

## CHAPTER VIII.

### THE NEUTRAL POINT.

What had taken place? Whence proceeded this strange intoxication whose consequences might have proved so disastrous? A little forgetfulness on Ardan's part had done the whole mischief, but fortunately M'Nicholl was able to remedy it in time.

After a regular fainting spell several minutes long, the Captain was the first man to return to consciousness and the full recovery of his intellectual faculties. His first feelings were far from pleasant. His stomach gnawed him as if he had not eaten for a week, though he had taken breakfast only a few hours before; his eyes were dim, his brain throbbing, and his limbs shaking. In short, he presented every symptom usually seen in a man dying of starvation. Picking himself up with much care and difficulty, he roared out to Ardan for something to eat. Seeing that the Frenchman was unable or unwilling to respond, he concluded to help himself, by beginning first of all to prepare a little tea. To do this, fire was necessary; so, to light his lamp, he struck a match.

But what was his surprise at seeing the sulphur tip of the match blazing with a light so bright and dazzling that his eyes could hardly bear it! Touching it to the gas burner, a stream of light flashed forth equal in its intensity to the flame of an electric lamp. Then he understood it all in an instant. The dazzling glare, his maddened brain, his gnawing

stomach--all were now clear as the noon-day Sun.

"The oxygen!" he cried, and, suddenly stooping down and examining the tap of the air apparatus, he saw that it had been only half turned off. Consequently the air was gradually getting more and more impregnated with this powerful gas, colorless, odorless, tasteless, infinitely precious, but, unless when strongly diluted with nitrogen, capable of producing fatal disorders in the human system. Ardan, startled by M'Nicholl's question about the means of returning from the Moon, had turned the cock only half off.

The Captain instantly stopped the escape of the oxygen, but not one moment too soon. It had completely saturated the atmosphere. A few minutes more and it would have killed the travellers, not like carbonic acid, by smothering them, but by burning them up, as a strong draught burns up the coals in a stove.

It took nearly an hour for the air to become pure enough to allow the lungs their natural play. Slowly and by degrees, the travellers recovered from their intoxication; they had actually to sleep off the fumes of the oxygen as a drunkard has to sleep off the effects of his brandy. When Ardan learned that he was responsible for the whole trouble, do you think the information disconcerted him? Not a bit of it. On the contrary, he was rather proud of having done something startling, to break the monotony of the journey; and to put a little life, as he said, into old Barbican and the grim Captain, so as to get a little fun out of such grave philosophers.

After laughing heartily at the comical figure cut by his two friends capering like crazy students at the Closerie des Lilas, he went on moralizing on the incident:

"For my part, I'm not a bit sorry for having partaken of this fuddling gas. It gives me an idea, dear boys. Would it not be worth some enterprising fellow's while to establish a sanatorium provided with oxygen chambers, where people of a debilitated state of health could enjoy a few hours of intensely active existence! There's money in it, as you Americans say. Just suppose balls or parties given in halls where the air would be provided with an extra supply of this enrapturing gas! Or, theatres where the atmosphere would be maintained in a highly oxygenated condition. What passion, what fire in the actors! What enthusiasm in the spectators! And, carrying the idea a little further, if, instead of an assembly or an audience, we should oxygenize towns, cities, a whole country--what activity would be infused into the whole people! What new life would electrify a stagnant community! Out of an old used-up nation we could perhaps make a bran-new one, and, for my part, I know more than one state in old Europe where this oxygen experiment might be attended with a decided advantage, or where, at all events, it could do no harm!"

The Frenchman spoke so glibly and gesticulated so earnestly that M'Nicholl once more gravely examined the stop-cock; but Barbican damped his enthusiasm by a single observation.

"Friend Michael," said he, "your new and interesting idea we shall discuss at a more favorable opportunity. At present we want to know where all these cocks and hens have come from."

"These cocks and hens?"

"Yes."

Ardan threw a glance of comical bewilderment on half a dozen or so of splendid barn-yard fowls that were now beginning to recover from the effects of the oxygen. For an instant he could not utter a word; then, shrugging his shoulders, he muttered in a low voice:

"Catastrophe prematurely exploded!"

"What are you going to do with these chickens?" persisted Barbican.

"Acclimatize them in the Moon, by Jove! what else?" was the ready reply.

"Why conceal them then?"

"A hoax, a poor hoax, dear President, which proves a miserable failure! I intended to let them loose on the Lunar Continent at the first favorable opportunity. I often had a good laugh to myself, thinking of your astonishment and the Captain's at seeing a lot of American poultry scratching for worms on a Lunar dunghill!"

"Ah! wag, jester, incorrigible farceur!" cried Barbican with a smile; "you want no nitrous oxide to put a bee in your bonnet! He is always as bad as you and I were for a short time, M'Nicholl, under the laughing gas! He's never had a sensible moment in his life!"

"I can't say the same of you," replied Ardan; "you had at least one sensible moment in all your lives, and that was about an hour ago!"

Their incessant chattering did not prevent the friends from at once repairing the disorder of the interior of the Projectile. Cocks and hens were put back in their cages. But while doing so, the friends were astonished to find that the birds, though good sized creatures, and now pretty fat and plump, hardly felt heavier in their hands than if they had been so many sparrows. This drew their interested attention to a new phenomenon.

From the moment they had left the Earth, their own weight, and that of the Projectile and the objects therein contained, had been undergoing a progressive diminution. They might never be able to ascertain this fact with regard to the Projectile, but the moment was now rapidly approaching when the loss of weight would become perfectly sensible, both regarding themselves and the tools and instruments surrounding them. Of course, it is quite clear, that this decrease could not be indicated by an ordinary scales, as the weight to balance the object would have lost precisely as much as the object itself. But a spring balance, for instance, in which the tension of the coil is independent of attraction, would have readily given the exact equivalent of the

loss.

Attraction or weight, according to Newton's well known law, acting in direct proportion to the mass of the attracting body and in inverse proportion to the square of the distance, this consequence clearly follows: Had the Earth been alone in space, or had the other heavenly bodies been suddenly annihilated, the further from the Earth the Projectile would be, the less weight it would have. However, it would never entirely lose its weight, as the terrestrial attraction would have always made itself felt at no matter what distance. But as the Earth is not the only celestial body possessing attraction, it is evident that there may be a point in space where the respective attractions may be entirely annihilated by mutual counteraction. Of this phenomenon the present instance was a case in point. In a short time, the Projectile and its contents would for a few moments be absolutely and completely deprived of all weight whatsoever.

The path described by the Projectile was evidently a line from the Earth to the Moon averaging somewhat less than 240,000 miles in length. According as the distance between the Projectile and the Earth was increasing, the terrestrial attraction was diminishing in the ratio of the square of the distance, and the lunar attraction was augmenting in the same proportion.

As before observed, the point was not now far off where, the two attractions counteracting each other, the bullet would actually weigh nothing at all. If the masses of the Earth and the Moon had been equal,

this should evidently be found half way between the two bodies. But by making allowance for the difference of the respective masses, it was easy to calculate that this point would be situated at the 9/10 of the total distance, or, in round numbers, at something less than 216,000 miles from the Earth.

At this point, a body that possessed no energy or principle of movement within itself, would remain forever, relatively motionless, suspended like Mahomet's coffin, being equally attracted by the two orbs and nothing impelling it in one direction rather than in the other.

Now the Projectile at this moment was nearing this point; if it reached it, what would be the consequence?

To this question three answers presented themselves, all possible under the circumstances, but very different in their results.

1. Suppose the Projectile to possess velocity enough to pass the neutral point. In such case, it would undoubtedly proceed onward to the Moon, being drawn thither by Lunar attraction.

2. Suppose it lacked the requisite velocity for reaching the neutral point. In such a case it would just as certainly fall back to the Earth, in obedience to the law of Terrestrial attraction.

3. Suppose it to be animated by just sufficient velocity to reach the neutral point, but not to pass it. In that case, the Projectile would

remain forever in the same spot, perfectly motionless as far as regards the Earth and the Moon, though of course following them both in their annual orbits round the Sun.

Such was now the state of things, which Barbican tried to explain to his friends, who, it need hardly be said, listened to his remarks with the most intense interest. How were they to know, they asked him, the precise instant at which the Projectile would reach the neutral point? That would be an easy matter, he assured them. It would be at the very moment when both themselves and all the other objects contained in the Projectile would be completely free from every operation of the law of gravity; in other words, when everything would cease to have weight.

This gradual diminution of the action of gravity, the travellers had been for some time noticing, but they had not yet witnessed its total cessation. But that very morning, about an hour before noon, as the Captain was making some little experiment in Chemistry, he happened by accident to overturn a glass full of water. What was his surprise at seeing that neither the glass nor the water fell to the floor! Both remained suspended in the air almost completely motionless.

"The prettiest experiment I ever saw!" cried Ardan; "let us have more of it!"

And seizing the bottles, the arms, and the other objects in the Projectile, he arranged them around each other in the air with some regard to symmetry and proportion. The different articles, keeping



strictly each in its own place, formed a very attractive group wonderful to behold. Diana, placed in the apex of the pyramid, would remind you of those marvellous suspensions in the air performed by Houdin, Herman, and a few other first class wizards. Only being kept in her place without being hampered by invisible strings, the animal rather seemed to enjoy the exhibition, though in all probability she was hardly conscious of any thing unusual in her appearance.

Our travellers had been fully prepared for such a phenomenon, yet it struck them with as much surprise as if they had never uttered a scientific reason to account for it. They saw that, no longer subject to the ordinary laws of nature, they were now entering the realms of the marvellous. They felt that their bodies were absolutely without weight. Their arms, fully extended, no longer sought their sides. Their heads oscillated unsteadily on their shoulders. Their feet no longer rested on the floor. In their efforts to hold themselves straight, they looked like drunken men trying to maintain the perpendicular. We have all read stories of some men deprived of the power of reflecting light and of others who could not cast a shadow. But here reality, no fantastic story, showed you men who, through the counteraction of attractive forces, could tell no difference between light substances and heavy substances, and who absolutely had no weight whatever themselves!

"Let us take graceful attitudes!" cried Ardan, "and imagine we are playing tableaux! Let us, for instance, form a grand historical group of the three great goddesses of the nineteenth century. Barbican will represent Minerva or Science; the Captain, Bellona or War; while I,

as Madre Natura, the newly born goddess of Progress, floating gracefully over you both, extend my hands so, fondly patronizing the one, but grandly ordering off the other, to the regions of eternal night! More on your toe, Captain! Your right foot a little higher! Look at Barbican's admirable pose! Now then, prepare to receive orders for a new tableau! Form group à la Jardin Mabille! Presto! Change!"

In an instant, our travellers, changing attitudes, formed the new group with tolerable success. Even Barbican, who had been to Paris in his youth, yielding for a moment to the humor of the thing, acted the naïf Anglais to the life. The Captain was frisky enough to remind you of a middle-aged Frenchman from the provinces, on a hasty visit to the capital for a few days' fun. Ardan was in raptures.

"Oh! if Raphael could only see us!" he exclaimed in a kind of ecstasy.

"He would paint such a picture as would throw all his other masterpieces in the shade!"

"Knock spots out of the best of them by fifty per cent!" cried the Captain, gesticulating well enough à l'étudiant, but rather mixing his metaphors.

"He should be pretty quick in getting through the job," observed Barbican, the first as usual to recover tranquillity. "As soon as the Projectile will have passed the neutral point--in half an hour at longest--lunar attraction will draw us to the Moon."

"We shall have to crawl on the ceiling then like flies," said Ardan.

"Not at all," said the Captain; "the Projectile, having its centre of gravity very low, will turn upside down by degrees."

"Upside down!" cried Ardan. "That will be a nice mess! everything higgledy-piggledy!"

"No danger, friend Michael," said M'Nicholl; "there shall be no disorder whatever; nothing will quit its place; the movement of the Projectile will be effected by such slow degrees as to be imperceptible."

"Yes," added Barbican, "as soon as we shall have passed the neutral point, the base of the Projectile, its heaviest part, will swing around gradually until it faces the Moon. Before this phenomenon, however, can take place, we must of course cross the line."

"Cross the line!" cried the Frenchman; "then let us imitate the sailors when they do the same thing in the Atlantic Ocean! Splice the main brace!"

A slight effort carried him sailing over to the side of the Projectile. Opening a cupboard and taking out a bottle and a few glasses, he placed them on a tray. Then setting the tray itself in the air as on a table in front of his companions, he filled the glasses, passed them around, and, in a lively speech interrupted with many a joyous hurrah, congratulated his companions on their glorious achievement in being the first that

ever crossed the lunar line.

This counteracting influence of the attractions lasted nearly an hour. By that time the travellers could keep themselves on the floor without much effort. Barbican also made his companions remark that the conical point of the Projectile diverged a little from the direct line to the Moon, while by an inverse movement, as they could notice through the window of the floor, the base was gradually turning away from the Earth. The Lunar attraction was evidently getting the better of the Terrestrial. The fall towards the Moon, though still almost insensible, was certainly beginning.

It could not be more than the eightieth part of an inch in the first second. But by degrees, as the attractive force would increase, the fall would be more decided, and the Projectile, overbalanced by its base, and presenting its cone to the Earth, would descend with accelerated velocity to the Lunar surface. The object of their daring attempt would then be successfully attained. No further obstacle, therefore, being likely to stand in the way of the complete success of the enterprise, the Captain and the Frenchman cordially shook hands with Barbican, all kept congratulating each other on their good fortune as long as the bottle lasted.

They could not talk enough about the wonderful phenomenon lately witnessed; the chief point, the neutralization of the law of gravity, particularly, supplied them with an inexhaustible subject. The Frenchman, as usual, as enthusiastic in his fancy, as he was fanciful in

his enthusiasm, got off some characteristic remarks.

"What a fine thing it would be, my boys," he exclaimed, "if on Earth we could be so fortunate as we have been here, and get rid of that weight that keeps us down like lead, that rivets us to it like an adamantine chain! Then should we prisoners become free! Adieu forever to all weariness of arms or feet! At present, in order to fly over the surface of the Earth by the simple exertion of our muscles or even to sustain ourselves in the air, we require a muscular force fifty times greater than we possess; but if attraction did not exist, the simplest act of the will, our slightest whim even, would be sufficient to transport us to whatever part of space we wished to visit."

"Ardan, you had better invent something to kill attraction," observed M'Nicholl drily; "you can do it if you try. Jackson and Morton have killed pain by sulphuric ether. Suppose you try your hand on attraction!"

"It would be worth a trial!" cried Ardan, so full of his subject as not to notice the Captain's jeering tone; "attraction once destroyed, there is an end forever to all loads, packs and burdens! How the poor omnibus horses would rejoice! Adieu forever to all cranes, derricks, capstans, jack-screws, and even hotel-elevators! We could dispense with all ladders, door steps, and even stair-cases!"

"And with all houses too," interrupted Barbican; "or, at least, we should dispense with them because we could not have them. If there was

no weight, you could neither make a wall of bricks nor cover your house with a roof. Even your hat would not stay on your head. The cars would not stay on the railway nor the boats on the water. What do I say? We could not have any water. Even the Ocean would leave its bed and float away into space. Nay, the atmosphere itself would leave us, being detained in its place by terrestrial attraction and by nothing else."

"Too true, Mr. President," replied Ardan after a pause. "It's a fact. I acknowledge the corn, as Marston says. But how you positive fellows do knock holes into our pretty little creations of fancy!"

"Don't feel so bad about it, Ardan;" observed M'Nicholl; "though there may be no orb from which gravity is excluded altogether, we shall soon land in one, where it is much less powerful than on the Earth."

"You mean the Moon!"

"Yes, the Moon. Her mass being  $1/89$  of the Earth's, her attractive power should be in the same proportion; that is, a boy 10 years old, whose weight on Earth is about 90 lbs., would weigh on the Moon only about 1 pound, if nothing else were to be taken into consideration. But when standing on the surface of the Moon, he is relatively 4 times nearer to the centre than when he is standing on the surface of the Earth. His weight, therefore, having to be increased by the square of the distance, must be sixteen times greater. Now 16 times  $1/89$  being less than  $1/5$ , it is clear that my weight of 150 pounds will be cut down to nearly 30 as soon as we reach the Moon's surface."

"And mine?" asked Ardan.

"Yours will hardly reach 25 pounds, I should think," was the reply.

"Shall my muscular strength diminish in the same proportion?" was the next question.

"On the contrary, it will be relatively so much the more increased that you can take a stride 15 feet in width as easily as you can now take one of ordinary length."

"We shall be all Samsons, then, in the Moon!" cried Ardan.

"Especially," replied M'Nicholl, "if the stature of the Selenites is in proportion to the mass of their globe."

"If so, what should be their height?"

"A tall man would hardly be twelve inches in his boots!"

"They must be veritable Lilliputians then!" cried Ardan; "and we are all to be Gullivers! The old myth of the Giants realized! Perhaps the Titans that played such famous parts in the prehistoric period of our Earth, were adventurers like ourselves, casually arrived from some great planet!"

"Not from such planets as Mercury, Venus or Mars anyhow, friend Michael," observed Barbican. "But the inhabitants of Jupiter, Saturn, Uranus, or Neptune, if they bear the same proportion to their planet that we do ours, must certainly be regular Brobdignagians."

"Let us keep severely away from all planets of the latter class then," said Ardan. "I never liked to play the part of Lilliputian myself. But how about the Sun, Barbican? I always had a hankering after the Sun!"

"The Sun's volume is about 1-1/3 million times greater than that of the Earth, but his density being only about 1/4, the attraction on his surface is hardly 30 times greater than that of our globe. Still, every proportion observed, the inhabitants of the Sun can't be much less than 150 or 160 feet in height."

"Mille tonnerres!" cried Ardan, "I should be there like Ulysses among the Cyclops! I'll tell you what it is, Barbican; if we ever decide on going to the Sun, we must provide ourselves before hand with a few of your Rodman's Columbiads to frighten off the Solarians!"

"Your Columbiads would not do great execution there," observed M'Nicholl; "your bullet would be hardly out of the barrel when it would drop to the surface like a heavy stone pushed off the wall of a house."

"Oh! I like that!" laughed the incredulous Ardan.

"A little calculation, however, shows the Captain's remark to be



perfectly just," said Barbican. "Rodman's ordinary 15 inch Columbiad requires a charge of 100 pounds of mammoth powder to throw a ball of 500 pounds weight. What could such a charge do with a ball weighing 30 times as much or 15,000 pounds? Reflect on the enormous weight everything must have on the surface of the Sun! Your hat, for instance, would weigh 20 or 30 pounds. Your cigar nearly a pound. In short, your own weight on the Sun's surface would be so great, more than two tons, that if you ever fell you should never be able to pick yourself up again!"

"Yes," added the Captain, "and whenever you wanted to eat or drink you should rig up a set of powerful machinery to hoist the eatables and drinkables into your mouth."

"Enough of the Sun to-day, boys!" cried Ardan, shrugging his shoulders; "I don't contemplate going there at present. Let us be satisfied with the Moon! There, at least, we shall be of some account!"