

CHAPTER XIX.

A STRUGGLE WITH THE IMPOSSIBLE.

For some time Barbicane and his companions, mute and pensive, looked at this world, which they had only seen from a distance, like Moses saw Canaan, and from which they were going away for ever. The position of the projectile relatively to the moon was modified, and now its lower end was turned towards the earth.

This change, verified by Barbicane, surprised him greatly. If the bullet was going to gravitate round the satellite in an elliptical orbit, why was not its heaviest part turned towards it like the moon to the earth? There again was an obscure point.

By watching the progress of the projectile they could see that it was following away from the moon an analogous curve to that by which it approached her. It was, therefore, describing a very long ellipsis which would probably extend to the point of equal attraction, where the influences of the earth and her satellite are neutralised.

Such was the conclusion which Barbicane correctly drew from the facts observed, a conviction which his two friends shared with him.

Questions immediately began to shower upon him.

"What will become of us after we have reached the neutral point?" asked Michel Ardan.

"That is unknown!" answered Barbicane.

"But we can make suppositions, I suppose?"

"We can make two," answered Barbicane. "Either the velocity of the projectile will then be insufficient, and it will remain entirely motionless on that line of double attraction--"

"I would rather have the other supposition, whatever it is," replied Michel.

"Or the velocity will be sufficient," resumed Barbicane, "and it will continue its elliptical orbit, and gravitate eternally round the orb of night."

"Not very consoling that revolution," said Michel, "to become the humble servants of a moon whom we are in the habit of considering our servant. And is that the future that awaits us?"

Neither Barbicane nor Nicholl answered.

"Why do you not answer?" asked the impatient Michel.

"There is nothing to answer," said Nicholl.

"Can nothing be done?"

"No," answered Barbicane. "Do you pretend to struggle with the impossible?"

"Why not? Ought a Frenchman and two Americans to recoil at such a word?"

"But what do you want to do?"

"Command the motion that is carrying us along!"

"Command it?"

"Yes," resumed Michel, getting animated, "stop it or modify it; use it for the accomplishment of our plans."

"And how, pray?"

"That is your business! If artillerymen are not masters of their bullets they are no longer artillerymen. If the projectile commands the gunner, the gunner ought to be rammed instead into the cannon! Fine savants, truly! who don't know now what to do after having induced me--"

"Induced!" cried Barbicane and Nicholl. "Induced! What do you mean by that?"

"No recriminations!" said Michel. "I do not complain. The journey pleases me. The bullet suits me. But let us do all that is humanly possible to fall somewhere, if only upon the moon."

"We should only be too glad, my worthy Michel," answered Barbicane, "but we have no means of doing it."

"Can we not modify the motion of the projectile?"

"No."

"Nor diminish its speed?"

"No."

"Not even by lightening it like they lighten an overloaded ship?"

"What can we throw out?" answered Nicholl. "We have no ballast on board. And besides, it seems to me that a lightened projectile would go on more quickly."

"Less quickly," said Michel.

"More quickly," replied Nicholl.

"Neither more nor less quickly," answered Barbicane, wishing to make his two friends agree, "for we are moving in the void where we cannot take specific weight into account."

"Very well," exclaimed Michel Ardan in a determined tone; "there is only one thing to do."

"What is that?" asked Nicholl.

"Have breakfast," imperturbably answered the audacious Frenchman, who always brought that solution to the greatest difficulties.

In fact, though that operation would have no influence on the direction of the projectile, it might be attempted without risk, and even successfully from the point of view of the stomach. Decidedly the amiable Michel had only good ideas.

They breakfasted, therefore, at 2 a.m., but the hour was not of much consequence. Michel served up his habitual menu, crowned by an amiable bottle out of his secret cellar. If ideas did not come into their heads the Chambertin of 1863 must be despaired of.

The meal over, observations began again.

The objects they had thrown out of the projectile still followed it at the same invariable distance. It was evident that the bullet in its movement of translation round the moon had not passed through any atmosphere, for the specific weight of these objects would have modified their respective distances.

There was nothing to see on the side of the terrestrial globe. The earth was only a day old, having been new at midnight the day before, and two days having to go by before her crescent, disengaged from the solar rays, could serve as a clock to the Selenites, as in her movement of rotation each of her points always passes the same meridian of the moon every twenty-four hours.

The spectacle was a different one on the side of the moon; the orb was shining in all its splendour amidst innumerable constellations, the rays of which could not trouble its purity. Upon the disc the plains again wore the sombre tint which is seen from the earth. The rest of the nimbus was shining, and amidst the general blaze Tycho stood out like a sun.

Barbicane could not manage any way to appreciate the velocity of the projectile, but reasoning demonstrated that this speed must be uniformly diminishing in conformity with the laws of rational mechanics.

In fact, it being admitted that the bullet would describe an orbit round the moon, that orbit must necessarily be elliptical. Science proves that

it must be thus. No mobile circulation round any body is an exception to that law. All the orbits described in space are elliptical, those of satellites round their planets, those of planets around their sun, that of the sun round the unknown orb that serves as its central pivot. Why should the projectile of the Gun Club escape that natural arrangement?

Now in elliptical orbits attracting bodies always occupy one of the foci of the ellipsis. The satellite is, therefore, nearer the body round which it gravitates at one moment than it is at another. When the earth is nearest the sun she is at her perihelion, and at her aphelion when most distant. The moon is nearest the earth at her perigee, and most distant at her apogee. To employ analogous expressions which enrich the language of astronomers, if the projectile remained a satellite of the moon, it ought to be said that it is in its "aposelene" at its most distant point, and at its "periselene" at its nearest.

In the latter case the projectile ought to attain its maximum of speed, in the latter its minimum. Now it was evidently going towards its "aposelene," and Barbicane was right in thinking its speed would decrease up to that point, and gradually increase when it would again draw near the moon. That speed even would be absolutely nil if the point was coexistent with that of attraction.

Barbicane studied the consequences of these different situations; he was trying what he could make of them when he was suddenly interrupted by a cry from Michel Ardan.

"Ifaith!" cried Michel, "what fools we are!"

"I don't say we are not," answered Barbicane; "but why?"

"Because we have some very simple means of slackening the speed that is taking us away from the moon, and we do not use them."

"And what are those means?"

"That of utilising the force of recoil in our rockets."

"Ah, why not?" said Nicholl.

"We have not yet utilised that force, it is true," said Barbicane, "but we shall do so."

"When?" asked Michel.

"When the time comes. Remark, my friends, that in the position now occupied by the projectile, a position still oblique to the lunar disc, our rockets, by altering its direction, might take it farther away instead of nearer to the moon. Now I suppose it is the moon you want to reach?"

"Essentially," answered Michel.

"Wait, then. Through some inexplicable influence the projectile has a tendency to let its lower end fall towards the earth. It is probable that at the point of equal attraction its conical summit will be rigorously directed towards the moon. At that moment it may be hoped that its speed will be nil. That will be the time to act, and under the effort of our rockets we can, perhaps, provoke a direct fall upon the surface of the lunar disc."

"Bravo!" said Michel.

"We have not done it yet, and we could not do it as we passed the neutral point, because the projectile was still animated with too much velocity."

"Well reasoned out," said Nicholl.

"We must wait patiently," said Barbicane, "and put every chance on our side; then, after having despaired so long, I again begin to think we shall reach our goal."

This conclusion provoked hurrahs from Michel Ardan. No one of these daring madmen remembered the question they had all answered in the negative--No, the moon is not inhabited! No, the moon is probably not inhabitable! And yet they were going to do all they could to reach it.

One question only now remained to be solved: at what precise moment would the projectile reach that point of equal attraction where the travellers would play their last card?

In order to calculate that moment to within some seconds Barbicane had only to have recourse to his travelling notes, and to take the different altitudes from lunar parallels. Thus the time employed in going over the distance between the neutral point and the South Pole must be equal to the distance which separates the South Pole from the neutral point. The hours representing the time it took were carefully noted down, and the calculation became easy.

Barbicane found that this point would be reached by the projectile at 1 a.m. on the 8th of December. It was then 3 a.m. on the 7th of December. Therefore, if nothing intervened, the projectile would reach the neutral point in twenty-two hours.

The rockets had been put in their places to slacken the fall of the bullet upon the moon, and now the bold fellows were going to use them to provoke an exactly contrary effect. However that may be, they were ready, and there was nothing to do but await the moment for setting fire to them.

"As there is nothing to do," said Nicholl, "I have a proposition to make."

"What is that?" asked Barbicane.

"I propose we go to sleep."

"That is a nice idea!" exclaimed Michel Ardan.

"It is forty hours since we have closed our eyes," said Nicholl. "A few hours' sleep would set us up again."

"Never!" replied Michel.

"Good," said Nicholl; "every man to his humour--mine is to sleep."

And lying down on a divan, Nicholl was soon snoring like a forty-eight pound bullet.

"Nicholl is a sensible man," said Barbicane soon. "I shall imitate him."

A few minutes after he was joining his bass to the captain's baritone.

"Decidedly," said Michel Ardan, when he found himself alone, "these practical people sometimes do have opportune ideas."

And stretching out his long legs, and folding his long arms under his head, Michel went to sleep too.

But this slumber could neither be durable nor peaceful. Too many preoccupations filled the minds of these three men, and a few hours after, at about 7 a.m., they all three awoke at once.

The projectile was still moving away from the moon, inclining its conical summit more and more towards her. This phenomenon was inexplicable at present, but it fortunately aided the designs of Barbicane.

Another seventeen hours and the time for action would have come.

That day seemed long. However bold they might be, the travellers felt much anxiety at the approach of the minute that was to decide everything, either their fall upon the moon or their imprisonment in an immutable orbit. They therefore counted the hours, which went too slowly for them, Barbicane and Nicholl obstinately plunged in calculations, Michel walking up and down the narrow space between the walls contemplating with longing eye the impassible moon.

Sometimes thoughts of the earth passed through their minds. They saw again their friends of the Gun Club, and the dearest of them all, J.T. Maston. At that moment the honourable secretary must have been occupying his post on the Rocky Mountains. If he should perceive the projectile upon the mirror of his gigantic telescope what would he think? After having seen it disappear behind the south pole of the moon, they would see it reappear at the north! It was, therefore, the satellite of a

satellite! Had J.T. Maston sent that unexpected announcement into the world? Was this to be the dénouement of the great enterprise?

Meanwhile the day passed without incident. Terrestrial midnight came. The 8th of December was about to commence. Another hour and the point of equal attraction would be reached. What velocity then animated the projectile? They could form no estimate; but no error could vitiate Barbicane's calculations. At 1 a.m. that velocity ought to be and would be nil.

Besides, another phenomenon would mark the stopping point of the projectile on the neutral line. In that spot the two attractions, terrestrial and lunar, would be annihilated. Objects would not weigh anything. This singular fact, which had so curiously surprised Barbicane and his companions before, must again come about under identical circumstances. It was at that precise moment they must act.

The conical summit of the bullet had already sensibly turned towards the lunar disc. The projectile was just right for utilising all the recoil produced by setting fire to the apparatus. Chance was therefore in the travellers' favour. If the velocity of the projectile were to be absolutely annihilated upon the neutral point, a given motion, however slight, towards the moon would determine its fall.

"Five minutes to one," said Nicholl.

"Everything is ready," answered Michel Ardan, directing his match towards the flame of the gas.

"Wait!" said Barbicane, chronometer in hand.

At that moment weight had no effect. The travellers felt its complete disappearance in themselves. They were near the neutral point if they had not reached it.

"One o'clock!" said Barbicane.

Michel Ardan put his match to a contrivance that put all the fuses into instantaneous communication. No detonation was heard outside, where air was wanting, but through the port-lights Barbicane saw the prolonged flame, which was immediately extinguished.

The projectile had a slight shock which was very sensibly felt in the interior.

The three friends looked, listened, without speaking, hardly breathing. The beating of their hearts might have been heard in the absolute silence.

"Are we falling?" asked Michel Ardan at last.

"No," answered Nicholl; "for the bottom of the projectile has not turned

towards the lunar disc!"

At that moment Barbicane left his window and turned towards his two companions. He was frightfully pale, his forehead wrinkled, his lips contracted.

"We are falling!" said he.

"Ah!" cried Michel Ardan, "upon the moon?"

"Upon the earth!" answered Barbicane.

"The devil!" cried Michel Ardan; and he added philosophically, "when we entered the bullet we did not think it would be so difficult to get out of it again."

In fact, the frightful fall had begun. The velocity kept by the projectile had sent it beyond the neutral point. The explosion of the fuses had not stopped it. That velocity which had carried the projectile beyond the neutral line as it went was destined to do the same upon its return. The law of physics condemned it, in its elliptical orbit, to pass by every point it had already passed.

It was a terrible fall from a height of 78,000 leagues, and which no springs could deaden. According to the laws of ballistics the projectile would strike the earth with a velocity equal to that which animated it

as it left the Columbiad--a velocity of "16,000 metres in the last second!"

And in order to give some figures for comparison it has been calculated that an object thrown from the towers of Notre Dame, the altitude of which is only 200 feet, would reach the pavement with a velocity of 120 leagues an hour. Here the projectile would strike the earth with a velocity of 57,600 leagues an hour.

"We are lost men," said Nicholl coldly.

"Well, if we die," answered Barbicane, with a sort of religious enthusiasm, "the result of our journey will be magnificently enlarged! God will tell us His own secret! In the other life the soul will need neither machines nor engines in order to know! It will be identified with eternal wisdom!"

"True," replied Michel Ardan: "the other world may well console us for that trifling orb called the moon!"

Barbicane crossed his arms upon his chest with a movement of sublime resignation.

"God's will be done!" he said.