the College a copy of the bronze Virchow medal, executed in honour of Rudolf Virchow. The present was accepted by the College with acclamation.

After the transaction of business relating to the affairs of the College, the PRESIDENT (Sir Andrew Clark) delivered his annual address, in which, among other matters of interest only to the College, he gave obituary notices of the Fellows who had died during the past year, namely: Sir Henry Cooper, Sir George Paget, Sir Risdon Bennett, and Drs. H. Munro, Sutton, and W. H. Stone. Dr. Munro was referred to as one of five of the same family all of whom were distinguished Fellows, and whose portraits were on the walls of the College. Passing to the various lectures of the past year, the President specially referred in terms of high eulogy to the Harveian Oration given by Dr. W. H. Dickinson, and to the Croonian Lectures given by Professor Burdon Sanderson, F.R.S. He then shortly reviewed the changes necessary in the prospectus and examinations of the College by the adoption of the five-years curriculum, and stated that as what he had to say on the proposed new University for London was

<sup>1</sup> Travels amongst the Great Andes of the Equator. London: Murray. 1892.