

## CHAPTER XIV.

### A NIGHT OF THREE HUNDRED AND FIFTY-FOUR HOURS AND A HALF.

At the moment this phenomenon took place the projectile was grazing the moon's North Pole, at less than twenty-five miles' distance. A few seconds had, therefore, sufficed to plunge it into the absolute darkness of space. The transition had taken place so rapidly, without gradations of light or attenuation of the luminous undulations, that the orb seemed to have been blown out by a powerful gust.

"The moon has melted, disappeared!" cried Michel Ardan, wonder-stricken.

In fact, no ray of light or shade had appeared on the disc, formerly so brilliant. The obscurity was complete, and rendered deeper still by the shining of the stars. It was the darkness of lunar night, which lasts 354 hours and a half on each point of the disc--a long night, the result of the equality of the movements of translation and rotation of the moon, the one upon herself, the other round the earth. The projectile in the satellite's cone of shadow was no longer under the action of the solar rays.

In the interior darkness was, therefore, complete. The travellers could no longer see one another. Hence came the necessity to lighten this darkness. However desirous Barbicane might be to economise the gas, of

which he had so small a reserve, he was obliged to have recourse to it for artificial light--an expensive brilliancy which the sun then refused.

"The devil take the radiant orb!" cried Michel Ardan; "he is going to force us to spend our gas instead of giving us his rays for nothing."

"We must not accuse the sun," said Nicholl. "It is not his fault, it is the moon's fault for coming and putting herself like a screen between us and him."

"It's the sun!" said Michel again.

"It's the moon!" retorted Nicholl.

An idle dispute began, which Barbicane put an end to by saying--

"My friends, it is neither the fault of the sun nor the moon. It is the projectile's fault for deviating from its course instead of rigorously following it. Or, to be juster still, it is the fault of that unfortunate asteroid which so deplorably altered our first direction."

"Good!" answered Michel Ardan; "as that business is settled let us have our breakfast. After a night entirely passed in making observations, we want something to set us to rights a little."

This proposition met with no contradiction. Michel prepared the repast in a few minutes. But they ate for the sake of eating. They drank without toasts or hurrahs. The bold travellers, borne away into the darkness of space without their accustomed escort of rays, felt a vague uneasiness invade their hearts. The "farouche" darkness, so dear to the pen of Victor Hugo, surrounded them on all sides.

In the meantime they talked about this interminable night, 354 hours, or nearly 15 days, long, which physical laws have imposed upon the inhabitants of the moon. Barbicane gave his friends some explanation of the causes and consequences of this curious phenomenon.

"Curious it certainly is," said he, "for if each hemisphere of the moon is deprived of solar light for fifteen days, the one over which we are moving at this moment does not even enjoy, during its long night, a sight of the brilliantly-lighted earth. In a word, there is no moon, applying that qualification to our spheroid, except for one side of the disc. Now, if it was the same upon earth--if, for example, Europe never saw the moon, and she was only visible at the antipodes--you can figure to yourselves the astonishment of a European on arriving in Australia."

"They would make the voyage for nothing but to go and see the moon," answered Michel.

"Well," resumed Barbicane, "that astonishment is reserved to the Selenite who inhabits the opposite side of the moon to the earth, a side

for ever invisible to our fellow-beings of the terrestrial globe."

"And which we should have seen," added Nicholl, "if we had arrived here at the epoch when the moon is new--that is to say, a fortnight later."

"To make amends," resumed Barbicane, "an inhabitant of the visible face is singularly favoured by Nature to the detriment on the invisible face. The latter, as you see, has dark nights of 354 hours long, without a ray of light to penetrate the obscurity. The other, on the contrary, when the sun, which has lighted him for a fortnight, sets under the horizon, sees on the opposite horizon a splendid orb rise. It is the earth, thirteen times larger than that moon which we know--the earth, which is developed to a diameter of two degrees, and which sheds a light thirteen times greater, which no atmosphere qualifies; the earth, which only disappears when the sun reappears."

"A fine sentence," said Michel Ardan; "rather academical perhaps."

"It follows," resumed Barbicane, nowise put out, "that the visible face of the disc must be very agreeable to inhabit, as it is always lighted by the sun or the moon."

"But," said Nicholl, "this advantage must be quite compensated by the unbearable heat which this light must cause."

"This inconvenience is the same under two faces, for the light reflected

by the earth is evidently deprived of heat. However, this invisible face is still more deprived of heat than the visible face. I say that for you, Nicholl; Michel would probably not understand."

"Thank you," said Michel.

"In fact," resumed Barbicane, "when the invisible face receives the solar light and heat the moon is new--that is to say, that she is in conjunction, that she is situated between the sun and the earth. She is then, on account of the situation which she occupies in opposition when she is full, nearer the sun by the double of her distance from the earth. Now this distance may be estimated at the two-hundredth part of that which separates the sun and the earth; or, in round numbers, at two hundred thousand leagues. Therefore this visible face is nearer the sun by two hundred thousand leagues when it receives his rays."

"Quite right," replied Nicholl.

"Whilst--" resumed Barbicane.

"Allow me," said Michel, interrupting his grave companion.

"What do you want?"

"I want to go on with the explanation."

"Why?"

"To prove that I have understood."

"Go on, then," said Barbicane, smiling.

"Whilst," said Michel, imitating the tone and gestures of President Barbicane, "when the visible face of the moon is lighted by the sun the moon is full--that is to say, situated with regard to the earth the opposite to the sun. The distance which separates it from the radiant orb is then increased in round numbers by 200,000 leagues, and the heat which it receives must be rather less."

"Well done!" exclaimed Barbicane. "Do you know, Michel, for an artist you are intelligent."

"Yes," answered Michel carelessly, "we are all intelligent on the Boulevard des Italiens."

Barbicane shook hands gravely with his amiable companion, and went on enumerating the few advantages reserved to the inhabitants of the visible face.

Amongst others he quoted the observations of the sun's eclipses, which can only be seen from one side of the lunar disc, because the moon must be in opposition before they can take place. These eclipses, caused by

the interposition of the earth between the sun and the moon, may last two hours, during which, on account of the rays refracted by its atmosphere, the terrestrial globe can only appear like a black spot upon the sun.

"Then," said Nicholl, "the invisible hemisphere is very ill-treated by Nature."

"Yes," answered Barbicane, "but not the whole of it. By a certain movement of liberation, a sort of balancing on its centre, the moon presents more than the half of her disc to the earth. She is like a pendulum, the centre of gravity of which is towards the terrestrial globe, and which oscillates regularly. Whence comes that oscillation? Because her movement of rotation on her axis is animated with uniform velocity, whilst her movement of translation, following an elliptical orb round the earth, is not. At the perigee the velocity of translation is greater, and the moon shows a certain portion of her western border. At her apogee the velocity of rotation is greater, and a morsel of her eastern border appears. It is a strip of about eight degrees, which appears sometimes on the west, sometimes on the east. The result is, therefore, that of a thousand parts the moon shows five hundred and sixty-nine."

"No matter," answered Michel; "if we ever become Selenites, we will inhabit the visible face. I like light."

"Unless," replied Nicholl, "the atmosphere should be condensed on the other side, as certain astronomers pretend."

"That is a consideration," answered Michel simply.

In the meantime breakfast was concluded, and the observers resumed their posts. They tried to see through the dark port-light by putting out all light in the projectile. But not one luminous atom penetrated the obscurity.

One inexplicable fact preoccupied Barbicane. How was it that though the projectile had been so near the moon, within a distance of twenty-five miles, it had not fallen upon her? If its speed had been enormous, he would have understood why it had not fallen. But with a relatively slight speed the resistance to lunar attraction could not be explained. Was the projectile under the influence of some strange force? Did some body maintain it in the ether? It was henceforth evident that it would not touch any point upon the moon. Where was it going? Was it going farther away from or nearer to the disc? Was it carried along in the gloom across infinitude? How were they to know, how calculate in the dark? All these questions made Barbicane anxious, but he could not solve them.

In fact, the invisible orb was there, perhaps, at a distance of some leagues only, but neither his companions nor he could any longer see it. If any noise was made on its surface they could not hear it. The air,



that vehicle of transmission, was wanting to convey to them the groans of that moon which the Arabian legends make "a man already half-granite, but still palpitating."

It will be agreed that it was enough to exasperate the most patient observers. It was precisely the unknown hemisphere that was hidden from their eyes. That face which a fortnight sooner or a fortnight later had been, or would be, splendidly lighted up by the solar rays, was then lost in absolute darkness. Where would the projectile be in another fortnight? Where would the hazards of attraction have taken it? Who could say?

It is generally admitted that the invisible hemisphere of the moon is, by its constitution, absolutely similar to the visible hemisphere. One-seventh of it is seen in those movements of libration Barbicane spoke of. Now upon the surface seen there were only plains and mountains, amphitheatres and craters, like those on the maps. They could there imagine the same arid and dead nature. And yet, supposing the atmosphere to have taken refuge upon that face? Suppose that with the air water had given life to these regenerated continents? Suppose that vegetation still persists there? Suppose that animals people these continents and seas? Suppose that man still lives under those conditions of habitability? How many questions there were it would have been interesting to solve! What solutions might have been drawn from the contemplation of that hemisphere! What delight it would have been to glance at that world which no human eye has seen!

The disappointment of the travellers in the midst of this darkness may be imagined. All observation of the lunar disc was prevented. The constellations alone were visible, and it must be acknowledged that no astronomers, neither Faye, Chacornac, nor the Secchi, had ever been in such favourable conditions to observe them.

In fact, nothing could equal the splendour of this starry world, bathed in limpid ether. Diamonds set in the celestial vault threw out superb flames. One look could take in the firmament from the Southern Cross to the North Star, those two constellations which will in 12,000 years, on account of the succession of equinoxes, resign their rôles of polar stars, the one to Canopus in the southern hemisphere, the other to Wega in the northern. Imagination lost itself in this sublime infinitude, amidst which the projectile was moving like a new star created by the hand of man. From natural causes these constellations shone with a soft lustre; they did not twinkle because there was no atmosphere to intervene with its strata unequally dense, and of different degrees of humidity, which causes this scintillation.

The travellers long watched the constellated firmament, upon which the vast screen of the moon made an enormous black hole. But a painful sensation at length drew them from their contemplation. This was an intense cold, which soon covered the glasses of the port-lights with a thick coating of ice. The sun no longer warmed the projectile with his rays, and it gradually lost the heat stored up in its walls. This heat

was by radiation rapidly evaporated into space, and a considerable lowering of the temperature was the result. The interior humidity was changed into ice by contact with the window-panes, and prevented all observation.

Nicholl, consulting the thermometer, said that it had fallen to 17° (centigrade) below zero (1° Fahr). Therefore, notwithstanding every reason for being economical, Barbicane was obliged to seek heat as well as light from gas. The low temperature of the bullet was no longer bearable. Its occupants would have been frozen to death.

"We will not complain about the monotony of the journey," said Michel Ardan. "What variety we have had, in temperature at all events! At times we have been blinded with light, and saturated with heat like the Indians of the Pampas! Now we are plunged into profound darkness amidst boreal cold, like the Esquimaux of the pole! No, indeed! We have no right to complain, and Nature has done many things in our honour!"

"But," asked Nicholl, "what is the exterior temperature?"

"Precisely that of planetary space," answered Barbicane.

"Then," resumed Michel Ardan, "would not this be an opportunity for making that experiment we could not attempt when we were bathed in the solar rays?"

"Now or never," answered Barbicane, "for we are usefully situated in order to verify the temperature of space, and see whether the calculations of Fourier or Pouillet are correct."

"Any way it is cold enough," said Michel. "Look at the interior humidity condensing on the port-lights. If this fall continues the vapour of our respiration will fall around us in snow."

"Let us get a thermometer," said Barbicane.

It will be readily seen that an ordinary thermometer would have given no result under the circumstances in which it was going to be exposed. The mercury would have frozen in its cup, for it does not keep liquid below 44° below zero. But Barbicane had provided himself with a spirit thermometer, on the Walferdin system, which gives the minima of excessively low temperature.

Before beginning the experiment this instrument was compared with an ordinary thermometer, and Barbicane prepared to employ it.

"How shall we manage it?" asked Nicholl.

"Nothing is easier," answered Michel Ardan, who was never at a loss.

"Open the port-light rapidly, throw out the instrument; it will follow the projectile with exemplary docility; a quarter of an hour after take it in."

"With your hand?" asked Barbicane.

"With my hand," answered Michel.

"Well, then, my friend, do not try it," said Barbicane, "for the hand you draw back will be only a stump, frozen and deformed by the frightful cold."

"Really?"

"You would feel the sensation of a terrible burn, like one made with a red-hot iron, for the same thing happens when heat is brutally abstracted from our body as when it is inserted. Besides, I am not sure that objects thrown out still follow us."

"Why?" said Nicholl.

"Because if we are passing through any atmosphere, however slightly dense, these objects will be delayed. Now the darkness prevents us verifying whether they still float around us. Therefore, in order not to risk our thermometer, we will tie something to it, and so easily pull it back into the interior."

Barbicane's advice was followed. Nicholl threw the instrument out of the rapidly-opened port-light, holding it by a very short cord, so that it

could be rapidly drawn in. The window was only open one second, and yet that one second was enough to allow the interior of the projectile to become frightfully cold.

"Mille diables!" cried Michel Ardan, "it is cold enough here to freeze white bears!"

Barbicane let half-an-hour go by, more than sufficient time to allow the instrument to descend to the level of the temperature of space. The thermometer was then rapidly drawn in.

Barbicane calculated the quantity of mercury spilt into the little phial soldered to the lower part of the instrument, and said--

"One hundred and forty degrees centigrade below zero!" (218° Fahr.)

M. Pouillet was right, not Fourier. Such was the frightful temperature of sidereal space! Such perhaps that of the lunar continents when the orb of night loses by radiation all the heat which she absorbs during the fifteen days of sunshine.