ROBERT MICHAEL BALLANTYNE

UP IN THE CLOUDS: BALLOON VOYAGES

Robert Michael Ballantyne

Up in the Clouds: Balloon Voyages

Ballantyne R.

Up in the Clouds: Balloon Voyages / R. Ballantyne — «Public Domain»,

Содержание

R. M. Ballantyne
Up in the Clouds: Balloon Voyages

Chapter One.
Balloon Voyages. Treats of Early Efforts to Fly, etcetera

It is man's nature to soar intellectually, and it seems to have been his ambition from earliest ages to soar physically.

Every one in health knows, or at some period of life must have known, that upward bounding of the spirit which induces a longing for the possession of wings, that the material body might be wafted upwards into those blue realms of light, which are so attractive to the eye and imagination of poor creeping man that he has appropriately styled them the heavens.

Man has envied the birds since the world began. Who has not watched, with something more than admiration, the easy gyrations of the sea-mew, and listened, with something more than delight, to the song of the soaring lark?

To fly with the body as well as with the mind, is a wish so universal that the benignant Creator Himself seems to recognise it in that most attractive passage in Holy Writ, wherein it is said that believers shall "mount up with wings as eagles, they shall run and not be weary, they shall walk and not faint."

Of course man has not reached the middle of the nineteenth century without making numerous attempts to fly bodily up to the skies. Fortunately, however, such ambitious efforts have seldom been made except by the intellectually enthusiastic. Prosaic man, except in the case of the Tower of Babel, has remained content to gaze upwards with longing desire, and only a few of our species in the course of centuries have possessed temerity enough to make the deliberate effort to ride upon the wings of the wind.

Naturally, the first attempts were, like most beginnings, simple and imitative. The birds flew with wings, therefore man put on artificial wings and essayed to fly like the birds. It was not until many grievous disappointments and sad accidents had befallen him, that he unwillingly gave up wings in despair, and set to work to accomplish his ends by more cumbrous and complex machinery.

Very early in the world's history, however, "flying machines" were made, some of which were doubtless intended by their honest inventors to carry men through the air, while others were mere shams, made by designing men, wherewith to impose upon the ignorant for wicked ends of their own; and some of these last were, no doubt, believed to be capable of the feats attributed to them.

The credulity of the ancients is not to be wondered at when we reflect on the magical illusions which science enables us to produce at the present day—illusions so vivid and startling that it requires the most elaborate explanations by adepts and philosophers to convince some among their audiences that what they think they see is absolutely not real! No wonder that the men of old had firm faith in the existence of all kinds of flying machines and creatures.

They believed that fiery dragons were created by infernal machination, which, although not what we may call natural creatures, were nevertheless supposed to rush impetuous through the sky, vomiting flames and scattering the seeds of pestilence far and wide. In those dark ages, writers even ventured to describe the method of imitating the composition of such terrific monsters! A number of large hollow reeds were to be bound together, then sheathed completely in skin, and smeared over with pitch and other inflammable matters. This light and bulky engine, when set on fire, launched during thick darkness from some cliff into the air, and borne along by the force of the wind, would

undoubtedly carry conviction to the minds of the populace, whilst it would fill them with amazement and terror!

Sometimes, however, those who attempted to practise on the credulity of their fellows were themselves appalled by the results of their contrivances. Such was the case so late as the year 1750, when a small Roman Catholic town in Swabia was almost entirely burnt to ashes by an unsuccessful experiment made by some of the lowest order of priests for the astonishment, if not the edification, of their flocks. An attempt was made by them to represent the effigy of Martin Luther, whom the monks believed to be in league with Satan, under the form of a winged serpent with a forked tail and hideous claws. Unfortunately Martin's effigy, when ignited, refused to fly, and, instead of doing what was required of it, fell against the chimney of a house to which it set fire. The flames spread furiously in every direction, and were not subdued until the town was nearly consumed.

In the early part of the sixteenth century a very determined attempt at flying was made by an Italian who visited Scotland, and was patronised by James the Fourth. He gained the favour of that monarch by holding out to him hopes of replenishing his treasury by means of the "philosopher's stone." The wily Italian managed, by his plausible address, to obtain a position which replenished, to some degree, his own empty purse, having been collated by royal favour to the abbacy of Tungland, in Galloway. Being an ingenious fellow, and somewhat, apparently, of an enthusiast, he spent some of his leisure time in fashioning a pair of huge wings of various plumage, with which he actually undertook to fly through the air from the walls of Stirling Castle to France! That he believed himself to be capable of doing so seems probable, from the fact that he actually made the attempt, but fell to the ground with such violence as to break his leg. He was sharp-witted, however, for instead of retiring crest-fallen at his failure, he coolly accounted for the accident by saying, "My wings were composed of various feathers; among them were the feathers of dunghill fowls, and they, by a certain sympathy, were attracted to the dunghill; whereas, had my wings been composed of eagles' feathers alone, the same sympathy would have attracted them to the region of the air!"

About a century later a poor monk, whose boldness and enterprise were more conspicuous than his prudence, attempted a similar feat. He provided himself with a gigantic pair of wings, constructed on a principle propounded by the rector of the grammar school of Tubingen, in 1617, and, leaping from the top of a high tower, fell to the ground, broke both his legs, and lost his life.

It was long before men came to see and admit that in regard to this they were attempting to accomplish the impossible.

There can be no doubt that it is absolutely impossible for man to fly by the simple power of his own muscles, applied to any sort of machinery whatever. This is not an open question. That man may yet contrive to raise himself in the air by means of steam or electricity, or some other motive power, remains to be seen. It does not seem probable, but no one can say authoritatively that it is impossible. It is demonstrable, however, that to rise, or even to remain suspended, in the air by means of machinery impelled by human force alone is a feat which is as much an impossibility as it is for a man, by the strength of his own legs, to leap thirty or forty times his own length,—a grasshopper can do that easily, and a bird can fly easily, but a man cannot, and never will be able to do so, because his peculiar conformation forbids it.

This was first demonstrated by Borelli, an eminent Italian mathematician and philosopher, who lived in a fertile age of discovery, and was thoroughly acquainted with the true principles of mechanics and pneumatics. He showed, by accurate calculation, the prodigious force which in birds must be exerted and maintained by the pectoral muscles with which the all-wise Creator has supplied them, and, by applying the same principles to the structure of the human frame, he proved how extremely disproportionate was the strength of the corresponding muscles in man. In fact, the man who should attempt to fly like a bird would be guilty of greater folly and ignorant presumption than the little infant who should endeavour to perform the feats of a gladiator! It is well for man in all things to attain, if

possible, to a knowledge of what certainly lies beyond his powers, for such knowledge prevents the waste and misdirection of energies, as well as saving from disappointment and other evil results.

But many of those enthusiasts, who have attempted at various periods of the world's history to fly, did not fall into the error which we have attempted to point out. On the contrary, they went intelligently to work; their only aim being modestly to fly *somewhat* after the manner of a bird, but they all failed; nevertheless one philosopher, of modern times, stoutly continued to assert the opinion that there is no impossibility in man being able to fly *apparently*, though not really, like a bird. He did not hold that man could ever fly as high, or as far, or as fast, or in any degree as easily, as a bird. All that he ventured to say was, that he might perhaps fly *somewhat like one*.

As the plan of this philosopher is rather curious, we shall detail it.

It is well known that balloons, filled with appropriate gas, will rise. Big balloons and little ones are equally uppish in their tendencies. It is also known that rotundity of form is not essential to the successful rising of a balloon. "Well, then," says this philosopher, "what is to prevent a man making two balloons, flattish, and in the form of wings, which, instead of flying away with him, as ordinary balloons would infallibly do, should be so proportioned to his size and weight as that they would not do more than raise him an inch or so off the ground, and so keep him stotting and bobbing lightly about, something like the bright thin india-rubber balls with which children are wont to play now-a-days?

"Having attained this position of, so to speak, readiness to fly, there is nothing to prevent him from propelling himself gently along the surface of the ground by means of fans, or, if you choose, small flexible cloth wings attached to the hands and arms. The legs might also be brought into play a little. It is obvious, however, that such wings would require to be mounted only in calm weather, for a breeze of wind would infallibly sweep the flyer off the face of the earth! We would only observe, in conclusion, that, however ridiculous this method of flying may appear in your eyes, this at least may be said in its favour, that whereas all other plans that have been tried have signally failed, *this* plan has never failed—never having been tried! We throw the idea before a discriminating public, in the hope that some aspiring enthusiast, with plenty of means and nerve, and no family to mourn his loss, may one day prove, to the confusion of the incredulous, that our plan is not a mere flight of imagination!"

When men began to find that wings refused in any circumstances to waft them to the realms of ether, they set about inventing aerial machines in which to ascend through the clouds and navigate the skies.

In the fourteenth century a glimmering of the true principles on which a balloon could be constructed was entertained by Albert of Saxony, a monk of the order of Saint Augustin, but he never carried his theories into practice. His opinion was that, since fire is more attenuated than air, and floats above the region of our atmosphere, all that was necessary would be to enclose a portion of such ethereal substance in a light hollow globe which would thus be raised to a certain height, and kept suspended in the sky, and that by introducing a portion of air into the globe it would be rendered heavier than before, and might thus be made to descend. This was in fact the statement of the principles on which fire-balloons were afterwards constructed and successfully sent up, excepting that air heated by fire, instead of fire itself, was used.

Others who came after Albert of Saxony held the same theory, but they all failed to reduce it to practice, and most of these men coupled with their correct notions on the subject, the very erroneous idea that by means of masts, sails, and a rudder, a balloon might be made to sail through the air as a ship sails upon the sea. In this they seem to have confounded two things which are dissimilar, namely, a vessel driven through water, and a vessel floating in air.

The fallacy here may be easily pointed out. A ship is driven through water by a body in motion, namely, wind, while its rudder is dragged through a body comparatively at rest, namely, water; hence the rudder slides against or is pushed against the water, and according as it is *turned* to one side or the other, it is *pushed* to one side or the other, the stern of the ship going along with it, and the bow, of course, making a corresponding motion in the opposite direction. Thus the ship is turned or "steered,"

but it is manifest that if the ship were at rest there would be no pushing of the rudder by the water —no steering. On the other hand, if, though the ship were in motion, the sea was also flowing at the *same rate* with the wind, there would be no flowing of water past the ship, the rudder would not be acted on, and the vessel could not be steered.

Now a balloon, carried by the wind, cannot be steered by a rudder, because it does not, like the ship, rest half in one medium which is in motion, and half in another medium which is at rest. There is no sliding of any substance past its side, no possibility therefore of pushing a rudder against anything. All floats along *with* the wind.

If, however, the balloon could be made to go *faster* than the wind, then steering would at once become possible; but sails cannot accomplish this, because, although wind can drive a ship faster than water flows, wind cannot drive a substance faster than itself flows.

The men of old did not, however, seem to take these points into consideration. It yet remains to be seen whether steam shall ever be successfully applied to aerial machines, but this may certainly be assumed in the meantime, that, until by some means a balloon is propelled *faster than the wind* through the atmosphere, sails will be useless, and steering, or giving direction, impossible.

It was believed, in those early times, when scientific knowledge was slender, that the dew which falls during the night is of celestial origin, shed by the stars, and drawn by the sun, in the heat of the day, back to its native skies. Many people even went the length of asserting that an egg, filled with the morning dew, would, as the day advanced, rise spontaneously into the air. Indeed one man, named Father Laurus, speaks of this as an observed fact, and gravely gives directions how it is to be accomplished. “Take,” says he, “a goose’s egg, and having filled it with dew gathered fresh in the morning, expose it to the sun during the hottest part of the day, and it will ascend and rest suspended for a few moments.” Father Laurus must surely have omitted to add that a goose’s brains in the head of the operator was an element essential to the success of the experiment!

But this man, although very ignorant in regard to the nature of the substances with which he wrought, had some quaint notions in his head. He thought, for instance, that if he were to cram the cavity of an artificial dove with highly condensed air, the imprisoned fluid would impel the machine in the same manner as wind impels a sail. If this should not be found to act effectively, he proposed to apply fire to it in some way or other, and, to prevent the machine from being spirited away altogether by that volatile element, asbestos, or some incombustible material, was to be used as a lining. To feed and support this fire steadily, he suggested a compound of butter, salts, and orpiment, lodged in metallic tubes, which, he imagined, would at the same time heighten the whole effect by emitting a variety of musical tones like an organ!

Another man, still more sanguine than the lest in his aerial flights of fancy, proposed that an ascent should be attempted by the application of fire as in a rocket to an aerial machine. We are not, however, told that this daring spirit ever ventured to try thus to invade the sky.

There can be no doubt that much ingenuity, as well as absurdity, has been displayed in the various suggestions that have been made from time to time, and occasionally carried into practice. One man went the length of describing a huge apparatus, consisting of very long tin pipes, in which air was to be compressed by the vehement action of fire below. In a boat suspended from the machine a man was to sit and direct the whole by the opening and shutting of valves.

Another scheme, more ingenious but not less fallacious, was propounded in 1670 by Francis Lana, a Jesuit, for navigating the air. This plan was to make four copper balls of very large dimensions, yet so extremely thin that, after the air had been extracted, they should become, in a considerable degree, specifically lighter than the surrounding medium. Each of his copper balls was to be about 25 feet in diameter, with the thickness of only the 225th part of an inch, the metal weighing 365 pounds avoirdupois, while the weight of the air which it should contain would be about 670 pounds, leaving, after a vacuum had been formed, an excess of 305 pounds for the power of ascension. The four balls would therefore, it was thought, rise into the air with a combined force of 1220 pounds, which was

deemed by Lana to be sufficient to transport a boat completely furnished with masts, sails, oars, and rudders, and carrying several passengers. The method by which the vacuum was to be obtained was by connecting each globe, fitted with a stop-cock, to a tube of at least thirty-five feet long; the whole being filled with water; when raised to the vertical position the water would run out, the stop-cocks would be closed at the proper time, and the vacuum secured. It does not seem to have entered the head of this philosopher that the weight of the surrounding atmosphere would crush and destroy his thin exhausted receivers, but he seems to have been alarmed at the idea of his supposed discovery being applied to improper uses, such as the passing of desperadoes over fortified cities, on which they might rain down fire and destruction from the clouds!

Perhaps the grandest of all the fanciful ideas that have been promulgated on this subject was that of Galien, a Dominican friar, who proposed to collect the fine diffused air of the higher regions, where hail is formed, above the summit of the loftiest mountains, and to enclose it in a cubical bag of enormous dimensions—extending more than a mile every way! This vast machine was to be composed of the thickest and strongest sail-cloth, and was expected to be capable of transporting through the air a whole army with all their munitions of war!

There were many other devices which men hit upon, some of which embraced a certain modicum of truth mixed with a large proportion of fallacy. Ignorance, more or less complete, as to the principles and powers with which they dealt, was, in days gone by, the cause of many of the errors and absurdities into which men were led in their efforts to mount the atmosphere. Our space, however, forbids further consideration of this subject, which is undoubtedly one of considerable interest, and encircled with a good deal of romance.

Turning away from all those early and fanciful speculations, we now come to that period in the history of balloon voyaging, or aeronautics, when true theories began to be philosophically applied, and ascending into the skies became an accomplished fact.

Chapter Two.
The First Balloons

The germ of the invention of the balloon lies in the discovery of Mr Cavendish, made in 1766, that hydrogen gas, called inflammable air, is at least seven times lighter than atmospheric air. Founding on this fact, Dr Black of Edinburgh proved by experiment that a very thin bag, filled with this gas, would rise to the ceiling of a room.

In Dr Thomson's *History of Chemistry*, an anecdote, related by Mr Benjamin Bell, refers to this as follows:—

"Soon after the appearance of Mr Cavendish's paper on hydrogen gas, in which he made an approximation to the specific gravity of that body, showing that it was at least ten times lighter than common air, Dr Black invited a party of friends to supper, informing them that he had a curiosity to show them. Dr Hutton, Mr Clerk of Eldin, and Sir George Clerk of Penicuik, were of the number. When the company invited had arrived, he took them into a room where he had the allantois of a calf filled with hydrogen gas, and, upon setting it at liberty, it immediately ascended and adhered to the ceiling. The phenomenon was easily accounted for; it was taken for granted that a small black thread had been attached to the allantois, that the thread passed through the ceiling, and that some one in the apartment above, by pulling the thread, elevated it to the ceiling, and kept it in its position! This explanation was so plausible, that it was agreed to by the whole company, though, like many other plausible theories, it turned out wholly fallacious, for, when the allantois was brought down, no thread whatever was found attached to it. Dr Black explained the cause of the ascent to his admiring friends; but such was his carelessness of his own reputation, that he never gave the least account of this curious experiment even to his class, and several years elapsed before this obvious property of hydrogen gas was applied to the elevation of balloons."

Cavallo made the first practical attempts with hydrogen gas six years later, but he only succeeded in causing soap-bubbles to ascend.

At last the art of aerial navigation was discovered in France, and in 1782 the first ascent was made. The triumph was achieved by Stephen and Joseph Montgolfier, sons of a wealthy paper-maker who dwelt at Annonay, on the banks of a rivulet which flows into the Rhone, not far from Lyons.

These brothers were remarkable men. Although bred in a remote provincial town, and without the benefit of a liberal education, they were possessed in a high degree of ingenuity and the spirit of observation. They educated themselves, and acquired an unusually large stock of information, which their inventive and original minds led them to apply in new fields of speculation. They were associated in business with their father, a man who passed his quiet days like a patriarch amidst a large family and a numerous body of dependants, until he reached the advanced age of ninety-three.

Stephen devoted himself chiefly to the study of mathematics, Joseph to chemistry; and they were accustomed to form their plans in concert. It appears that they had long contemplated, with philosophical interest, the floating and ascent of clouds in the air, and when they heard of or read Cavendish's theories in regard to *different kinds of air*, it at once struck them that by enclosing some gas lighter than the atmosphere in a bag, a weight might be raised from the earth into the air.

The brothers Montgolfier were men of that vigorous stamp who act promptly on receiving their convictions. At once they set about experimenting, and constructed large bags of paper,—the substance which naturally came readiest to their hands, and which appeared to them to be best suited to their purpose. These were filled with hydrogen gas, which raised them to the ceiling; but, owing to the escape of the gas through the pores and cracks of the case, those embryo balloons descended in a few minutes. Instead of varnishing the paper to prevent the escape of the gas, and supposing, erroneously, that the fault lay in the latter, they sought about for a new gas more suitable to the paper.

This they found, as they supposed, in the gas which resulted from the combustion of wet straw and wool, which had an upward tendency, they thought, on account of its electrical properties, which caused it to be repelled from the ground. It is scarcely necessary now to point out that the true cause of the upward tendency lay in the rarefaction of the air by the heat of the fire, and that hot air has a tendency to rise because its bulk is greatly increased beyond the same quantity of the surrounding cold air.

Although wrong in assigning the cause of the result, they were right in the application of it. While on a visit to Avignon Joseph Montgolfier procured a silk bag having a small opening at its lower end, and a capacity of about fifty cubic feet. Under the orifice some paper was burnt; the air inside was heated and expanded so as to fill the bag, which, when let go, soared rapidly up to the height of seventy or eighty feet, where it remained until the air cooled and allowed it to descend. Thus did the *first* balloon ascend in the month of November 1782.

Delighted with their success, the indefatigable brothers resolved to make further experiment on a larger scale. They procured a quantity of packcloth or coarse linen, formed it into a globe about ninety feet in circumference, lined it with paper, and lighted a fire under it in an iron choffer. This balloon went up with a force which they estimated as equivalent to 500 pounds.

After this the Montgolfiers appeared to have become ambitious of accomplishing greater things, and giving to their discoveries publicity; for we are told that, “they invited the members of the provincial meeting of the states of the Vivarais, then assembled at Annonay, to witness the first *public* aerial ascent. On the 5th June 1783, amidst a very large concourse of spectators, the spherical bag or balloon, consisting of different pieces of linen, merely buttoned together, was suspended from cross poles. Two men kindled a fire under it, and kept feeding the flame with small bundles of chopped straw. The loose bag gradually swelled, assuming a graceful form, and in the space of five minutes it was completely distended, and made such an effort to escape that eight men were required to hold it down.

“On a signal being given the stays were slipped, and the balloon instantly rose with an accelerating motion till it reached some height, when its velocity continued uniform, and carried it to an elevation of more than a mile. All was admiration and transport. Amidst the shouts of unbounded applause, the progress of the artificial cloud retiring from sight arrested every eye. It was hurried along by the wind; but its buoyant force being soon spent, it remained suspended only ten minutes, and fell gently in a vineyard at a distance of about a mile and a half from the place of its ascension. So memorable a feat lighted up the glow of national vanity, and the two Montgolfiers were hailed and exalted by the spontaneous impulse of their fellow-citizens.”

This event created a sensation not only in France but over the whole of Europe. In Paris, particularly, the effect on all classes was so great that they determined to have the experiment repeated, set a subscription on foot, and appointed a scientific man named Charles, and two brothers of the name of Robert, to construct a balloon. This they did, but instead of applying the Montgolfier motive power—heated air—they used hydrogen gas, procured by the action of diluted sulphuric acid upon iron filings. Their balloon, which was made of thin silk, varnished with a solution of elastic gum, was a much nearer approach to the balloon of modern days than that of Montgolfier. It was a great success; it rose and remained suspended at a height of 100 feet, in which state it was conveyed with acclamation to the Place des Victoires, where it rested and underwent some repairs. At midnight it was conveyed in solemn procession by torchlight, and guarded by a detachment of horse, to the Champ de Mars, where, on the following day, the whole world of Paris turned out to witness another ascent. The balloon went up to the sound of cannon, and in two minutes reached a height of 3000 feet, when it was lost for a time in a dark cloud, but speedily reappeared still higher. After a flight of fifteen miles, performed in three-quarters of an hour, it sunk to the ground in a field near Ecouen, where it was secured by the peasants.

The Parisians now appeared to become balloon-mad. The Royal Academy of Sciences invited Joseph Montgolfier to repeat his experiments, and another balloon was prepared by him of coarse linen with a paper lining, which, however, was destroyed by incessant and violent rain before it could be tried. Undeterred by this, another was constructed by him, which ascended from Versailles on the 19th of September 1783.

This balloon deserves peculiar notice as being the first which carried up living creatures. A sheep, a cockerel, and a duck, were the first aeronauts! They ascended to a height of about 1500 feet; remained suspended for a time, and descended some two miles off in perfect safety—indeed we may say in perfect comfort, for the sheep was discovered to be quietly feeding when it returned to the earth!

The practicability of ballooning being now fairly established, men soon began to venture their own persons in the frail cars. A young and enthusiastic naturalist named Rozier leaped into the car of another of Montgolfier's balloons soon after this, and ascended in safety to an elevation of about 300 feet, but on this occasion the balloon was held down by ropes. The ice, however, was broken, and bolder attempts quickly followed.

Chapter Three.
Early Attempts at Aerial Navigation

The first free and unfettered balloon voyage was performed very soon after the event mentioned at the end of the last chapter. It was a daring attempt, and attended with great danger.

A balloon made by Montgolfier was used. It was 75 feet high, 45 feet wide, and spheroidal in form—heated air being the motive power. The bold aeronauts, on this occasion, were the naturalist Rozier and the Marquis d'Arlandes, a major of infantry. From the gardens of the Château of Muetta they ascended on the 21st November 1783.

In the car there was a quantity of ballast, and a provision of straw to feed the fire. The balloon mounted at first with a majestic steady motion, gazed at in breathless wonder by thousands of spectators, who assembled not only in the neighbourhood of the Château, but clustered on every point of vantage in Paris.

When the daring voyagers reached a considerable height, they took off their hats and waved them to their friends below, and the multitude—realising, perhaps, that that which in former ages had been deemed the dream of visionaries, was at last an accomplished fact—responded with enthusiastic acclamations until the balloon passed upwards through the clouds and was lost to view.

It would seem that these first aeronauts were of different temperaments; for, after they had reached a height of nearly 3000 feet, and the earth was no longer distinguishable, the Marquis began to think that he had seen enough of the upper regions, would fain have descended, and murmured against his companion, who still kept feeding the fire. Apparently his alarm was justifiable, for Rozier continued recklessly to heap on fuel, until he almost set the balloon on fire. On hearing some cracks from the top, and observing some holes burning in its sides, the Marquis became so alarmed that he compelled his companion to desist, and with wet sponges stopped the conflagration, which had actually begun.

When the fire diminished, however, the balloon began to descend much quicker than was safe or agreeable, and the marquis himself began to throw fresh straw on the fire to enable them to clear the roofs of Paris. This they did very dexterously, considering that they were so unaccustomed to such navigation, throwing on just as much fuel as was sufficient for the purpose, and keeping clear of steeples and chimneys until they alighted in safety beyond the Boulevards. Their voyage lasted about half-an-hour, and they described a track of six miles around Paris, having ascended to a height of 3000 feet.

Thus was the first balloon voyage successfully accomplished by the French; and the Montgolfiers, besides enjoying the triumph which their persevering efforts deserved, were awarded the annual prize—six hundred livres—of the Academy of Sciences. The elder brother was invited to Court, decorated with the badge of Saint Michael, and received a patent of nobility; while the younger received a pension and a sum of forty thousand livres wherewith to prosecute his experiments with balloons.

The great success of the Montgolfier balloons naturally threw the efforts of Monsieur Charles and the brothers Robert into the shade. Nevertheless those gentlemen had got hold of a better principle than their rivals; and, knowing this, they resolved to convince the sceptical by constructing another balloon. They wisely began by obtaining subscriptions to enable them to carry out their designs, and finally succeeded in making a globe formed of tiffany, covered with elastic varnish, which was twenty-eight feet in diameter. This they filled with hydrogen gas. Some idea of their difficulties and expenses may be gathered from the fact that the mere filling of the balloon required an apparatus which cost about 400 pounds sterling, one-half of which was expended on the production of the gas alone.

The ascent of this balloon deserves to be regarded with special interest, because, besides being the first *hydrogen* balloon which carried up human beings, it was the first in which scientific observations were made and recorded. Monsieur Charles was a lecturer on natural philosophy, and, like our own great aeronaut, Mr Glaisher, does not seem to have been content to produce merely a spectacle, but went up to the realms of ether with an intelligent and scientific eye; for we read of him recording the indications of the thermometer and barometer at different heights and under various conditions.

There were many accidents and delays in the construction of this balloon; but at last, on the 1st December 1783, it was taken to the Tuileries and there filled with gas. The process was slow, as the gas had to be generated in large quantities by means of diluted sulphuric acid and iron filings put into wooden casks disposed round a large cistern, from which it was conveyed through water in long leaden pipes. To keep the impatient populace quiet, therefore, during the tedious operation, Montgolfier sent up one of his fire-balloons.

At last, when it was sufficiently filled, Messieurs Charles and Robert stepped into the car, which was ballasted with sandbags, and the ropes were let go. It went up with slow and solemn motion, at the rate of about five miles an hour. "The car," writes a reporter of the day in language more inflated than the balloon itself, "ascending amidst profound silence and admiration, allowed, in its soft and measured ascent, the bystanders to follow with their eyes and hearts two interesting men, who, like demigods, soared to the abode of the immortals, to receive the reward of intellectual progress, and carry the imperishable name of Montgolfier. After the globe had reached the height of 2000 feet, it was no longer possible to distinguish the aerial navigators; but the coloured pennants which they waved in the air testified their safety and their tranquil feelings. All fears were now dissipated; enthusiasm succeeded to astonishment; and every demonstration was given of joy and applause."

The period of flight was an hour and three-quarters, which, for those early days of the art, was a pretty long voyage. By throwing over ballast the voyagers ascended, and by letting off gas they descended at pleasure; and they observed that during an hour, while they were exposed to the sun's rays, the gas was heated up to the temperature of fifty-five degrees of Fahrenheit's scale, which had the effect of sensibly increasing the buoyancy of the balloon. They descended safely on the meadow of Nesle, about twenty-five miles from Paris.

But, not content with what he had accomplished, Monsieur Charles made a sudden resolve to have another flight alone. The shades of night were falling, and the sun had already set, when the enthusiastic aeronaut re-entered the car, and, casting off the grapnels, began his solitary night voyage. He was well rewarded. The balloon shot up with such celerity as to reach the height of about two miles in ten minutes, and the sun rose again to him in full orb! From his lofty station he watched it until it set again below the distant horizon. Probably Monsieur Charles was the first man in the world on whom the sun thus rose and set twice in the same day!

Конец ознакомительного фрагмента.