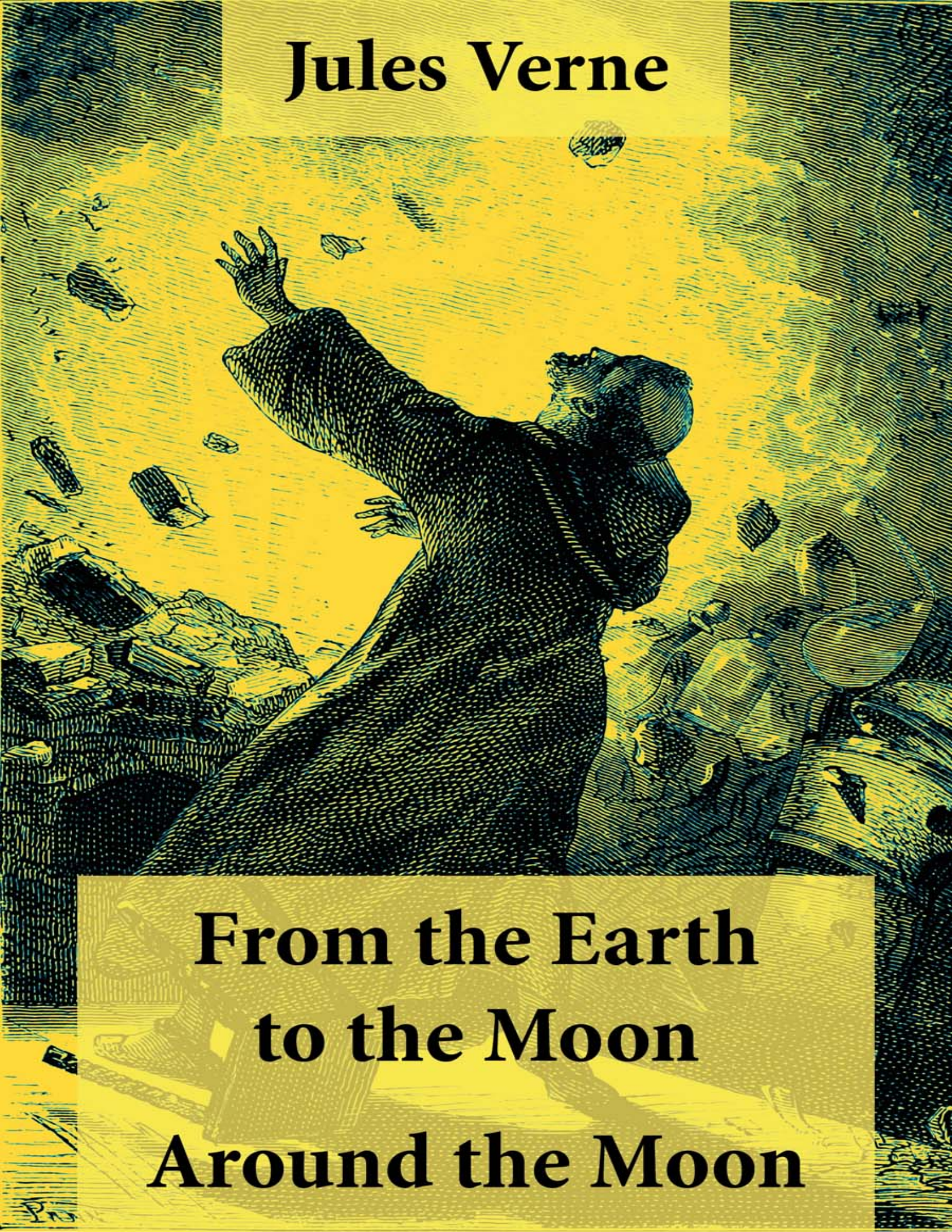
Jules Verne



From the Earth to the Moon

Around the Moon

Jules Verne

From the Earth to the Moon + Around the Moon

2 Unabridged Science Fiction Classics

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CHAPTER I.

THE GUN CLUB.

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During the Federal war in the United States a new and very influential club was established in the city of Baltimore, Maryland. It is well known with what energy the military instinct was developed amongst that nation of shipowners, shopkeepers, and mechanics. Mere tradesmen jumped their counters to become extempore captains, colonels, and generals without having passed the Military School at West Point; they soon rivalled their colleagues of the old continent, and, like them, gained victories by dint of lavishing bullets, millions, and men.

But where Americans singularly surpassed Europeans was in the science of ballistics, or of throwing massive weapons by the use of an engine; not that their arms attained a higher degree of perfection, but they were of unusual dimensions, and consequently of hitherto unknown ranges. The English, French, and Prussians have nothing to learn about flank, running, enfilading, or point-blank firing; but their cannon, howitzers, and mortars are mere pocket-pistols compared with the formidable engines of American artillery.

This fact ought to astonish no one. The Yankees, the first mechanicians in the world, are born engineers, just as Italians are musicians and Germans metaphysicians. Thence nothing more natural than to see them bring their audacious ingenuity to bear on the science of ballistics. Hence those gigantic cannon, much less useful than sewing-machines, but quite as astonishing, and much more admired. The marvels of this style by Parrott, Dahlgren, and Rodman are

well known. There was nothing left the Armstrongs, Pallisers, and Treuille de Beaulieux but to bow before their transatlantic rivals.

Therefore during the terrible struggle between Northerners and Southerners, artillerymen were in great request; the Union newspapers published their inventions with enthusiasm, and there was no little tradesman nor _naïf_ “booby” who did not bother his head day and night with calculations about impossible trajectory engines.

Now when an American has an idea he seeks another American to share it. If they are three, they elect a president and two secretaries. Given four, they elect a clerk, and a company is established. Five convoke a general meeting, and the club is formed. It thus happened at Baltimore. The first man who invented a new cannon took into partnership the first man who cast it and the first man that bored it. Such was the nucleus of the Gun Club. One month after its formation it numbered eighteen hundred and thirty-three effective members, and thirty thousand five hundred and seventy-five corresponding members.

One condition was imposed as a _sine quâ non_ upon every one who wished to become a member—that of having invented, or at least perfected, a cannon; or, in default of a cannon, a firearm of some sort. But, to tell the truth, mere inventors of fifteen-barrelled rifles, revolvers, or sword-pistols did not enjoy much consideration. Artillerymen were always preferred to them in every circumstance.

“The estimation in which they are held,” said one day a learned orator of the Gun Club, “is in proportion to the size of their cannon, and in direct ratio to the square of distance attained by their projectiles!”

A little more and it would have been Newton’s law of gravitation applied to moral order.

Once the Gun Club founded, it can be easily imagined its effect upon the inventive genius of the Americans. War-engines took colossal proportions, and projectiles launched

beyond permitted distances cut inoffensive pedestrians to pieces. All these inventions left the timid instruments of European artillery far behind them. This may be estimated by the following figures:—

Formerly, “in the good old times,” a thirty-six pounder, at a distance of three hundred feet, would cut up thirty-six horses, attacked in flank, and sixty-eight men. The art was then in its infancy. Projectiles have since made their way. The Rodman gun that sent a projectile weighing half a ton a distance of seven miles could easily have cut up a hundred and fifty horses and three hundred men. There was some talk at the Gun Club of making a solemn experiment with it. But if the horses consented to play their part, the men unfortunately were wanting.

However that may be, the effect of these cannon was very deadly, and at each discharge the combatants fell like ears before a scythe. After such projectiles what signified the famous ball which, at Coutras, in 1587, disabled twenty-five men; and the one which, at Zorndorff, in 1758, killed forty fantassins; and in 1742, Kesseldorf’s Austrian cannon, of which every shot levelled seventy enemies with the ground? What was the astonishing firing at Jena or Austerlitz, which decided the fate of the battle? During the Federal war much more wonderful things had been seen. At the battle of Gettysburg, a conical projectile thrown by a rifle-barrel cut up a hundred and seventy-three Confederates, and at the passage of the Potomac a Rodman ball sent two hundred and fifteen Southerners into an evidently better world. A formidable mortar must also be mentioned, invented by J.T. Maston, a distinguished member and perpetual secretary of the Gun Club, the result of which was far more deadly, seeing that, at its trial shot, it killed three hundred and thirty-seven persons—by bursting, it is true.

What can be added to these figures, so eloquent in themselves? Nothing. So the following calculation obtained

by the statistician Pitcairn will be admitted without contestation: by dividing the number of victims fallen under the projectiles by that of the members of the Gun Club, he found that each one of them had killed, on his own account, an average of two thousand three hundred and seventy-five men and a fraction.

By considering such a result it will be seen that the single preoccupation of this learned society was the destruction of humanity philanthropically, and the perfecting of firearms considered as instruments of civilisation. It was a company of Exterminating Angels, at bottom the best fellows in the world.

It must be added that these Yankees, brave as they have ever proved themselves, did not confine themselves to formulae, but sacrificed themselves to their theories. Amongst them might be counted officers of every rank, those who had just made their _début_ in the profession of arms, and those who had grown old on their gun-carriage. Many whose names figured in the book of honour of the Gun Club remained on the field of battle, and of those who came back the greater part bore marks of their indisputable valour. Crutches, wooden legs, articulated arms, hands with hooks, gutta-percha jaws, silver craniums, platinum noses, nothing was wanting to the collection; and the above-mentioned Pitcairn likewise calculated that in the Gun Club there was not quite one arm amongst every four persons, and only two legs amongst six.

But these valiant artillerymen paid little heed to such small matters, and felt justly proud when the report of a battle stated the number of victims at tenfold the quantity of projectiles expended.

One day, however, a sad and lamentable day, peace was signed by the survivors of the war, the noise of firing gradually ceased, the mortars were silent, the howitzers were muzzled for long enough, and the cannon, with muzzles depressed, were stored in the arsenals, the shots

were piled up in the parks, the bloody reminiscences were effaced, cotton shrubs grew magnificently on the well-manured fields, mourning garments began to be wornout, as well as sorrow, and the Gun Club had nothing whatever to do.

Certain old hands, inveterate workers, still went on with their calculations in ballistics; they still imagined gigantic bombs and unparalleled howitzers. But what was the use of vain theories that could not be put in practice? So the saloons were deserted, the servants slept in the antechambers, the newspapers grew mouldy on the tables, from dark corners issued sad snores, and the members of the Gun Club, formerly so noisy, now reduced to silence by the disastrous peace, slept the sleep of Platonic artillery!

“This is distressing,” said brave Tom Hunter, whilst his wooden legs were carbonising at the fireplace of the smoking-room. “Nothing to do! Nothing to look forward to! What a tiresome existence! Where is the time when cannon awoke you every morning with its joyful reports?”

“That time is over,” answered dandy Bilsby, trying to stretch the arms he had lost. “There was some fun then! You invented an howitzer, and it was hardly cast before you ran to try it on the enemy; then you went back to the camp with an encouragement from Sherman, or a shake of the hands from MacClellan! But now the generals have gone back to their counters, and instead of cannonballs they expedite inoffensive cotton bales! Ah, by Saint Barb! the future of artillery is lost to America!”

“Yes, Bilsby,” cried Colonel Blomsberry, “it is too bad! One fine morning you leave your tranquil occupations, you are drilled in the use of arms, you leave Baltimore for the battlefield, you conduct yourself like a hero, and in two years, three years at the latest, you are obliged to leave the fruit of so many fatigues, to go to sleep in deplorable idleness, and keep your hands in your pockets.”

The valiant colonel would have found it very difficult to give such a proof of his want of occupation, though it was not the pockets that were wanting.

“And no war in prospect, then,” said the famous J.T. Maston, scratching his gutta-percha cranium with his steel hook; “there is not a cloud on the horizon now that there is so much to do in the science of artillery! I myself finished this very morning a diagram with plan, basin, and elevation of a mortar destined to change the laws of warfare!”

“Indeed!” replied Tom Hunter, thinking involuntarily of the Honourable J.T. Maston’s last essay.

“Indeed!” answered Maston. “But what is the use of the good results of such studies and so many difficulties conquered? It is mere waste of time. The people of the New World seem determined to live in peace, and our bellicose *Tribune* has gone as far as to predict approaching catastrophes due to the scandalous increase of population!”

“Yet, Maston,” said Colonel Blomsberry, “they are always fighting in Europe to maintain the principle of nationalities!”

“What of that?”

“Why, there might be something to do over there, and if they accepted our services—”

“What are you thinking of?” cried Bilsby. “Work at ballistics for the benefit of foreigners!”

“Perhaps that would be better than not doing it at all,” answered the colonel.

“Doubtless,” said J.T. Maston, “it would be better, but such an expedient cannot be thought of.”

“Why so?” asked the colonel.

“Because their ideas of advancement would be contrary to all our American customs. Those folks seem to think that you cannot be a general-in-chief without having served as second lieutenant, which comes to the same as saying that no one can point a gun that has not cast one. Now that is simply—”

“Absurd!” replied Tom Hunter, whittling the arms of his chair with his bowie-knife; “and as things are so, there is nothing left for us but to plant tobacco or distil whale-oil!”

“What!” shouted J.T. Maston, “shall we not employ these last years of our existence in perfecting firearms? Will not a fresh opportunity present itself to try the ranges of our projectiles? Will the atmosphere be no longer illuminated by the lightning of our cannons? Won’t some international difficulty crop up that will allow us to declare war against some transatlantic power? Won’t France run down one of our steamers, or won’t England, in defiance of the rights of nations, hang up three or four of our countrymen?”

“No, Maston,” answered Colonel Blomsberry; “no such luck! No, not one of those incidents will happen; and if one did, it would be of no use to us. American sensitiveness is declining daily, and we are going to the dogs!”

“Yes, we are growing quite humble,” replied Bilsby.

“And we are humiliated!” answered Tom Hunter.

“All that is only too true,” replied J.T. Maston, with fresh vehemence. “There are a thousand reasons for fighting floating about, and still we don’t fight! We economise legs and arms, and that to the profit of folks that don’t know what to do with them. Look here, without looking any farther for a motive for war, did not North America formerly belong to the English?”

“Doubtless,” answered Tom Hunter, angrily poking the fire with the end of his crutch.

“Well,” replied J.T. Maston, “why should not England in its turn belong to the Americans?”

“It would be but justice,” answered Colonel Blomsberry.

“Go and propose that to the President of the United States,” cried J.T. Maston, “and see what sort of a reception you would get.”

“It would not be a bad reception,” murmured Bilsby between the four teeth he had saved from battle.

“I’faith,” cried J.T. Maston, “they need not count upon my vote in the next elections.”

“Nor upon ours,” answered with common accord these bellicose invalids.

“In the meantime,” continued J.T. Maston, “and to conclude, if they do not furnish me with the opportunity of trying my new mortar on a real battlefield, I shall send in my resignation as member of the Gun Club, and I shall go and bury myself in the backwoods of Arkansas.”

“We will follow you there,” answered the interlocutors of the enterprising J.T. Maston.

Things had come to that pass, and the club, getting more excited, was menaced with approaching dissolution, when an unexpected event came to prevent so regrettable a catastrophe.

The very day after the foregoing conversation each member of the club received a circular couched in these terms:—

“Baltimore, October 3rd.

“The president of the Gun Club has the honour to inform his colleagues that at the meeting on the 5th ultimo he will make them a communication of an extremely interesting nature. He therefore begs that they, to the suspension of all other business, will attend, in accordance with the present invitation,

“Their devoted colleague,

“IMPEY BARBICANE, P.G.C.”

CHAPTER II.

PRESIDENT BARBICANE'S COMMUNICATION.

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On the 5th of October, at 8 p.m., a dense crowd pressed into the saloons of the Gun Club, 21, Union-square. All the members of the club residing at Baltimore had gone on the invitation of their president. The express brought corresponding members by hundreds, and if the meeting-hall had not been so large, the crowd of *savants* could not have found room in it; they overflowed into the neighbouring rooms, down the passages, and even into the courtyards; there they ran against the populace who were pressing against the doors, each trying to get into the front rank, all eager to learn the important communication of President Barbicane, all pressing, squeezing, crushing with that liberty of action peculiar to the masses brought up in the idea of self-government.

That evening any stranger who might have chanced to be in Baltimore could not have obtained a place at any price in the large hall; it was exclusively reserved to residing or corresponding members; no one else was admitted; and the city magnates, common councillors, and select men were compelled to mingle with their inferiors in order to catch stray news from the interior.

The immense hall presented a curious spectacle; it was marvellously adapted to the purpose for which it was built. Lofty pillars formed of cannon, superposed upon huge mortars as a base, supported the fine ironwork of the arches —real cast-iron lacework.

Trophies of blunderbusses, matchlocks, arquebuses, carbines, all sorts of ancient or modern firearms, were

picturesquely enlaced against the walls. The gas, in full flame, came out of a thousand revolvers grouped in the form of lustres, whilst candlesticks of pistols, and candelabra made of guns done up in sheaves, completed this display of light. Models of cannons, specimens of bronze, targets spotted with shot-marks, plaques broken by the shock of the Gun Club, balls, assortments of rammers and sponges, chaplets of shells, necklaces of projectiles, garlands of howitzers—in a word, all the tools of the artilleryman surprised the eyes by their wonderful arrangement, and induced a belief that their real purpose was more ornamental than deadly.

In the place of honour was seen, covered by a splendid glass case, a piece of breech, broken and twisted under the effort of the powder—a precious fragment of J.T. Maston's cannon.

At the extremity of the hall the president, assisted by four secretaries, occupied a wide platform. His chair, placed on a carved gun-carriage, was modelled upon the powerful proportions of a 32-inch mortar; it was pointed at an angle of 90 degs., and hung upon trunnions so that the president could use it as a rocking-chair, very agreeable in great heat. Upon the desk, a huge iron plate, supported upon six carronades, stood a very tasteful inkstand, made of a beautifully-chased Spanish piece, and a report-bell, which, when required, went off like a revolver. During the vehement discussions this new sort of bell scarcely sufficed to cover the voices of this legion of excited artillerymen.

In front of the desk, benches, arranged in zigzags, like the circumvallations of intrenchment, formed a succession of bastions and curtains where the members of the Gun Club took their seats; and that evening, it may be said, there were plenty on the ramparts. The president was sufficiently known for all to be assured that he would not have called together his colleagues without a very great motive.

Impey Barbicane was a man of forty, calm, cold, austere, of a singularly serious and concentrated mind, as exact as a chronometer, of an imperturbable temperament and immovable character; not very chivalrous, yet adventurous, and always bringing practical ideas to bear on the wildest enterprises; an essential New-Englander, a Northern colonist, the descendant of those Roundheads so fatal to the Stuarts, and the implacable enemy of the Southern gentlemen, the ancient cavaliers of the mother country—in a word, a Yankee cast in a single mould.

Barbicane had made a great fortune as a timber-merchant; named director of artillery during the war, he showed himself fertile in inventions; enterprising in his ideas, he contributed powerfully to the progress of ballistics, gave an immense impetus to experimental researches.

He was a person of average height, having, by a rare exception in the Gun Club, all his limbs intact. His strongly-marked features seemed to be drawn by square and rule, and if it be true that in order to guess the instincts of a man one must look at his profile, Barbicane seen thus offered the most certain indications of energy, audacity, and *sang-froid*.

At that moment he remained motionless in his chair, mute, absorbed, with an inward look sheltered under his tall hat, a cylinder of black silk, which seems screwed down upon the skull of American men.

His colleagues talked noisily around him without disturbing him; they questioned one another, launched into the field of suppositions, examined their president, and tried, but in vain, to make out the *x* of his imperturbable physiognomy.

Just as eight o’clock struck from the fulminating clock of the large hall, Barbicane, as if moved by a spring, jumped up; a general silence ensued, and the orator, in a slightly emphatic tone, spoke as follows:—

“Brave colleagues,—It is some time since an unfruitful peace plunged the members of the Gun Club into deplorable

inactivity. After a period of some years, so full of incidents, we have been obliged to abandon our works and stop short on the road of progress. I do not fear to proclaim aloud that any war which would put arms in our hands again would be welcome—”

“Yes, war!” cried impetuous J.T. Maston.

“Hear, hear!” was heard on every side.

“But war,” said Barbicane, “war is impossible under actual circumstances, and, whatever my honourable interrupter may hope, long years will elapse before our cannons thunder on a field of battle. We must, therefore, make up our minds to it, and seek in another order of ideas food for the activity by which we are devoured.”

The assembly felt that its president was coming to the delicate point; it redoubled its attention.

“A few months ago, my brave colleagues,” continued Barbicane, “I asked myself if, whilst still remaining in our speciality, we could not undertake some grand experiment worthy of the nineteenth century, and if the progress of ballistics would not allow us to execute it with success. I have therefore sought, worked, calculated, and the conviction has resulted from my studies that we must succeed in an enterprise that would seem impracticable in any other country. This project, elaborated at length, will form the subject of my communication; it is worthy of you, worthy of the Gun Club’s past history, and cannot fail to make a noise in the world!”

“Much noise?” cried a passionate artilleryman.

“Much noise in the true sense of the word,” answered Barbicane.

“Don’t interrupt!” repeated several voices.

“I therefore beg of you, my brave colleagues,” resumed the president, “to grant me all your attention.”

A shudder ran through the assembly. Barbicane, having with a rapid gesture firmly fixed his hat on his head, continued his speech in a calm tone:—

“There is not one of you, brave colleagues, who has not seen the moon, or, at least, heard of It. Do not be astonished if I wish to speak to you about the Queen of Night. It is, perhaps, our lot to be the Columbuses of this unknown world. Understand me, and second me as much as you can, I will lead you to its conquest, and its name shall be joined to those of the thirty-six States that form the grand country of the Union!”

“Hurrah for the moon!” cried the Gun Club with one voice.

“The moon has been much studied,” resumed Barbicane; “its mass, density, weight, volume, constitution, movements, distance, the part it plays in the solar world, are all perfectly determined; selenographic maps have been drawn with a perfection that equals, if it does not surpass, those of terrestrial maps; photography has given to our satellite proofs of incomparable beauty—in a word, all that the sciences of mathematics, astronomy, geology, and optics can teach is known about the moon; but until now no direct communication with it has ever been established.”

A violent movement of interest and surprise welcomed this sentence of the orator.

“Allow me,” he resumed, “to recall to you in few words how certain ardent minds, embarked upon imaginary journeys, pretended to have penetrated the secrets of our satellite. In the seventeenth century a certain David Fabricius boasted of having seen the inhabitants of the moon with his own eyes. In 1649 a Frenchman, Jean Baudoin, published his *Journey to the Moon by Dominique Gonzales, Spanish Adventurer*. At the same epoch Cyrano de Bergerac published the celebrated expedition that had so much success in France. Later on, another Frenchman (that nation took a great deal of notice of the moon), named Fontenelle, wrote his *Plurality of Worlds*, a masterpiece of his time; but science in its progress crushes even masterpieces! About 1835, a pamphlet, translated from the

New York American, related that Sir John Herschel, sent to the Cape of Good Hope, there to make astronomical observations, had, by means of a telescope, perfected by interior lighting, brought the moon to within a distance of eighty yards. Then he distinctly perceived caverns in which lived hippopotami, green mountains with golden borders, sheep with ivory horns, white deer, and inhabitants with membraneous wings like those of bats. This treatise, the work of an American named Locke, had a very great success. But it was soon found out that it was a scientific mystification, and Frenchmen were the first to laugh at it."

"Laugh at an American!" cried J.T. Maston; "but that's a *casus belli*!"

"Be comforted, my worthy friend; before Frenchmen laughed they were completely taken in by our countryman. To terminate this rapid history, I may add that a certain Hans Pfaal, of Rotterdam, went up in a balloon filled with a gas made from azote, thirty-seven times lighter than hydrogen, and reached the moon after a journey of nineteen days. This journey, like the preceding attempts, was purely imaginary, but it was the work of a popular American writer of a strange and contemplative genius. I have named Edgar Poe!"

"Hurrah for Edgar Poe!" cried the assembly, electrified by the words of the president.

"I have now come to an end of these attempts which I may call purely literary, and quite insufficient to establish any serious communications with the Queen of Night. However, I ought to add that some practical minds tried to put themselves into serious communication with her. Some years ago a German mathematician proposed to send a commission of *savants* to the steppes of Siberia. There, on the vast plains, immense geometrical figures were to be traced by means of luminous reflectors; amongst others, the square of the hypothenuse, vulgarly called the 'Ass's Bridge.' 'Any intelligent being,' said the mathematician,

‘ought to understand the scientific destination of that figure. The Selenites (inhabitants of the moon), if they exist, will answer by a similar figure, and, communication once established, it will be easy to create an alphabet that will allow us to hold converse with the inhabitants of the moon.’ Thus spoke the German mathematician, but his project was not put into execution, and until now no direct communication has existed between the earth and her satellite. But it was reserved to the practical genius of Americans to put itself into communication with the sidereal world. The means of doing so are simple, easy, certain, unfailing, and will make the subject of my proposition.”

A hubbub and tempest of exclamations welcomed these words. There was not one of the audience who was not dominated and carried away by the words of the orator.

“Hear, hear! Silence!” was heard on all sides.

When the agitation was calmed down Barbicane resumed, in a graver tone, his interrupted speech.

“You know,” said he, “what progress the science of ballistics has made during the last few years, and to what degree of perfection firearms would have been brought if the war had gone on. You are not ignorant in general that the power of resistance of cannons and the expansive force of powder are unlimited. Well, starting from that principle, I asked myself if, by means of sufficient apparatus, established under determined conditions of resistance, it would not be possible to send a cannonball to the moon!”

At these words an “Oh!” of stupefaction escaped from a thousand panting breasts; then occurred a moment of silence, like the profound calm that precedes thunder. In fact, the thunder came, but a thunder of applause, cries, and clamour which made the meeting-hall shake again. The president tried to speak; he could not. It was only at the end of ten minutes that he succeeded in making himself heard.

“Let me finish,” he resumed coldly. “I have looked at the question in all its aspects, and from my indisputable

calculations it results that any projectile, hurled at an initial speed of twelve thousand yards a second, and directed at the moon, must necessarily reach her. I have, therefore, the honour of proposing to you, my worthy colleagues, the attempting of this little experiment.”

CHAPTER III.

EFFECT OF PRESIDENT BARBICANE'S COMMUNICATION.

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It is impossible to depict the effect produced by the last words of the honourable president. What cries! what vociferations! What a succession of groans, hurrahs, cheers, and all the onomatopoeia of which the American language is so full. It was an indescribable hubbub and disorder. Mouths, hands, and feet made as much noise as they could. All the weapons in this artillery museum going off at once would not have more violently agitated the waves of sound. That is not surprising; there are cannoneers nearly as noisy as their cannons.

Barbicane remained calm amidst these enthusiastic clamours; perhaps he again wished to address some words to his colleagues, for his gestures asked for silence, and his fulminating bell exhausted itself in violent detonations; it was not even heard. He was soon dragged from his chair, carried in triumph, and from the hands of his faithful comrades he passed into those of the no less excited crowd.

Nothing can astonish an American. It has often been repeated that the word "impossible" is not French; the wrong dictionary must have been taken by mistake. In America everything is easy, everything is simple, and as to mechanical difficulties, they are dead before they are born. Between the Barbicane project and its realisation not one true Yankee would have allowed himself to see even the appearance of a difficulty. As soon said as done.

The triumphant march of the president was prolonged during the evening. A veritable torchlight procession—Irish,

Germans, Frenchmen, Scotchmen—all the heterogeneous individuals that compose the population of Maryland—shouted in their maternal tongue, and the cheering was unanimous.

Precisely as if she knew it was all about her, the moon shone out then with serene magnificence, eclipsing other lights with her intense irradiation. All the Yankees directed their eyes towards the shining disc; some saluted her with their hands, others called her by the sweetest names; between eight o'clock and midnight an optician in Jones-Fall-street made a fortune by selling field-glasses. The Queen of Night was looked at through them like a lady of high life. The Americans acted in regard to her with the freedom of proprietors. It seemed as if the blonde Phoebe belonged to these enterprising conquerors and already formed part of the Union territory. And yet the only question was that of sending a projectile—a rather brutal way of entering into communication even with a satellite, but much in vogue amongst civilised nations.

Midnight had just struck, and the enthusiasm did not diminish; it was kept up in equal doses in all classes of the population; magistrates, *savants*, merchants, tradesmen, street-porters, intelligent as well as "green" men were moved even in their most delicate fibres. It was a national enterprise; the high town, low town, the quays bathed by the waters of the Patapsco, the ships, imprisoned in their docks, overflowed with crowds intoxicated with joy, gin, and whisky; everybody talked, argued, perorated, disputed, approved, and applauded, from the gentleman comfortably stretched on the bar-room couch before his glass of "sherry-cobbler" to the waterman who got drunk upon "knock-me-down" in the dark taverns of Fell's Point.

However, about 2 a.m. the emotion became calmer. President Barbicane succeeded in getting home almost knocked to pieces. A Hercules could not have resisted such enthusiasm. The crowd gradually abandoned the squares

and streets. The four railroads of Ohio, Susquehanna, Philadelphia, and Washington, which converge at Baltimore, took the heterogeneous population to the four corners of the United States, and the town reposed in a relative tranquillity.

It would be an error to believe that during this memorable evening Baltimore alone was agitated. The large towns of the Union, New York, Boston, Albany, Washington, Richmond, New Orleans, Charlestown, La Mobile of Texas, Massachusetts, Michigan, and Florida, all shared in the delirium. The thirty thousand correspondents of the Gun Club were acquainted with their president's letter, and awaited with equal impatience the famous communication of the 5th of October. The same evening as the orator uttered his speech it ran along the telegraph wires, across the states of the Union, with a speed of 348,447 miles a second. It may, therefore, be said with absolute certainty that at the same moment the United States of America, ten times as large as France, cheered with a single voice, and twenty-five millions of hearts, swollen with pride, beat with the same pulsation.

The next day five hundred daily, weekly, monthly, or bimonthly newspapers took up the question; they examined it under its different aspects—physical, meteorological, economical, or moral, from a political or social point of view. They debated whether the moon was a finished world, or if she was not still undergoing transformation. Did she resemble the earth in the time when the atmosphere did not yet exist? What kind of spectacle would her hidden hemisphere present to our terrestrial spheroid? Granting that the question at present was simply about sending a projectile to the Queen of Night, every one saw in that the starting-point of a series of experiments; all hoped that one day America would penetrate the last secrets of the mysterious orb, and some even seemed to fear that her conquest would disturb the balance of power in Europe.

The project once under discussion, not one of the papers suggested a doubt of its realisation; all the papers, treatises, bulletins, and magazines published by scientific, literary, or religious societies enlarged upon its advantages, and the “Natural History Society” of Boston, the “Science and Art Society” of Albany, the “Geographical and Statistical Society” of New York, the “American Philosophical Society” of Philadelphia, and the “Smithsonian Institution” of Washington sent in a thousand letters their congratulations to the Gun Club, with immediate offers of service and money.

It may be said that no proposition ever had so many adherents; there was no question of hesitations, doubts, or anxieties. As to the jokes, caricatures, and comic songs that would have welcomed in Europe, and, above all, in France, the idea of sending a projectile to the moon, they would have been turned against their author; all the “life-preservers” in the world would have been powerless to guarantee him against the general indignation. There are things that are not to be laughed at in the New World.

Impey Barbicane became from that day one of the greatest citizens of the United States, something like a Washington of science, and one fact amongst several will serve to show the sudden homage which was paid by a nation to one man.

Some days after the famous meeting of the Gun Club the manager of an English company announced at the Baltimore Theatre a representation of *Much Ado About Nothing*, but the population of the town, seeing in the title a damaging allusion to the projects of President Barbicane, invaded the theatre, broke the seats, and forced the unfortunate manager to change the play. Like a sensible man, the manager, bowing to public opinion, replaced the offending comedy by *As You Like It*, and for several weeks he had fabulous houses.

CHAPTER IV.

ANSWER FROM THE CAMBRIDGE OBSERVATORY.

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In the meantime Barbicane did not lose an instant amidst the enthusiasm of which he was the object. His first care was to call together his colleagues in the board-room of the Gun Club. There, after a debate, they agreed to consult astronomers about the astronomical part of their enterprise. Their answer once known, they would then discuss the mechanical means, and nothing would be neglected to assure the success of their great experiment.

A note in precise terms, containing special questions, was drawn up and addressed to the observatory of Cambridge in Massachusetts. This town, where the first University of the United States was founded, is justly celebrated for its astronomical staff. There are assembled the greatest men of science; there is the powerful telescope which enabled Bond to resolve the nebula of Andromeda and Clarke to discover the satellite of Sirius. This celebrated institution was, therefore, worthy in every way of the confidence of the Gun Club.

After two days the answer, impatiently awaited, reached the hands of President Barbicane.

It ran as follows:—

"*The Director of the Cambridge Observatory to the President of the Gun Club at Baltimore*.

"On the receipt of your favour of the 6th inst., addressed to the Observatory of Cambridge in the name of the members of the Baltimore Gun Club, we immediately called a meeting of our staff, who have deemed it expedient to answer as follows:—

“The questions proposed to it were these:—

“‘1. Is it possible to send a projectile to the moon?

“‘2. What is the exact distance that separates the earth and her satellite?

“‘3. What would be the duration of the projectile’s transit to which a sufficient initial speed had been given, and consequently at what moment should it be hurled so as to reach the moon at a particular point?

“‘4. At what moment would the moon present the most favourable position for being reached by the projectile?

“‘5. What point in the heavens ought the cannon, destined to hurl the projectile, be aimed at?

“‘6. What place in the heavens will the moon occupy at the moment when the projectile will start?’

“Regarding question No. 1, ‘Is it possible to send a projectile to the moon?’

“Yes, it is possible to send a projectile to the moon if it is given an initial velocity of 1,200 yards a second. Calculations prove that this speed is sufficient. In proportion to the distance from the earth the force of gravitation diminishes in an inverse ratio to the square of the distance—that is to say, that for a distance three times greater that force is nine times less. In consequence, the weight of the projectile will decrease rapidly, and will end by being completely annulled at the moment when the attraction of the moon will be equal to that of the earth—that is to say, at the 47/52 of the distance. At that moment the projectile will have no weight at all, and if it clears that point it will fall on to the moon only by the effect of lunar gravitation. The theoretic possibility of the experiment is, therefore, quite demonstrated; as to its success, that depends solely in the power of the engine employed.

“Regarding question No. 2, ‘What is the exact distance that separates the earth from her satellite?’

“The moon does not describe a circle round the earth, but an ellipse, of which our earth occupies one of the foci;

the consequence is, therefore, that at certain times it approaches nearer to, and at others recedes farther from, the earth, or, in astronomical language, it has its apogee and its perigee. At its apogee the moon is at 247,552 miles from the earth, and at its perigee at 218,657 miles only, which makes a difference of 28,895, or more than a ninth of the distance. The perigee distance is, therefore, the one that should give us the basis of all calculations.

"Regarding question No. 3, 'What would be the duration of the projectile's transit to which a sufficient initial speed has been given, and consequently at what moment should it be hurled so as to reach the moon at a particular point?'

"If the projectile kept indefinitely the initial speed of 12,000 yards a second, it would only take about nine hours to reach its destination; but as that initial velocity will go on decreasing, it will happen, everything calculated upon, that the projectile will take 300,000 seconds, or 83 hours and 20 minutes, to reach the point where the terrestrial and lunar gravitations are equal, and from that point it will fall upon the moon in 50,000 seconds, or 13 hours, 53 minutes, and 20 seconds. It must, therefore, be hurled 97 hours, 13 minutes, and 20 seconds before the arrival of the moon at the point aimed at.

"Regarding question No. 4, 'At what moment would the moon present the most favourable position for being reached by the projectile?'

"According to what has been said above the epoch of the moon's perigee must first be chosen, and at the moment when she will be crossing her zenith, which will still further diminish the entire distance by a length equal to the terrestrial radius—i.e., 3,919 miles; consequently, the passage to be accomplished will be 214,976 miles. But the moon is not always at her zenith when she reaches her perigee, which is once a month. She is only under the two conditions simultaneously at long intervals of time. This coincidence of perigee and zenith must be waited for. It

happens fortunately that on December 4th of next year the moon will offer these two conditions; at midnight she will be at her perigee and her zenith—that is to say, at her shortest distance from the earth and at her zenith at the same time.

“Regarding question No. 5, ‘At what point in the heavens ought the cannon destined to hurl the projectile be aimed?’

“The preceding observations being admitted, the cannon ought to be aimed at the zenith of the place (the zenith is the spot situated vertically above the head of a spectator), so that its range will be perpendicular to the plane of the horizon, and the projectile will pass the soonest beyond the range of terrestrial gravitation. But for the moon to reach the zenith of a place that place must not exceed in latitude the declination of the luminary—in other words, it must be comprised between 0° and 28° of north or south latitude. In any other place the range must necessarily be oblique, which would seriously affect the success of the experiment.

“Regarding question No. 6, ‘What place will the moon occupy In the heavens at the moment of the projectile’s departure?’

“At the moment when the projectile is hurled into space, the moon, which travels forward 13° 10’ 35” each day, will be four times as distant from her zenith point—i.e., by 52° 42’ 20”, a space which corresponds to the distance she will travel during the transit of the projectile. But as the deviation which the rotatory movement of the earth will impart to the shock must also be taken into account, and as the projectile cannot reach the moon until after a deviation equal to sixteen radii of the earth, which, calculated upon the moon’s orbit, is equal to about 11°, it is necessary to add these 11° to those caused by the already-mentioned delay of the moon, or, in round numbers, 64°. Thus, at the moment of firing, the visual radius applied to the moon will describe with the vertical line of the place an angle of 64°.

“Such are the answers to the questions proposed to the Observatory of Cambridge by the members of the Gun Club.