A Balloon Voyage.

Many valuable and interesting observations have been made by the intrepid aëronauts, Messrs. Glaisher and Coxwell. The following account of an ascent from Wolverhampton is very interesting:—

"At a few minutes before one o'clock all was ready for starting. It was then discovered that the balloon was too buoyant, and gas was discharged till the machine contained not more than 70,000 feet. Mr. Glaisher then made a few prefatory observations, and Mr. Coxwell taking his seat in the netting, the machine was set at liberty at one o'clock. The ascent was all that could be desired; the balloon rose beautifully and rapidly, taking a course of south by west in the direction of Worcester. Its progress, however, instead of being forward was upward, and it got very little to the south of the town; it seemed rather to stand completely over it. After the first ten minutes it was lost in a cloud, but soon re-appeared to be lost again till about twenty minutes past one, when it was observable at an immense altitude—estimated by Mr. Coxwell's assistant at not less than three miles. From twenty minutes to half-past one it was again lost, but at the time last mentioned it appeared again like a transparent ball, the sun shining on the outer edge of the balloon, and giving it the appearance of the moon at daytime, and as happy an illustration as any we have seen of the moon's phases. It was then pursuing a course two or three points to the east of south, going in the direction of Birmingham, and evidently lowering fast, or making a "dip," so that it might rise again and give Mr. Glaisher an opportunity of repeating the observations that he had taken in the earlier part of his journey. The locality of the "dip" seemed to be over Wednesbury or Dudley Port. After it had been made, the balloon appeared to be almost stationary; but a careful observer could see it gradually rise, at a rate, however, which was far less rapid than when it was over the town of Wolverhampton.

The locality of the descent was not known in Wolverhampton till seven or eight o'clock in the evening, when Mr. Glaisher and Mr. Coxwell returned. They stated that their journey had in every respect been successful; that they had obtained an altitude of four and a-half statute miles, or 23,760 feet, and that they descended near Solihull, a few miles beyond Birmingham, at 4.25 P.M. In the course of their journey they made but one "dip," and then rose again into the higher strata, gradually ascending to their highest altitude, and then descending at the place named. When four and a-half miles high the temperature stood at 24 degrees. At that height the aëronauts felt all the symptoms of sea-sickness, the same as on their last ascent, though on this occasion Mr. Glaisher suffered much more severely. The hands and lips assumed a bluish hue, there was a severe pressure on the brain, which, in the case of Mr. Glaisher, produced intense headache, which lasted many hours afterwards. Considering the pain that Mr. Glaisher was suffering, it is a matter of surprise that he was able to continue his observations, or at any rate to the wonderful extent which he seems to have done; for the minute-book records the registering of the various instruments during almost every minute of the journey. Though the symptoms were unpleasant enough, there was none of that

bleeding of the nose, singing of the ears, and distension of the muscles that popular belief describes as the almost inevitable consequences of an aërostatic journey at a high altitude. The rarefaction of the atmosphere produced the same phenomena that were observed on the occasion of the former voyage, though hardly, in some respects, to such an intense degree. The throbbing of the heart, for instance, was not so distinctly heard, but the pulsation was nevertheless wonderfully accelerated; in the case of Mr. Glaisher the pulsation was 108 in the minute, and in the case of Mr. Coxwell it rose from 78 to 100.

When over the town of Wolverhampton, at a height of more than three miles, the temperature was 37 deg., and at this and the higher altitude which the aëronauts subsequently attained they had to wrap themselves in additional clothing. A circumstance that was not noticed on the occasion of the first ascent was an accumulation of ice on the wet and dry bulbs of the thermometers; at one period of the journey the coating became quite a thick one. Another interesting discovery that was not made on the occasion of the former voyage was the presence of ozone, which Mr. Glaisher states was present to the extent of about nine points. In making their "dip" after the aëronauts veered to the south-east of Wolverhampton, they descended into a region where the temperature was about 50 deg.; at less than a mile high the temperature was about 60 deg., and on this occasion, the journey being comparatively free from clouds, there was no irregularity in the decrease of the heat of the atmosphere according to the ascent—it was gradual and almost regular throughout. At half-past two o'clock, when at an altitude of three miles, the temperature was 28 deg.

The balloon moved very slowly, and Mr. Glaisher had ample opportunity to make observations, not only of his instruments, but also of the view around him. The appearance of the scene was grand in the extreme. All around was a vast expanse of blue; the whole atmosphere seemed bathed in it, or it might be likened to an immense shoreless ocean. Clouds, shaped and packed like rocks, supplied the place of land; others floated about like immense icebergs, and in the distance others stretched themselves away like a range of snow-clad mountains. As the balloon floated before the wind, one of these immense clouds—which was apparently unobservable to those who watched the balloon at a distance—followed in its wake, and it was not till the machine sunk into lower strata that its aërial attendant left it. The appearance of the earth was almost as pleasing as the appearance of the heavens. Wolverhampton, the Black Country, and Birmingham lay stretched below the balloon like a map, and it required little imagination to suppose that it was laid on a chequered carpet, to which the surrounding country could easily and correctly be likened. The outline of the buildings, streets, roads, and canals, was distinctly defined, and the Black Country showed its beauties in a marvellous degree. The flames of the furnaces and the masses of dark refuse which grace that part of the district were very conspicuous, and the appearance of the country generally bore no little resemblance, Mr. Glaisher said, to the surface of the moon.

When the balloon was at an elevation of not more than a mile or so, terrestrial voices could be very distinctly heard. The ringing of a bell, for instance, was as clear and resonant as though the voyagers had been but a few yards from it; the voices of people shouting could also be heard, and when at an altitude of three miles the aëronauts heard a clap of thunder. One singular feature of the journey was the appearance of the *cirri*, or clouds known as the "mare's tails." Let the balloon be high

or low, it never seemed to approach them; they seemed as far overhead at four and a-half miles as they were at one mile. Shortly after the machine had made a slight descent from its highest elevation, the aëronauts held a consultation about the advisability of going still higher than they had been. On the suggestion of Mr. Coxwell, it was determined not to attempt it, so a few minutes afterwards preparations were made to descend. As the balloon approached the earth, a very singular phenomenon presented itself; the aëronauts observed the shadow of it on the earth below, surrounded by the prismatic colours. This singular appearance was observable for a short time, but gradually faded away.

Among other observations it may be added that the earth did not present a concave or cup-shaped appearance, according to the popular belief, but the horizon always appeared on a level with the car. As the machine neared the earth, the descent became more rapid, and it was not till half a dozen bags of ballast had been thrown out that the loss of gas in the upper air had been counteracted. Mr. Coxwell landed it in the middle of a field, where it alighted almost as steadily as a feather. Such a quantity of gas had been allowed to escape, that as the balloon approached the earth Mr. Coxwell allowed the neck of it to go upwards, and it assumed the shape and appearance of a parachute. Not a single instrument was broken throughout the whole of the journey; and the voyage was as successful in every respect as the most sanguine could have desired."

Mr. Glaisher himself gives the following account of another ascent in the neighbourhood of London:—

"On the morning of August 21, 18—, by half-past four, we left the earth. The morning was warm, but dull, the sky overcast with cirro-stratus cloud. The temperature was nearly as high as 61 deg., and the wet bulb read 59 deg. There were in the car, besides Mr. Coxwell and myself, Captain Percival, of the Connaught Rangers, Mr. Ingelow, and my son.

We at first rose very slowly. By 4.38 we were 1,000 feet high, and the temperature was 58 deg. At this time Mr. Coxwell's pulse was 95; Mr. Ingelow's, 80; Captain Percival's, 90; and mine, 80. At 4.41 there was a break of clouds in the east, and a beautiful line of light was seen, with gold and silver tints: we were then still only at 1,000 feet. Here and there, dotted over the land, the morning mist was sweeping. At 4.51 the temperature was 50 deg.; scud was below us, and the night-cloud was in a transition state, forming into the cumulous at the same level as we were, viz., about 3,500 feet; black clouds were above, and mist was creeping along the ground. At 4.53 we were above a mile high; the temperature was 43 deg., and the wet bulb only one degree lower; we were just entering cloud. At 4.57 we were in cloud, surrounded on every side by white mist; the temperatures of the air and dew point were alike, as both the dry and wet bulb read 39¾ deg. The light rapidly increased, and gradually we emerged from the dense cloud into a basin surrounded with immense mountains of cloud rising far above us, and shortly afterwards we were looking into deep ravines, bounded with beautiful curved lines. The sky immediately overhead was blue, dotted with cirrus clouds.

As we ascended, the tops of the mountain-like clouds became silvery and golden. At 5.1 we were level with them, and the sun appeared flooding with golden light all the space we could see for many degrees both right and left, tinting with orange and silver all the remaining space around us. It was a glorious sight indeed. At this time we were about 8,000 feet high, and

the temperature had increased from 38½ deg. in the cloud to 41 deg. We still ascended rather more quickly as the sun's rays fell upon the balloon, each instant opening up to us ravines of wonderful extent, and presenting to our view a mighty sea of clouds. Here arose shining masses of silvery heaps; there large masses of cloud in mountain chains, rising perpendicularly from the plain, dark on one side, and silvery and bright on the other, with summits of dazzling whiteness; some there were of a pyramidal form, and a large portion undulatory or wavy, in some places subsiding into hollows, and in one place having every appearance of a huge lake. Nor was the scene wanting in light and shade: each large mass of cloud cast behind it its shadow, and this circumstance, added to the very many tints, formed a scene at once most beautiful and sublime.

At 5.8 we were nearly two miles high; the temperature was 37 deg., the air was dry. At 5.18 we were above two miles in height; the temperature was 31 deg., and here it was found that Mr. Coxwell's pulse was 90; Captain Percival's, 88; Mr. Ingelow's, 100; and mine, 88. The pulse of Captain Percival was so weak, he could scarcely feel it. Mr. Coxwell, on the other hand, thought his somewhat stronger. By 5.31 we were about three miles high; the temperature was 23 deg., and it decreased to 19 deg. by 5.34. We then continued at a little above three miles for half an hour, during which time the temperature at the same height increased 5 deg. or 6 deg. as the sun rose, and at this elevation the number of pulsations in a minute were taken: Mr. Coxwell's, 94; Mr. Ingelow, 112; Captain Percival, 78; and myself, 98. Captain Percival, however, could scarcely feel any pulsation at all.

Shortly after six o'clock it was determined to descend. We were then about three miles from the earth. The temperature, which had been as high as 27 deg., had fallen to 23 deg. At 6.13, at the height of 2¼ miles, we heard a train. At 6.20 we were two miles high, and the temperature had increased to 39 deg.; and at this time I noticed the loud ticking of a watch. Captain Percival said he could not hear it—he was seated and I standing; and some experiments were made, when it was found that when the ear was at the same level as the watch no sound was heard, but it was remarkably distinct on the ear being situated above it.

At the height of two miles the barking of a dog was heard. The shadow of the balloon, with the encircling oval of prismatic colours, was here very remarkable, and it increased in dimensions and vividness of colour till we entered a cloud at 6.29; the increase of temperature which had been in progress during the descent, was immediately checked, and on emerging from the cloud at 6.33, the temperature was 41 deg. The earth was now in sight, without a ray of sunlight falling upon it. The temperature gradually increased to 56 deg. at 1,000 feet high, and 62 deg. on reaching the ground, as gently as on the preceding evening, a little after seven o'clock, at Dunton Lodge, near Biggleswade.

Mr. Glaisher and Mr. Coxwell, in a subsequent ascent, reached an altitude of about six miles. Dangerous symptoms appeared: blindness and faintness, besides suffering from the intense cold. The last reading by Mr. Glaisher of the barometer was at ten inches, indicating about 5¼ miles; and of the thermometer 37 below freezing point. Mr. Coxwell allowed the ascent to proceed till he found his hands unable to move, and he could only open the valve by pulling the string with his teeth. A self-registering thermometer stood at 52 below freezing point.