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## **In Search of a Son.**

**BY**

**UNCLE LAWRENCE,**

**AUTHOR OF "YOUNG FOLKS' WHYS AND WHEREFORES," ETC.**



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## IN SEARCH OF A SON.

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### CHAPTER I. THE DESPATCH.

In the great silence of the fields a far-off clock struck seven. The sun, an August sun, had been up for some time, lighting up and warming the left wing of the old French château. The tall old chestnut-trees of the park threw the greater part of the right wing into the shade, and in this pleasant shade was placed a bench of green wood, chairs, and a stone table.



The door of the château opened, and a gentleman lightly descended the threshold. He was in his

slippers and dressing-robe, and under the dressing-robe you could see his night-gown. After having thrown a satisfied look upon the beauty of nature, he approached the green seat, and seated himself before the stone table. An old servant came up and said,—

"What will you take this morning, sir?"

And as the gentleman, who did not seem to be hungry, was thinking what he wanted, the servant added,—

"Coffee, soup, tea?"

"No," said the gentleman; "give me a little vermouth and seltzer water."

The servant retired, and soon returned with a tray containing the order. The gentleman poured out a little vermouth and seltzer water, then rolled a cigarette, lighted it, and, leaning back upon the rounded seat of the green bench, looked with pleasure at the lovely scene around him. On the left, in a small lake framed in the green lawn, was reflected one wing of the old château, as in a mirror. The bricks, whose colors were lighted up by the sun, seemed to be burning in the midst of the water. The large lawn began at the end of a gravelled walk, and seemed to be without limit, for the park merged into cultivated ground, and verdant hills rose over hills. There was not a cloud in the sky.

The gentleman, after gazing for some minutes around him, got up and opened the door of the château. He called out, "Peter!" in a subdued voice, fearing, no doubt, to waken some sleeper.

The servant ran out at once.

"Well, Peter," said the gentleman, "have the papers come?"

"No, sir; they have not yet come. That surprises me. If you wish, sir, I will go and meet the postman."

And Peter was soon lost to sight in a little shady alley which descended into the high-road. In a few moments he reappeared, followed by a man.

"Sir," said he, "I did not meet the letter-carrier; but here is a man with a telegraphic despatch."

The man advanced, and, feeling in a bag suspended at his side, he said,—

"Monsieur Dalize, I believe?"

"Yes, my friend."

"Well, here is a telegram for you which arrived at Sens last night."

"A telegram?" said Monsieur Dalize, knitting his brows, his eyes showing that he was slightly surprised, and almost displeased, as if he had learned that unexpected news was more often bad news than good. Nevertheless, he took the paper, unfolded it, and looked at once at the signature.

"Ah, from Roger," he said to himself.

And then he began to read the few lines of the telegram. As he read, his face brightened, surprise followed uneasiness, and then a great joy took the place of discontent. He said to the man,—

"You can carry back an answer, can you not?"

"Yes, sir."

"Well, Peter, bring me pen and ink at once."

Peter brought pen, ink, and paper, and Monsieur Dalize wrote his telegram. He gave it to the man, and, feeling through his pockets, pulled out a louis.

"Here, my good fellow," said he: "that will pay for the telegram and will pay you for your trouble."

The man looked at the coin in the hollow of his hand in an embarrassed way, fearing that he had not exactly understood.

"Come, now,—run," said Monsieur Dalize; "good news such as you have brought me cannot be paid for too dearly; only hurry."

"Ah, yes, sir, I will hurry," said the man; "and thank you very much, thank you very much."

And, in leaving, he said to himself, as he squeezed the money in his hand,—

"I should be very glad to carry to him every day good news at such a price as that."

When he was alone, Monsieur Dalize reread the welcome despatch. Then he turned around, and looked towards a window on the second floor of the château, whose blinds were not yet opened. From this window his looks travelled back to the telegram, which seemed to rejoice his heart and to give him cause for thought. He was disturbed in his reverie by the noise of two blinds opening against the wall. He rose hastily, and could not withhold the exclamation,—

"At last!"

"Oh, my friend," said the voice of a lady, in good-natured tones. "Are you reproaching me for waking up too late?"

"It is no reproach at all, my dear wife," said Monsieur Dalize, "as you were not well yesterday evening."

"Ah, but this morning I am entirely well," said Madame Dalize, resting her elbows on the sill of the window.

"So much the better," cried Mr. Dalize, joyfully, "and again so much the better."

"What light-heartedness!" said Madame Dalize, smiling.

"That is because I am happy, do you know, very happy."

"And the cause of this joy?"

"It all lies in this little bit of paper," answered Monsieur Dalize, pointing to the telegram towards the window.

"And what does this paper say?"

"It says,—now listen,—it says that my old friend, my best friend, has returned to France, and that in a few hours he will be here with us."

Madame Dalize was silent for an instant, then, suddenly remembering, she said,—

"Roger,—are you speaking of Roger?"

"The same."

"Ah, my friend," said Madame Dalize, "now I understand the joy you expressed." Then she added, as she closed the window, "I will dress myself and be down in a moment."

Hardly had the window of Madame Dalize's room closed than a little girl of some ten years, with a bright and pretty face surrounded by black curly hair, came in sight from behind the chateau. As she caught sight of Monsieur Dalize, she ran towards him.

"Good-morning, papa," she said, throwing herself into his open arms.

"Good-morning, my child," said Monsieur Dalize, taking the little girl upon his knees and kissing her over and over again.

"Ah, papa," said the child, "you seem very happy this morning."

"And you have noticed that too, Miette?"

"Why, of course, papa; any one can see that in your face."

"Well, I am very happy."

Miss Mariette Dalize, who was familiarly called Miette, for short, looked at her father without saying anything, awaiting an explanation. Monsieur Dalize understood her silence.

"You want to know what it is that makes me so happy?"

"Yes, papa."

"Well, then, it is because I am going to-day to see one of my friends,—my oldest friend, my most faithful friend,—whom I have not seen for ten long years."



Monsieur Dalize stopped for a moment.

"Indeed," he continued, "you cannot understand what I feel, my dear little Miette."

"And why not, papa?"

"Because you do not know the man of whom I speak."

Miette looked at her father, and said, in a serious tone,—

"You say that I don't know your best friend. Come! is it not Monsieur Roger?"

It was now the father's turn to look at his child, and, with pleased surprise, he said,—

"What? You know?"

"Why, papa, I have so often heard you talk to mamma of your friend Roger that I could not be mistaken."

"That is true; you are right."

"Then," continued Miss Miette, "it is Mr. Roger who is going to arrive here?"

"It is he," said Monsieur Dalize, joyously.

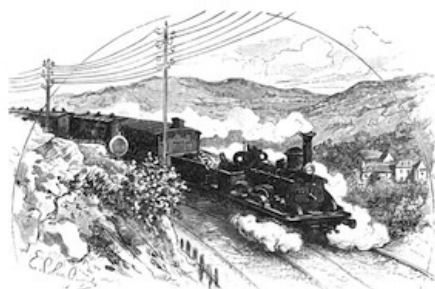


But Miss Miette did not share her father's joy. She was silent for a moment, as if seeking to remember something very important, then she lowered her eyes, and murmured, sadly,—

"The poor gentleman."

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## CHAPTER II. TWO FRIENDS.



The château of Sainte-Gemme, which was some miles from the village of Sens, had belonged to Monsieur Dalize for some years. It was in this old château, which had often been restored, but which still preserved its dignified appearance, that Monsieur Dalize and his family had come to pass the summer.

Monsieur Dalize had become the owner of the property of Sainte-Gemme on his retirement from business. He came out at the beginning of every May, and did not return to Paris until November. During August and September the family was complete, for then it included Albert Dalize, who was on vacation from college. With his wife and his children, Albert and Mariette, Monsieur Dalize was happy, but sometimes there was a cloud upon this happiness. The absence of a friend with whom Monsieur Dalize had been brought up, and the terrible sorrows which this friend had experienced, cast an occasional gloom over the heart of the owner of Sainte-Gemme. This friend was called Roger La Morlière. In the Dalize family he was called simply Roger. He was a distinguished chemist. At the beginning of his life he had been employed by a manufacturer of chemicals in Saint-Denis, and the close neighborhood to Paris enabled him frequently to see his friend Dalize, who had succeeded his father in a banking-house. Later, some flattering offers had drawn him off to Northern France, to the town of Lille. In this city Roger had found a charming young girl, whom he loved and whose hand he asked in marriage. Monsieur Dalize was one of the witnesses to this marriage, which seemed to begin most happily, although neither party was wealthy. Monsieur Dalize had already been married at this time, and husband and wife had gone to Lille to be present at the union of their friend Roger. Then a terrible catastrophe had occurred.

Roger had left France and gone to America. Ten years had now passed. The two friends wrote each other frequently. Monsieur Dalize's letters were full of kindly counsels, of encouragement, of consolation. Roger's, though they were affectionate, showed that he was tired of life, that his heart was in despair.

Still, Monsieur Dalize, in receiving the telegram which announced the return of this well-beloved friend, had only thought of the joy of seeing him again. The idea that this friend, whom he had known once so happy, would return to him broken by grief had not at first presented itself to his mind. Now he began to reflect. An overwhelming sorrow had fallen upon the man, and for ten years he had shrouded himself in the remembrance of this sorrow. What great changes must he have gone through! how different he would look from the Roger he had known!

Monsieur Dalize thought over these things, full of anxiety, his eyes fixed upon the shaded alley in front of him.

Miette had softly slipped down from her father's knees, and, seating herself by his side upon the bench, she remained silent, knowing that she had better say nothing at such a time.

Light steps crunched the gravel, and Madame Dalize approached.

Miss Miette had seen her mother coming, but Monsieur Dalize had seen nothing and heard nothing.

In great astonishment Madame Dalize asked, addressing herself rather to her daughter than to her husband,—

"What is the matter?"

Miss Miette made a slight motion, as if to say that she had better not answer; but this time Monsieur Dalize had heard.

He lifted sad eyes to his wife's face.



"Now, where has all the joy of the morning fled, my friend?" asked Madame Dalize. "And why this sudden sadness?"

"Because this child"—and Monsieur Dalize passed his hand through his daughter's thick curls—"has reminded me of the sorrows of Roger."

"Miette?" demanded Madame Dalize. "What has she said to you?"

"She simply said, when I spoke to her of Roger, 'The poor gentleman.' And she was right,—the poor gentleman, poor Roger."

"Undoubtedly," answered Madame Dalize; "but ten years have passed since that terrible day, and time heals many wounds."

"That is true; but I know Roger, and I know that he has forgotten nothing."

"Of course, forgetfulness would not be easy to him over there, in that long, solitary exile; but once he has returned here to us, near his family, his wounds will have a chance to heal; and, in any case," added Madame Dalize, taking her husband's hand, "he will have at hand two doctors who are profoundly devoted."

"Yes, my dear wife, you are right; and if he can be cured, we will know how to cure him."

Madame Dalize took the telegram from her husband's hands, and read this:

*"Monsieur Dalize, Château de Sainte-Gemme, at Sens:*

*Friend,—I am on my way home. Learn at Paris that you are at Sainte-Gemme. May I come there at once?"*

*"Roger."*

"And you answered him?"

"I answered, 'We are awaiting you with the utmost impatience. Take the first train.'"

"Will that first train be the eleven-o'clock train?"

"No; I think that Roger will not be able to take the express. The man with the telegram will not

have reached Sens soon enough, even if he hurried, as he promised he would. Then, the time taken to send the despatch, to receive it in Paris, and to take it to Roger's address would make it more than eleven. So our friend will have to take the next train; and you cannot count upon his being here before five o'clock."

"Oh!" cried Miss Miette, in a disappointed tone.

"What is the matter, my child?" asked Monsieur Dalize.

"Why, I think——"

"What do you think?"

"Well, papa," Miss Miette at last said, "I think that the railroads and the telegrams are far too slow."

Monsieur Dalize could not suppress a smile at hearing this exclamation. He turned to his wife, and said,—

"See, how hurried is this younger generation. They think that steam and electricity are too slow."

And, turning around to his daughter, he continued,—

"What would you like to have?"

"Why," answered the girl, "I would like to have Monsieur Roger here at once."

Her wish was to be fulfilled sooner than she herself could foresee.



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### CHAPTER III. MONSIEUR ROGER.



Monsieur and Madame Dalize went back into the château, and soon reappeared in walking-costumes. Miette, who was playing in the shadows of the great chestnut-trees, looked up in surprise.

"You are going out walking without me?" said she.

"No, my child," answered Madame Dalize, "we are not going out to take a walk at all; but we have to go and make our excuses to Monsieur and Madame Sylvestre at the farm, because we shall not be able to dine with them this evening, as we had agreed."

"Take me with you," said Miette.

"No; the road is too long and too fatiguing for your little legs."

"Are you going on foot?"

"Certainly," said Monsieur Dalize. "We must keep the horses fresh to send them down to meet Roger at the station."

Miss Miette could not help respecting so good a reason, and she resisted no longer.

When left alone, she began seriously to wonder what she should do during the absence of her parents, which would certainly last over an hour. An idea came to her. She went into the château,

passed into the drawing-room, took down a large album of photographs which was on the table, and carried it into her room. She did not have to search long. On the first page was the portrait of her mother, on the next was that of herself, Miette, and that of her brother Albert. The third page contained two portraits of men. One of these portraits was that of her father, the other was evidently the one that she was in search of, for she looked at it attentively.

"It was a long time ago," she said to herself, "that this photograph was made,—ten years ago; but I am sure that I shall recognize Monsieur Roger all the same when he returns."

At this very moment Miette heard the sound of a carriage some distance off. Surely the carriage was driving through the park. She listened with all her ears. Soon the gravelled road leading up to the château was crunched under the wheels of the carriage. Miette then saw an old-fashioned cab, which evidently had been hired at some hotel in Sens. The cab stopped before the threshold. Miette could not see so far from her window. She left the album upon her table, and ran downstairs, full of curiosity. In the vestibule she met old Peter, and asked him who it was.

"It is a gentleman whom I don't know," said Peter.

"Where is he?"

"I asked him into the parlor."

Miette approached lightly on tiptoe to the door of the parlor, which was open, wishing to see without being seen. She expected she would find in this visitor some country neighbor. The gentleman was standing, looking out of the glass windows.

From where she was Miette could see his profile. She made a gesture, as if to say, "I don't know him;" and she was going to withdraw as slowly as possible, with her curiosity unsatisfied, when the gentleman turned around. Miette now saw him directly in front of her in the full light. His beard and his hair were gray, his forehead was lightly wrinkled on the temples, a sombre expression saddened his features. His dress was elegant. He walked a few steps in the parlor, coming towards the door, but he had not yet seen Miette. In her great surprise she had quickly drawn herself back, but she still followed the visitor with her eyes. At first she had doubted now she was sure; she could not be mistaken. When the gentleman had reached the middle of the parlor, Miette could contain herself no longer. She showed herself in the doorway and advanced towards the visitor. He stopped, surprised at this pretty apparition. Miette came up to him and looked him in the eyes. Then, entirely convinced, holding out her arms towards the visitor, she said, softly,—

"Monsieur Roger!"

The gentleman in his turn looked with surprise at the pretty little girl who had saluted him by name. He cast a glance towards the door, and, seeing that she was alone, more surprised than ever, he looked at her long and silently.

Miette, abashed by this scrutiny, drew back a little, and said, with hesitation,—

"Tell me: you are surely Monsieur Roger?"

"Yes, I am indeed Monsieur Roger," said the visitor, at last, in a voice full of emotion. And, with a kindly smile, he added, "How did you come to recognize me, Miss Miette?"

Hearing her own name pronounced in this unexpected manner, Miss Miette was struck dumb with astonishment. At the end of a minute, she stammered,—

"Why, sir, you know me, then, also?"

"Yes, my child; I have known and loved you for a long time."

And Monsieur Roger caught Miette up in his arms and kissed her tenderly.

"Yes," he continued, "I know you, my dear child. Your father has often spoken of you in his letters; and has he not sent me also several of your photographs when I asked for them?"

"Why, that is funny!" cried Miette.

But she suddenly felt that the word was not dignified enough.

"That is very strange," she said: "for I, too, recognized you from your photograph; and it was only five minutes ago, at the very moment when you arrived, that I was looking at it, up-stairs in my room. Shall I go up and find the album?"

Monsieur Roger held her back.

"No, my child," said he, "remain here by me, and tell me something about your father and your mother."

Miette looked up at the clock.

"Papa and mamma may return at any moment. They will talk to you themselves a great deal better than I can. All that I can tell you is that they are going to be very, very glad; but they did not expect you until the evening. How does it happen that you are here already?"

"Because I took the first train,—the 6.30."



"But your telegram?"

"Yes, I sent a despatch last night on arriving at Paris, but I did not have the patience to wait for an answer. I departed, hoping they would receive me anyway with pleasure; and I already see that I was not mistaken."

"No, Monsieur Roger," answered Miette, "you were not mistaken. You are going to be very happy here, very happy. There, now! I see papa and mamma returning."

The door of the vestibule had just been opened.

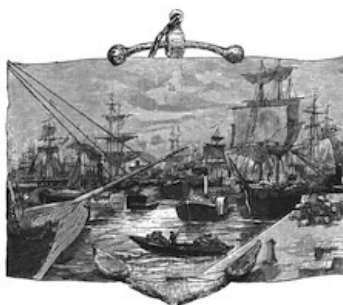
They could see Peter exchanging some words with his master and mistress. Then hurried steps were heard, and in a moment Monsieur Dalize was in the arms of his friend Roger. Miss Miette, who had taken her mamma by the arm, obliged her to bend down, and said in her ear,—

"I love him already, our friend Roger."



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## CHAPTER IV. MONSIEUR ROGER'S STORY.



The evening had come, the evening of that happy day when the two friends, after ten years of absence, had come together again. Monsieur Roger had known from the first that he would find loving and faithful hearts just as he had left them. They were all sitting, after dinner, in a large vestibule, whose windows, this beautiful evening in autumn, opened out upon the sleeping park. For some moments the conversation had fallen into an embarrassing silence. Every one looked at Monsieur Roger. They thought that he might speak, that he might recount the terrible event which had broken his life; but they did not like to ask him anything about it. Monsieur Roger was looking at the star-sprinkled sky, and seemed to be dreaming, but in his deeper self he had guessed the thoughts of his friends and understood he ought to speak. He passed his hand over his forehead to chase away a painful impression, and with a resolute, but low and soft voice, he said,—

"I see, my friends, my dear friends, I see that you expect from me the story of my sorrow."

Monsieur and Madame Dalize made a slight gesture of negation.

"Yes," continued Monsieur Roger, "I know very well that you do not wish it through idle curiosity, that you fear to reawaken my griefs; but to whom can I tell my story, if not to you? I owe it to you as a sacred debt, and, if I held my tongue, it seems to me a dark spot would come upon our friendship. You know what a lovely and charming wife I married. Her only fault—a fault only in the eyes of the world—was that she was poor. I had the same fault. When my son George came into the world I suddenly was filled with new ambitions. I wished, both for his sake and for his mother's, to amass wealth, and I worked feverishly and continuously in my laboratory. I had a problem before me, and at last I succeeded in solving it. I had discovered a new process for treating silver ores. Fear nothing: I am not going to enter into technical details; but it is necessary that I should explain to you the reason which made me"—here Monsieur paused, and then continued, with profound sadness—"which made *us* go to America. Silver ores in most of the mines of North America offer very complex combinations in the sulphur, bromide, chloride of lime, and iodine, which I found mixed up with the precious metal,—that is to say, with the silver. It is necessary to free the silver from all these various substances. Now, the known processes had not succeeded in freeing the silver in all its purity. There was always a certain quantity of the

silver which remained alloyed with foreign matters, and that much silver was consequently lost. The processes which I had discovered made it possible to obtain the entire quantity of silver contained in the ore. Not a fraction of the precious metal escaped. An English company owning some silver-mines in Texas heard of my discovery, and made me an offer. I was to go to Texas for ten years. The enterprise was to be at my own risk, but they would give me ten per cent on all the ore that I saved. I felt certain to succeed. My wife, full of faith in me, urged me to accept. What were we risking? A modest situation in a chemical laboratory, which I should always be able to obtain again. Over there on the other side of the Atlantic there were millions in prospect; and if I did not succeed from the beginning, my wife, who drew and painted better than an amateur,—as well as most painters, indeed,—and who had excellent letters of recommendation, would give drawing-lessons in New Orleans, where the company had its head-quarters. We decided to go; but first we came to Paris. I wished to say good-by to you and to show you my son, my poor little George, of whom I was so proud, and whom you did not know. He was then two and one-half years old. My decision had been taken so suddenly that I could not announce it to you. When we arrived in Paris, we learned that you were in Nice. I wrote to you,—don't you remember?" said Monsieur Roger, turning to Monsieur Dalize.



"Yes, my friend; I have carefully kept that letter of farewell, full of hope and of enthusiasm."

"We were going to embark from Liverpool on the steamer which would go directly to New Orleans. The steamer was called the Britannic."

Monsieur Roger stopped speaking, full of emotion at this recollection. At the end of a long silence he again took up the thread of his story.

"The first days of the journey we had had bad weather. And I had passed them almost entirely in our state-room with my poor wife and my little boy, who were very sea-sick. On the tenth day (it was the 14th of December) the weather cleared up, and, notwithstanding a brisk wind from the north-east, we were on the deck after dinner. The night had come; the stars were already out, though every now and then hidden under clouds high up in the sky, which fled quickly out of sight. We were in the archipelago of Bahama, not far from Florida.

"'One day more and we shall be in port,' I said to my wife and to George, pointing in the direction of New Orleans.

"My wife, full of hope,—too full, alas! poor girl,—said to me, with a smile, as she pointed to George,—

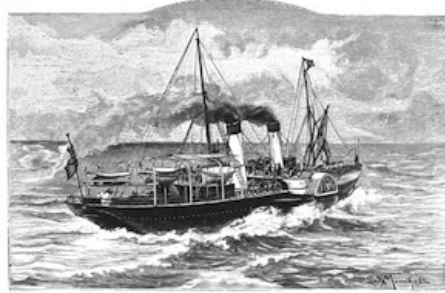
"'And this fortune that we have come so far to find, but which we shall conquer without doubt, this fortune will all be for this little gentleman.'

"George, whom I had just taken upon my knees, guessed that we were speaking of him, and he threw his little arms around my neck and touched my face with his lips."



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## CHAPTER V. FIRE AT SEA.



"At this moment, a moment that I shall never forget, I heard a sudden crackling noise, strange and unexpected, coming from a point seemingly close to me. I turned around and saw nothing. Nevertheless, I still heard that sound in my ears. It was a strange sound. One might have thought that an immense punch had been lighted in the interior of the ship, and that the liquid, stirred up by invisible hands, was tossed up and down, hissing and crackling. The quick movement of my head had arrested George in the midst of his caresses. Now he looked up at me with astonished eyes. The uneasiness which I felt in spite of the absence of any cause must have appeared upon my face, for my wife, standing beside me, leaned over to ask, in a subdued voice,—

"'What is the matter?'

"I think I answered, 'Nothing.' But my mind had dwelt upon an awful danger,—that danger of which the most hardened seamen speak with a beating heart,—fire at sea. Alas! my fears were to be realized. From one of the hatches there suddenly leaped up a tongue of flame. At the same instant we heard the awful cry, 'Fire!' To add to our distress, the wind had increased, and had become so violent that it fanned the flames with terrible rapidity, and had enveloped the state-rooms in the rear, whence the passengers were running, trembling and crying. In a few minutes the back of the ship was all on fire. My wife had snatched George from my arms, and held him closely against her breast, ready to save him or die with him. The captain, in the midst of the panic of the passengers, gave his orders. The boats were being lowered into the sea,—those at least which remained, for two had already been attacked by the fire. Accident threw the captain between me and my wife at the very moment when he was crying out to his men to allow none but the women and children in the boats. He recognized me. I had been introduced to him by a common friend, and he said, in a voice choked with emotion, pointing to my wife and my son,—

"'Embrace them!'



"Then he tore them both from my arms and pushed and carried them to the last boat, which was already too full. Night had come. With the rise of the wind, clouds had collected, obscuring the sky. By the light of the fire I saw for the last time—yes, for the last time—my wife and my child in the boat, shaken by an angry sea. Both were looking towards me. Did they see me also for the last time? And in my agony I cried out, 'George! George!' with a voice so loud that my son must surely have heard that last cry. Yes, he must have heard it. I stood rooted to the spot, looking without seeing anything, stupefied by this hopeless sorrow, not even feeling the intense heat of the flames, which were coming towards me. But the captain saw me. He ran towards me, drew me violently back, and threw me in the midst of the men, who were beginning a determined struggle against the fire which threatened to devour them. The instinct of life, the hope to see again my loved ones, gave me courage. I did as the others. Some of the passengers applied themselves to the chain; the pumps set in motion threw masses of water into the fire; but it seemed impossible to combat it, for it was alcohol which was burning. They had been obliged to repack part of the hold, where there were a number of demijohns of alcohol which the bad weather the first days had displaced. During the work one of these vast stone bottles had fallen and broken. As ill luck would have it, the alcohol descended in a rain upon a lamp in the story

below, and the alcohol had taken fire. So I had not been mistaken when the first sound had made me think of the crackling of a punch. We worked with an energy which can only be found in moments of this sort. The captain inspired us with confidence. At one time we had hope. The flames had slackened, or at least we supposed so; but in fact they had only gone another way, and reached the powder-magazine. A violent explosion succeeded, and one of the masts was hurled into the sea. Were we lost? No; for the engineer had had a sudden inspiration. He had cut the pipes, and immediately directed upon the flames torrents of steam from the engine. A curtain of vapor lifted itself up between us and the fire, a curtain which the flames could not penetrate. Then the pumps worked still more effectually. We were saved."



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## CHAPTER VI.

### MISS MIETTE'S FORTUNE.



"The rudder no longer guided us. What a night we passed! We made a roll-call: how many were wanting? and the boats which contained our wives, our children,—had those boats found a refuge? had they reached land anywhere? The ocean was still rough, and, notwithstanding the captain's words of hope, I was in despair,—anticipating the sorrow that was to overwhelm me. Every one remained on deck. At daybreak a new feeling of sadness seized us at the sight of our steamer, deformed and blackened by the fire. The deck for more than forty yards was nothing but a vast hole, at the bottom of which were lying, pell-mell, half-consumed planks and beams, windlasses blackened by fire, bits of wood, and formless masses of metal over which the tongues of flame had passed. Notwithstanding all this the steamer was slowly put in motion. We were able to reach Havana. There we hoped we might hear some news. And we did hear news,—but what news! A sailing-vessel had found on the morrow of the catastrophe a capsized boat on the coast of the island of Andros, where the boat had evidently been directed. A sailor who had tied himself to the boat, and whom they at first thought dead, was recalled to life, and told his story of the fire. From Havana, where the sailing-vessel had stopped, a rescuing-party was at once sent out. They found and brought back with them the débris of boats broken against the rocks and also many dead bodies. These were all laid out in a large room, where the remaining passengers of the Britannic were invited. We had to count the dead; we had to identify them. With what agony, with what cruel heart-beats I entered the room. I closed my eyes. I tried to persuade myself that I would not find there the beings that were so dear to me. I wished to believe that they had been saved, my dear ones, while my other companions in misfortune were all crying and sobbing. At last I opened my eyes, and, the strength of my vision being suddenly increased to a wonderful degree, I saw that in this long line of bodies there was no child. That was my first thought. May my poor wife forgive me! She also was not there; but it was not long before she came. That very evening a rescuing-party brought back her corpse with the latest found."

Monsieur Roger ceased speaking. He looked at his friends, Monsieur and Madame Dalize, who were silently weeping; then his eyes travelled to Miette. She was not crying; her look, sad but astonished, interested, questioned Monsieur Roger. He thought, "She cannot understand sorrow, this little girl, who has not had any trials."

And the eyes of Miette seemed to answer, "But George? George? did they not find him?"

At last Monsieur Roger understood this thought in the mind of Miette without any necessity on her part to express it by her lips, and, as if he were answering to a verbal question, he said, shaking his head,—

"No, they never found him."

Miette expected this answer; then she too began to weep.

Monsieur Dalize repeated the last words of Monsieur Roger.

"They did not find him! I do not dare to ask you, my dear friend, if you preserve any hope."

"Yes, I hope. I forced myself to hope for a long time. But the ocean kept my child in the same way that it buried in its depths many other victims of this catastrophe, for it was that very hope that made me remain in America. I might have returned to France and given up my engagements; but there I was closer to news, if there were any; and, besides, in work, in hard labor to which I intended to submit my body, I expected to find, if not forgetfulness, at least that weariness which dampens the spirit. I remained ten years in Texas, and I returned to-day without ever having forgotten that terrible night."



There was a silence. Then Monsieur Dalize, wishing to create a diversion, asked,—

"How does it happen that you did not announce to me beforehand your return. It was not until I received your telegram this morning that we learned this news which made us so happy. I had no reason to expect that your arrival would be so sudden. Did you not say that you were to remain another six months, and perhaps a year, in Texas?"

"Yes; and I did then think that I should be forced to prolong my stay for some months. My contract was ended, my work was done. I was free, but the mining-company wished to retain me. They wanted me to sign a new contract, and to this end they invented all sorts of pretexts to keep me where I was. As I did not wish to go to law against the people through whom I had made my fortune, I determined to wait, hoping that my patience would tire them out; and that, in fact, is what happened. The company bowed before my decision. This good news reached me on the eve of the departure of a steamer. I did not hesitate for a moment; I at once took ship. I might indeed have given you notice on the way, but I wished to reserve to myself the happiness of surprising you. It was not until I reached Paris that I decided to send you a despatch; and even then I did not have the strength to await your reply."

"Dear Roger!" said Monsieur Dalize. "And then your process, your discovery, succeeded entirely?"

"Yes, I have made a fortune,—a large fortune. I have told you that the enterprise was at my risk, but that the company would give me ten per cent. on all the ore that I would succeed in saving. Now, the mines of Texas used to produce four million dollars' worth a year. Thanks to my process, they produce nearly a million more. In ten years you can well see what was my portion."

"Splendid!" said Monsieur Dalize; "it represents a sum of—"

Madame Dalize interrupted her husband.

"Miette," said she, "cannot you do that little sum for us, my child?"

Miette wiped her eyes and ceased crying. Her mother's desire had been reached. The little girl took a pencil, and, after making her mother repeat the question to her, put down some figures upon a sheet of paper. After a moment she said, not without hesitation, for the sum appeared to her enormous,—

"Why! it is a million dollars that Monsieur Roger has made!"

"Exactly," said Monsieur Roger; "and, my dear child, you have, without knowing it, calculated pretty closely the fortune which you will receive from me as your wedding portion."

Monsieur and Madame Dalize looked up with astonishment. Miette gazed at Monsieur Roger without understanding.

"My dear friends," said Roger, turning to Monsieur and Madame Dalize, "you will not refuse me the pleasure of giving my fortune to Miss Miette. I have no one else in the world; and does not Mariette represent both of you? Where would my money be better placed?"

And turning towards Miss Miette, he said to her,—

"Yes, my child, that million will be yours on your marriage."

Miette looked from her mother to her father, not knowing whether she ought to accept, and seriously embarrassed. With a sweet smile, Monsieur Roger added,—

"And so, you see, you will be able to choose a husband that you like."

Then, quietly and without hesitation, Miss Miette said,—  
"It will be Paul Solange."



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## CHAPTER VII. VACATION.



Monsieur and Madame Dalize could not help smiling in listening to this frank declaration of their daughter: "It will be Paul Solange."

Monsieur Roger smiled in his turn, and said,—

"What! has Miss Miette already made her choice?"

"It is an amusing bit of childishness," answered Madame Dalize, "as you see. But, really, Miss Miette, although she teases him often, has a very kindly feeling for our friend Paul Solange."

"And who is this happy little mortal?" asked Monsieur Roger.

"A friend of Albert's," said Monsieur Dalize.

"Albert, your son?" said Monsieur Roger, to whom this name and this word were always painful. Then he added,—

"I should like very much to see him, your son."

"You shall soon see him, my dear Roger," answered Monsieur Dalize. "Vacation begins to-morrow morning, and to-morrow evening Albert will be at Sainte-Gemme."

"With Paul?" asked Miss Miette.

"Why, certainly," said Madame Dalize, laughing; "with your friend Paul Solange."

Monsieur Roger asked,—

"How old is Albert at present?"

"In his thirteenth year," said Monsieur Dalize.

Monsieur Roger remained silent. He was thinking that his little George, if he had lived, would also be big now, and, like the son of Monsieur Dalize, would be in his thirteenth year.

Next day the horses were harnessed, and all four went down to the station to meet the five-o'clock train. When Albert and Paul jumped out from the train, and had kissed Monsieur and

Madame Dalize and Miss Miette, they looked with some surprise at Monsieur Roger, whom they did not know.

"Albert," said Monsieur Dalize, showing Monsieur Roger to his son, "why don't you salute our friend Roger?"

"Is this Monsieur Roger?" cried Albert, and the tone of his voice showed that his father had taught him to know and to love the man who now, with his eyes full of tears, was pressing him to his heart.

"And you too, Paul, don't you want to embrace our friend?" said Monsieur Dalize.



"Yes, sir," answered Paul Solange, with a sad and respectful gravity, which struck Monsieur Roger and at once called up his affection.

On the way, Monsieur Roger, who was looking with emotion upon the two young people, but whose eyes were particularly fixed upon Paul, said, in a low voice, to Monsieur Dalize,—

"They are charming children."

"And it is especially Paul whom you think charming; acknowledge it," answered Monsieur Dalize, in the same tone.

"Why should Paul please me more than Albert?" asked Monsieur Roger.

"Ah, my poor friend," replied Monsieur Dalize, "because the father of Albert is here and the father of Paul is far away."

Monsieur Dalize was right. Monsieur Roger, without wishing it, had felt his sympathies attracted more strongly to this child, who was, for the time being, fatherless. He bent over to Monsieur Dalize, and asked,—

"Where is Paul's father?"

"In Martinique, where he does a big business in sugar-cane and coffee. Monsieur Solange was born in France, and he decided that his son should come here to study."

"I can understand that," replied Monsieur Roger; "but what a sorrow this exile must cause the mother of this child!"

"Paul has no mother: she died several years ago."

"Poor boy!" murmured Monsieur Roger, and his growing friendship became all the stronger.

That evening, after dinner, when coffee was being served, Miss Miette, who was in a very good humor, was seized with the desire to tease her little friend Paul.

"Say, Paul," she asked, from one end of the table to the other, "how many prizes did you take this year?"

Paul, knowing that an attack was coming, began to smile, and answered, good-naturedly,—

"You know very well, you naughty girl. You have already asked me, and I have told you."

"Ah, that is true," said Miette, with affected disdain: "you took one prize,—one poor little prize,—bah!"

Then, after a moment, she continued,—

"That is not like my brother: he took several prizes, *he* did,—a prize for Latin, a prize for history, a prize for mathematics, a prize for physical science, and a prize for chemistry. Well, well! and you,—you only took one prize; and that is the same one you took last year!"

"Yes," said Paul, without minding his friend's teasing; "but last year I took only the second prize, and this year I took the first."

"You have made some progress," said Miss Miette, sententiously.

Monsieur Roger had been interested in the dialogue.

"May I ask what prize Master Paul Solange has obtained?"

"A poor little first prize for drawing only," answered Miette.

"Ah, you love drawing?" said Monsieur Roger, looking at Paul.

But it was Miette who answered: "He loves nothing else."

Monsieur Dalize now, in his turn, took up the conversation, and said,—

"The truth is that our friend Paul has a passion for drawing. History and Latin please him a little, but for chemistry and the physical sciences he has no taste at all."

Monsieur Roger smiled.

"You are wrong," replied Monsieur Dalize, "to excuse by your smile Paul's indifference to the sciences.—And as to you, Paul, you would do well to take as your example Monsieur Roger, who would not have his fortune if he had not known chemistry and the physical sciences. In our day the sciences are indispensable."

Miss Miette, who had shoved herself a little away from the table, pouting slightly, heard these words, and came to the defence of the one whom she had begun by attacking. She opened a book full of pictures, and advanced with it to her father.

"Now, papa," she said, with a look of malice in her eyes, "did the gentleman who made that drawing have to know anything about chemistry or the physical sciences?"



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## CHAPTER VIII. A DRAWING LESSON.



For a moment Monsieur Dalize was disconcerted, and knew not what to say in answer. Happily, Monsieur Roger came to his aid. He took the book from Miette's hands, looked at the engraving, and said, quietly,—

"Why, certainly, my dear young friend, the gentleman who made that drawing ought to know something about chemistry and physical science."

"How so?" said Miette, astonished.

"Why, if he did not know the laws of physical science and of chemistry, he has, none the less, and perhaps even without knowing it himself, availed himself of the results of chemistry and physical science."

Miette took the book back again, looked at the drawing with care, and said,—

"Still, there are not in this drawing instruments or apparatus, or machines such as I have seen in my brother's books."

"But," answered Monsieur Roger, smiling, "it is not necessary that you should see instruments and apparatus and machines, as you say, to be in the presence of physical phenomena; and I assure you, my dear child, that this drawing which is under our eyes is connected with chemistry and physical science."

Miette now looked up at Monsieur Roger to see if he was not making fun of her. Monsieur Roger translated this dumb interrogation, and said,—

"Come, now! what does this drawing represent? Tell me yourself."



"Why, it represents two peasants,—a man and a woman,—who have returned home wet in the storm, and who are warming and drying themselves before the fire."

"It is, in fact, exactly that."

"Very well, sir?" asked Miette.

And in this concise answer she meant to say, "In all that, what do you see that is connected with chemistry or physical science?"

"Very well," continued Monsieur Roger; "do you see this light mist, this vapor, which is rising from the cloak that the peasant is drying before the fire?"

"Yes."

"Well, that is physical science," said Monsieur Roger.



"How do you mean?" asked Miette.

"I will explain in a moment. Let us continue to examine the picture. Do you see that a portion of the wood is reduced to ashes?"

"Yes."

"Do you also remark the flame and the smoke which are rising up the chimney?"

"Yes."

"That is chemistry."

"Ah!" said Miss Miette, at a loss for words.

Every one was listening to Monsieur Roger, some of them interested, the others amused. Miette glanced over at her friend Paul.

"What do you think of that?" she asked.

Paul did not care to reply. Albert wished to speak, but he stopped at a gesture from his father. Monsieur Dalize knew that the real interest of this scene lay with Monsieur Roger, the scientist, who was already loved by all this little world. Miette, as nobody else answered, returned to Monsieur Roger.

"But why," she asked, "is that physical science? Why is it chemistry?"

"Because it is physical science and chemistry," said Monsieur Roger, simply.

"Oh, but you have other reasons to give us!" said Madame Dalize, who understood what Monsieur Roger was thinking of.

"Yes," added Miette.

And even Paul, with unusual curiosity, nodded his head affirmatively.

"The reasons will be very long to explain, and would bore you," said Monsieur Dalize, certain that he would in this way provoke a protest.

The protest, in fact, came.

Monsieur Roger was obliged to speak.

"Well," said he, still addressing himself to Miss Miette, "this drawing is concerned with physical science, because the peasant, in placing his cloak before the heat of the fire, causes the phenomenon of evaporation to take place. The vapor which escapes from the damp cloth is water, is nothing but water, and will always be water under a different form. It is water modified, and modified for a moment, because this vapor, coming against the cold wall or other cold objects, will condense. That is to say, it will become again liquid water,—water similar to that which it was a moment ago; and that is a physical phenomenon,—for physical science aims to study the modifications which alter the form, the color, the appearance of bodies, but only their temporary modifications, which leave intact all the properties of bodies. Our drawing is concerned with chemistry, because the piece of wood which burns disappears, leaving in its place cinders in the hearth and gases which escape through the chimney. Here there is a complete modification, an absolute change of the piece of wood. Do what you will, you would be unable, by collecting

together the cinders and gases, to put together again the log of wood which has been burned; and that is a chemical phenomenon,—for the aim of chemistry is to study the durable and permanent modifications, after which bodies retain none of their original properties. Another example may make more easy this distinction between physical science and chemistry. Suppose that you put into the fire a bar of iron. That bar will expand and become red. Its color, its form, its dimensions will be modified, but it will always remain a bar of iron. That is a physical phenomenon. Instead of this bar of iron, put in the fire a bit of sulphur. It will flame up and burn in disengaging a gas of a peculiar odor, which is called sulphuric acid. This sulphuric-acid gas can be condensed and become a liquid, but it no longer contains the properties of sulphur. It is no longer a piece of sulphur, and can never again become a piece of sulphur. The modification of this body is therefore durable, and therefore permanent. Now, that is a chemical phenomenon."

Monsieur Roger stopped for a moment; then, paying no apparent attention to Paul, who, however, was listening far more attentively than one could imagine he would, he looked at Miette, and said,—

"I don't know, my child, if I have explained myself clearly enough; but you must certainly understand that in their case the artist has represented, whether he wished to or not, the physical phenomenon and the chemical phenomenon."

"Yes, sir," answered Miette, "I have understood quite well."

"Well," said Monsieur Dalize, "since you are so good a teacher, don't you think that you could, during vacation, cause a little chemistry and a little physical science to enter into that little head?" And he pointed to Paul Solange.

The latter, notwithstanding the sentiment of respectful sympathy which he felt for Monsieur Roger, and although he had listened with interest to his explanations, could not prevent a gesture of fear, so pronounced that everybody began to laugh.

Miette, who wished to console her good friend Paul and obtain his pardon for her teasing, came up to him, and said,—

"Come, console yourself, Paul; I will let you take my portrait a dozen times, as you did last year,—although it is very tiresome to pose for a portrait."



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## CHAPTER IX.

### THE TOWER OF HEURTEBIZE.



Next morning at six o'clock Paul Solange opened the door of the château and stepped out on to the lawn. He held a sketch-book in his hand. He directed his steps along a narrow pathway, shaded by young elms, towards one of the gates of the park. At a turning in the alley he found himself face to face with Monsieur Roger, who was walking slowly and thoughtfully. Paul stopped, and in his surprise could not help saying,—

"Monsieur Roger, already up?"

Monsieur answered, smiling,—

"But you also, Master Paul, you are, like me, already up. Are you displeased to meet me?"

"Oh, no, sir," Paul hastened to say, blushing a little. "Why should I be displeased at meeting you?"

"Then, may I ask you where you are going so early in the morning?"

"Over there," said Paul, stretching his hand towards a high wooded hill: "over there to Heurtebize."

"And what are you going to do over there?"

Paul answered by showing his sketch-book.

"Ah, you are going to draw?"

"Yes, sir; I am going to draw, to take a sketch of the tower; that old tower which you see on the right side of the hill."

"Well, Master Paul, will you be so kind," asked Monsieur Roger, "as to allow me to go with you and explore this old tower?"

Paul, on hearing this proposal, which he could not refuse, made an involuntary movement of dismay, exactly similar to that he had made the night before.

"Oh, fear nothing," said Monsieur Roger, good-naturedly. "I will not bore you either with physical science nor chemistry. I hope you will accept me, therefore, as your companion on the way, without any apprehensions of that kind of annoyance."

"Then, let us go, sir," answered Paul, a little ashamed to have had his thoughts so easily guessed.

They took a short cut across the fields, passing wide expanses of blossoming clover; they crossed a road, they skirted fields of wheat and of potatoes. At last they arrived upon the wooded hill of Heurtebize, at the foot of the old tower, which still proudly raised its head above the valleys.

"What a lovely landscape!" said Monsieur Roger, when he had got his breath.

"The view is beautiful," said Paul, softly; "but it is nothing like the view you get up above there."

"Up above?" said Monsieur Roger, without understanding.

"Yes, from the summit of the tower."

"You have climbed up the tower?"

"Several times."

"But it is falling into ruins, this poor tower; it has only one fault, that of having existed for two or three hundred years."

"It is indeed very old," answered Paul; "it is the last vestige of the old château of Sainte-Gemme, which, it is said, was built in the sixteenth century, or possibly even a century or two earlier; nobody is quite certain as to the date; at all events, the former proprietors several years ago determined to preserve it, and they even commenced some repairs upon it. The interior stairway has been put in part into sufficiently good condition to enable you to use it, if you at the same time call a little bit of gymnastics to your aid, as you will have to do at a few places. And I have used it in this way very often; but please now be good enough to——"



Paul stopped, hesitating.

"Good enough to what? Tell me."

Then Paul Solange added,—

"To say nothing of this to Madame Dalize. That would make her uneasy."

"Not only will I say nothing, my dear young friend, but I will join you in the ascent,—for I have the greatest desire to do what you are going to do, and to ascend the tower with you."

Paul looked at Monsieur Roger, and said, quickly,—

"But, sir, there is danger."

"Bah! as there is none for you, why should there be danger for me?"

Somewhat embarrassed, Paul replied,—

"I am young, sir; more active than you, perhaps, and——"

"If that is your only reason, my friend, do not disturb yourself. Let us try the ascent."

"On one condition, sir."

"What is that?"

"That I go up first."

"Yes, my dear friend, I consent. You shall go first," said Monsieur Roger, who would have himself suggested this if the idea had not come to Paul.

Both of them, Monsieur Roger and Paul, had at this moment the same idea of self-sacrifice. Paul said to himself, "If any accident happens, it will happen to me, and not to Monsieur Roger." And Monsieur Roger, sure of his own strength, thought, "If Paul should happen to fall, very likely I may be able to catch him and save him."

Luckily, the ascent, though somewhat difficult, was accomplished victoriously, and Monsieur Roger was enabled to recognize that the modified admiration which Paul Solange felt for the landscape, as seen from below, was entirely justified.

Paul asked,—

"How high is this tower? A hundred feet?"

"Less than that, I think," answered Monsieur Roger. "Still, it will be easy to find out exactly in a moment."

"In a moment?" asked Paul.

"Yes, in a moment."

"Without descending?"

"No; we will remain where we are."

Paul made a gesture which clearly indicated, "I would like to see that."

Monsieur Roger understood.

"There is no lack of pieces of stone in this tower; take one," said he to Paul.

Paul obeyed.

"You will let this stone fall to the earth at the very moment that I tell you to do so."

Monsieur Roger drew out his watch and looked carefully at the second-hand.

"Now, let go," he said.

Paul opened his hand; the stone fell. It could be heard striking the soil at the foot of the tower. Monsieur Roger, who during the fall of the stone had had his eyes fixed upon his watch, said,—

"The tower is not very high." Then he added, after a moment of reflection, "The tower is sixty-two and a half feet in height."

Paul looked at Monsieur Roger, thinking that he was laughing at him. Monsieur Roger lifted his eyes to Paul; he looked quite serious. Then Paul said, softly,—

"The tower is sixty feet high?"

"Sixty-two and a half feet,—for the odd two and a half feet must not be forgotten in our computation."

Paul was silent. Then, seeing that Monsieur Roger was ready to smile, and mistaking the cause of this smile, he said,—

"You are joking, are you not? You cannot know that the tower is really sixty feet high?"

"Sixty-two feet and six inches," repeated Monsieur Roger again. "That is exact. Do you want to have it proved to you?"

"Oh, yes, sir," said Paul Solange, with real curiosity.

"Very well. Go back to the château, and bring me a ball of twine and a yard-measure."

"I run," said Paul.

"Take care!" cried Monsieur Roger, seeing how quickly Paul was hurrying down the tower.

When Paul had safely reached the ground, Monsieur Roger said to himself, with an air of satisfaction,—

"Come, come! we will make something out of that boy yet!"



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## CHAPTER X. PHYSICAL SCIENCE.



Paul returned to the tower more quickly than Monsieur Roger had expected. Instead of returning to the château, he had taken the shortest cut, had reached the village, and had procured there the two things wanted. He climbed up the tower and arrived beside Monsieur Roger, holding out the ball of twine and the yard-stick.

"You are going to see, you little doubter, that I was not wrong," said Monsieur Roger.

He tied a stone to the twine, and let it down outside the tower to the ground.

"This length of twine," he said, "represents exactly the height of the tower, does it not?"

"Yes, sir," answered Paul.

Monsieur Roger made a knot in the twine at the place where it rested on the top of the tower. Then he asked Paul to take the yard-stick which he had brought, and to hold it extended between his two hands. Then, drawing up the twine which hung outside the tower, he measured it yard by yard. Paul counted. When he had reached the number sixty, he could not help bending over to see how much remained of the twine.

"Ah, sir," he cried, "I think you have won."

"Let us finish our count," said Monsieur Roger, quietly.

And Paul counted,—

"Sixty-one, sixty-two,—sixty-two feet——"

"And?"

"And six inches!" cried Paul.

"I have won, as you said, my young friend," cried Monsieur Roger, who enjoyed Paul's surprise. "Now let us cautiously descend and return to the château, where the breakfast-bell will soon ring."

The descent was made in safety, and they directed their steps towards Sainte-Gemme. Paul walked beside Monsieur Roger without saying anything. He was deep in thought.



Monsieur Roger, understanding what was going on in the brain of his friend, took care not to

disturb him. He waited, hoping for an answer. His hope was soon realized. As they reached the park, Paul, who, after thinking a great deal, had failed to solve the difficulty, said, all of a sudden,  
—

"Monsieur Roger!"

"What, my friend?"

"How did you measure the tower?"

Monsieur Roger looked at Paul, and, affecting a serious air, he said,—

"It is impossible, entirely impossible for me to answer."

"Impossible?" cried Paul, in surprise.

"Yes, impossible."

"Why, please?"

"Because in answering I will break the promise that I have made you,—the promise to say nothing about chemistry or physical science."

"Ah!" said Paul, becoming silent again.

Monsieur Roger glanced at his companion from the corner of his eye, knowing that his curiosity would soon awake again. At the end of the narrow, shady pathway they soon saw the red bricks of the château shining in the sun; but Paul had not yet renewed his question, and Monsieur Roger began to be a little uneasy,—for, if Paul held his tongue, it would show that his curiosity had vanished, and another occasion to revive it would be difficult to find.

Luckily, Paul decided to speak at the very moment when they reached the château.

"Then," said he, expressing the idea which was uppermost,— "Then it is physical science?"

Monsieur Roger asked, in an indifferent tone,—

"What is physical science?"

"Your method of measuring the tower."

"Yes, it is physical science, as you say. Consequently, you see very well that I cannot answer you."

"Ah, Monsieur Roger," said Paul, embarrassed, "you are laughing at me."

"Not at all, my friend. I made a promise; I must hold to it. I have a great deal of liking for you, and I don't want you to dislike me."

"Oh, sir!"

Suddenly they heard the voice of Monsieur Dalize, who cried, cheerfully,—

"See, they are already quarrelling!"

For some moments Monsieur Dalize, at the door of the vestibule, surrounded by his wife and his children, had been gazing at the two companions. Monsieur Roger and Paul approached.

"What is the matter?" asked Monsieur Dalize, shaking hands with his friend.

"A very strange thing has happened," answered Monsieur Roger.

"And what is that?"

"Simply that Master Paul wants me to speak to him of physical science."

An astonished silence, soon followed by a general laugh, greeted these words. Miss Miette took a step forward, looked at Paul with an uneasy air, and said,—

"Are you sick, my little Paul?"

Paul, confused, kept silent, but he answered by a reproachful look the ironical question of his friend Miette.

"But whence could such a change have come?" asked Madame Dalize, addressing Monsieur Roger. "Explain to us what has happened."

"Here are the facts," answered Monsieur Roger. "We had climbed up the tower of Heurtebize  
—"

Madame Dalize started, and turned a look of uneasiness towards Paul.

"Paul was not at fault," Monsieur Roger hastened to add. "I was the guilty one. Well, we were up there, when Master Paul got the idea of estimating the height of the tower. I answered that nothing was more simple than to know it at once. I asked him to let fall a stone. I looked at my watch while the stone was falling, and I said, 'The tower is sixty-two feet and six inches high.' Master Paul seemed to be astonished. He went after a yard-stick and some twine. We measured the tower, and Master Paul has recognized that the tower is in fact sixty-two feet and six inches

high. Now he wants me to tell him how I have been able so simply, with so little trouble, to learn the height. That is a portion of physical science; and, as I made Master Paul a promise this very morning not to speak to him of physical science nor of chemistry, you see it is impossible for me to answer."

Monsieur Dalize understood at once what his friend Roger had in view, and, assuming the same air, he answered,—

"Certainly, it is impossible; you are perfectly right. You promised; you must keep your promise."

"Unless," said Miss Miette, taking sides with her friend Paul,— "unless Paul releases Monsieur Roger from his promise."

"You are entirely right, my child," said Monsieur Roger; "should Paul release me sufficiently to ask me to answer him. But, as I remarked to you a moment ago, I fear that he will repent too quickly, and take a dislike to me. That I should be very sorry for."

"No, sir, I will not repent. I promise you that."

"Very well," said Miette; "there is another promise. You know that you will have to keep it."

"But," answered Monsieur Roger, turning to Paul, "it will be necessary for me to speak to you of weight, of the fall of bodies, of gravitation; and I am very much afraid that that will weary you."

"No, sir," answered Paul, very seriously, "that will not weary me. On the contrary, that will interest me, if it teaches me how you managed to calculate the height of the tower."

"It will certainly teach you that."

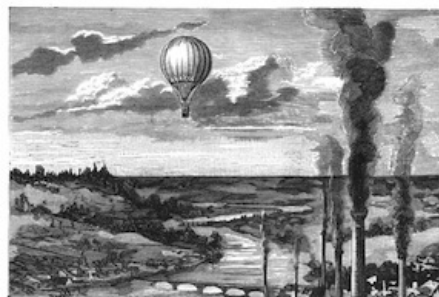
"Then I am content," said Paul.

"And I also," said Monsieur Roger to himself, happy to have attained his object so soon.



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## CHAPTER XI. THE SMOKE WHICH FALLS.



In the evening, after dinner, Monsieur Roger, to whom Paul recalled his promise, asked Miette to go and find him a pebble in the pathway before the chateau. When he had the bit of stone in his hand, Monsieur Roger let it fall from the height of about three feet.

"As you have just heard and seen," said he, addressing Paul, "this stone in falling from a small height produces only a feeble shock, but if it falls from the height of the house upon the flagstones of the pavement, the shock would be violent enough to break it."

Monsieur Roger interrupted himself, and put this question to Paul:

"Possibly you may have asked yourself why this stone should fall. Why do bodies fall?"

"Goodness knows," said the small voice of Miss Miette in the midst of the silence that followed.

"Miette," said Madame Dalize, "be serious, and don't answer for others."

"But, mamma, I am sure that Paul would have answered the same as I did:—would you not, Paul?"

Paul bent his head slightly as a sign that Miette was not mistaken.

"Well," continued Monsieur Roger, "another one before you did ask himself this question. It was a young man of twenty-three years, named Newton. He found himself one fine evening in a garden, sitting under an apple-tree, when an apple fell at his feet. This common fact, whose cause had never awakened the attention of anybody, filled all his thoughts; and, as the moon was shining in the heavens, Newton asked himself why the moon did not fall like the apple."

"That is true," said Miette; "why does not the moon fall?"

"Listen, and you will hear," said Monsieur Dalize.

Monsieur Roger continued:

"By much reflection, by hard work and calculation, Newton made an admirable discovery,—that of universal attraction. Yes, he discovered that all bodies, different though they may be, attract each other: they draw towards each other; the bodies which occupy the celestial spaces,—planets and suns,—as well as the bodies which are found upon our earth. The force which attracts bodies towards the earth, which made this stone fall, as Newton's apple fell, has received the name of weight. Weight, therefore, is the attraction of the earth for articles which are on its surface. Why does this table, around which we find ourselves, remain in the same place? Why does it not slide or fly away? Simply because it is retained by the attraction of the earth. I have told you that all bodies attract each other. It is therefore quite true that in the same way as the earth attracts the table, so does the table attract the earth."

"Like a loadstone," said Albert Dalize.

"Well, you may compare the earth in this instance to a loadstone. The loadstone draws the iron, and iron draws the loadstone, exactly as the earth and the table draw each other; but you can understand that the earth attracts the table with far more force than the table attracts the earth."

"Yes," said Miette; "because the earth is bigger than the table."

"Exactly so. It has been discovered that bodies attract each other in proportion to their size,—that is to say, the quantity of matter that they contain. On the other hand, the farther bodies are from each other the less they attract each other. I should translate in this fashion the scientific formula which tells us that bodies attract each other in an inverse ratio to the square of the distance. I would remind you that the square of a number is the product obtained by multiplying that number by itself. So all bodies are subject to that force which we call weight; all substances, all matter abandoned to itself, falls to the earth."



Just here Miss Miette shifted uneasily on her chair, wishing to make an observation, but not daring.

"Come, Miss Miette," said Monsieur Roger, who saw this manoeuvre, "you have something to tell us. Your little tongue is itching to say something. Well, speak; we should all like to hear you."

"Monsieur Roger," said Miette, "is not smoke a substance?"

"Certainly; the word substance signifies something that exists. Smoke exists. Therefore it is a substance."

"Then," replied Miette, with an air of contentment with herself, "as smoke is a substance, there is one substance which does not fall to the earth. Indeed, it does just the opposite."

"Ah! Miss Miette wants to catch me," said Monsieur Roger.

Miette made a gesture of modest denial, but at heart she was very proud of the effect which she had produced, for every one looked at her with interest.

"To the smoke of which you speak," continued Monsieur Roger, "you might add balloons, and even clouds."

"Certainly, that is true," answered Miette, naïvely.

"Very well; although smoke and balloons rise in the air instead of falling, although clouds remain suspended above our heads, smoke and balloons and clouds are none the less bodies with weight. What prevents their fall is the fact that they find themselves in the midst of the air, which is heavier than they are. Take away the air and they would fall."

"Take away the air?" cried Miette, with an air of doubt, thinking that she was facing an



impossibility.

"Yes, take away the air," continued Monsieur Roger; "for that can be done. There even exists for this purpose a machine, which is called an air-pump. You place under a glass globe a lighted candle. Then you make a vacuum,—that is to say, by the aid of the air-pump you exhaust the air in the globe; soon the candle is extinguished for want of air, but the wick of the candle continues for some instants to produce smoke. Now, you think, I suppose, that that smoke rises in the globe?"

"Certainly," said Miette.

"No, no, not at all; it falls."

"Ah! I should like to see that!" cried Miette.

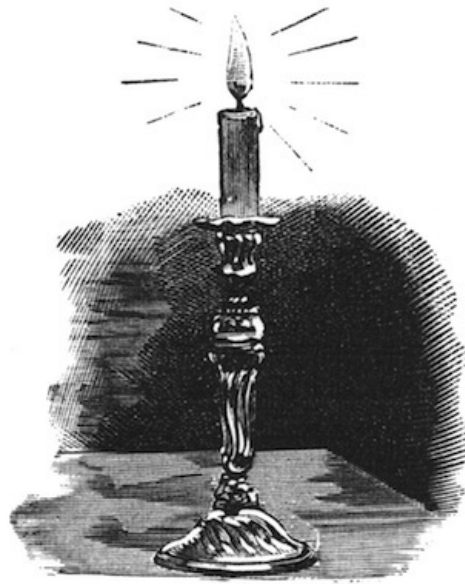
"And, in order to give you the pleasure of seeing this, I suppose you would like an air-pump?"

"Well, papa will buy me one.—Say, papa, won't you do it, so we may see the smoke fall?"

"No, indeed!" said Monsieur Dalize; "how can we introduce here instruments of physical science during vacation? What would Paul say?"

"Paul would say nothing. I am sure that he is just as anxious as I am to see smoke fall.—Are you not, Paul?"

And Paul Solange, already half-conquered, made a sign from the corner of his eye to his little friend that her demand was not at all entirely disagreeable to him.



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## CHAPTER XII. AT THE CENTRE OF THE EARTH.



Monsieur Roger, hiding his satisfaction, seemed to attach no importance to this request of Miette under the assent given by Paul. Wishing to profit by the awakened curiosity of his little friend, he hastened to continue, and said,—

"Who wants to bring me a bit of cork and a glass of water?"

"I! I!" cried Miette, running.

When Miette had returned with the articles, Monsieur Roger continued:

"I told you a moment ago that if balloons and smoke and clouds do not fall, it is because they find themselves in the midst of air which is heavier than they are. I am going to try an experiment

which will make you understand what I have said."

Monsieur Roger took the cork, raised his hand above his head, and opened his fingers: the cork fell.

"Is it a heavy body?" said he. "Did it fall to the ground?"

"Yes," cried Paul and Miette together.

Then Monsieur Roger placed the glass of water in front of him, took the cork, which Miette had picked up, and forced it with his finger to the bottom of the glass; then he withdrew his finger, and the cork mounted up to the surface again.

"Did you see?" asked Monsieur Roger.

"Yes," said Miss Miette.

"You remarked something?"

"Certainly: the cork would not fall, and you were obliged to force it into the water with your finger."

"And not only," continued Monsieur Roger, "it would not fall, as you say, but it even hastened to rise again as soon as it was freed from the pressure of my finger. We were wrong, then, when we said that this same cork is a heavy body?"

"Ah, I don't know," said Miette, a little confused.

"Still, we must know. Did this cork fall just now upon the ground?"

"Yes."

"Then it was a heavy body?"

"Yes."

"And now that it remains on the surface of the water, that it no longer precipitates itself towards the earth, it is no longer a heavy body?"

This time Miette knew not what to answer.

"Well, be very sure," continued Monsieur Roger, "that it is heavy. If it does not fall to the bottom of the water, it is because the water is heavier than it. The water is an obstacle to it. Nevertheless, it is attracted, like all bodies, towards the earth, or, more precisely, towards the centre of the earth."

"Towards the centre of the earth?" repeated Miette.

"Yes, towards the centre of the earth. Can Miss Miette procure for me two pieces of string and two heavy bodies,—for example, small pieces of lead?"

"String, yes; but where can I get lead?" asked Miette.

"Look in the box where I keep my fishing-tackle," said Monsieur Dalize to his daughter, "and find two sinkers there."

Miette disappeared, and came back in a moment with the articles desired. Monsieur Roger tied the little pieces of lead to the two separate strings. Then he told Miette to hold the end of one of these strings in her fingers. He himself did the same with the other string. The two strings from which the sinkers were suspended swayed to and fro for some seconds, and then stopped in a fixed position.



"Is it not evident," said Monsieur Roger, "that the direction of our strings is the same as the direction in which the force which we call weight attracts the bodies of lead? In fact, if you cut the string, the lead would go in that direction. The string which Miss Miette is holding and that which I hold myself seem to us to be parallel,—that is to say, that it seems impossible they should ever meet, however long the distance which they travel. Well, that is an error. For these two strings, if left to themselves, would meet exactly at the centre of the earth."

"Then," said Miette, "if we detach the sinkers, they would fall, and would join each other exactly at the centre of the earth?"

"Yes, if they encountered no obstacle; but they would be stopped by the resistance of the ground. They would attempt to force themselves through, and would not succeed."

"Why?"

"Why, if the ground which supports us did not resist, we would not be at this moment chatting quietly here on the surface of the earth; drawn by gravity, we would all be——"

"At the centre of the earth!" cried Miette.

"Exactly. And it might very well happen that I would not then be in a mood to explain to you the attraction of gravity."

"Yes, that is very probable," said Miss Miette, philosophically. Then she added, "If, instead of letting these bits of lead fall upon the ground, we let them fall in water?"

"Well, they would approach the centre of the earth for the entire depth of the water."

Miette had mechanically placed the sinker above the glass of water. She let it fall into it; the cork still swam above.

"Why does the lead fall to the bottom of the water, and why does the cork not fall?"

"Why," said Albert, "because lead is heavier than cork."

Miette looked at her brother, and then turned her eyes towards Monsieur Roger, as if the explanation given by Albert explained nothing, and finally she said,—

"Of course lead is heavier than cork; but why is it heavier?"

"My child, you want to know a great deal," said Madame Dalize.

"Ah, mamma, it is not my fault,—it is Paul's, who wants to know, and does not like to ask. I am obliged to ask questions in his stead."

That was true. Paul asked no questions, but he listened with attention, and his eyes seemed to approve the questions asked by his friend Miette. Monsieur Roger had observed with pleasure the conduct of his young friend, and it was for him, while he was looking at Miette, the latter continued:

"Tell us, Monsieur Roger, why is lead heavier than cork?"

"Because its density is greater," answered Monsieur Roger, seriously.

"Ah!" murmured Miette, disappointed; and, as Monsieur Roger kept silent, she added, "What is density?"

"It would take a long time to explain."

"Tell me all the same."

Monsieur Roger saw at this moment that Paul was beckoning to Miette to insist.

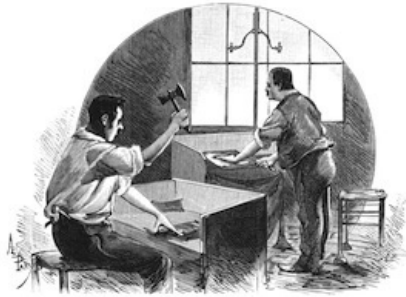
"Goodness!" said he, smiling at Paul; "Miss Miette was right just now. It is you that wish me to continue the questions!"



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## CHAPTER XIII.

### WHY LEAD IS HEAVIER THAN CORK.



Monsieur Roger continued in these words:

"We say that a body has density when it is thick and packed close. We give the name of density to the quantity of matter contained in a body of a certain size.

"Let us suppose that this bit of lead has the same bulk—that is to say, that it is exactly as big—as the cork. Suppose, also, that we have a piece of gold and a piece of stone, also of the same bulk as the cork, and that we weigh each different piece in a pair of scales. We would find that cork weighs less than stone, that stone weighs less than lead, and that lead weighs less than gold. But, in order to compare these differences with each other, it has been necessary to adopt a standard of weight.

"I now return to Miss Miette's question,—'Why is lead heavier than cork?'—a question to which I had solemnly answered, 'Because its density is greater.' Miss Miette must now understand that cork, weighing four times less than water, cannot sink in water, although that process is very easy to lead, which weighs eleven times more than water. And yet," said Monsieur Roger, "the problem is not perfectly solved, and I am quite sure that Miss Miette is not entirely satisfied."

Miss Miette remained silent.

"I was not mistaken. Miss Miette is not satisfied," said Monsieur Roger; "and she is right,—for I have not really explained to her why lead is heavier than cork."

Miss Miette made a gesture, which seemed to say, "That is what I was expecting."

"I said just now," continued Monsieur Roger, "that the density of a body was the quantity of matter contained in this body in a certain bulk. Now does Miss Miette know what matter is?"

"No."

"No! Now, there is the important thing: because, in explaining to her what matter is, I will make her understand why lead is heavier than cork."

"Well, I am listening," said Miette.

And Master Paul respectfully added, in an undertone, "We are listening."

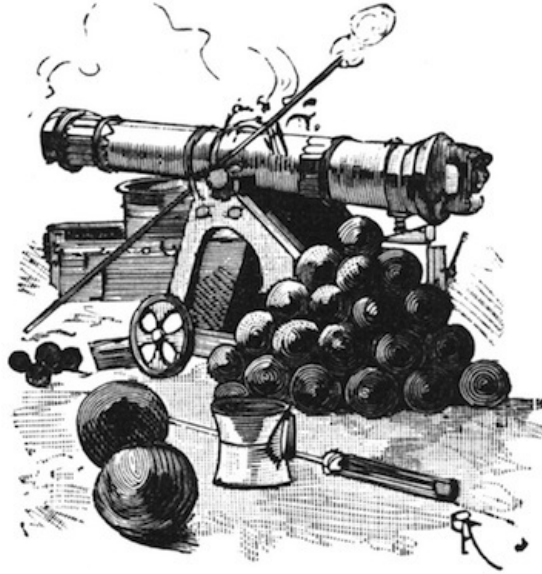
Monsieur Roger continued:

"The name of 'bodies' has been given to all objects which, in infinite variety, surround us and reveal themselves to us by the touch, taste, sight, and smell. All these bodies present distinct properties; but there are certain numbers of properties which are common to all. Those all occupy a certain space; all are expanded by heat, are contracted by cold, and can even pass from the solid to the liquid state, and from the liquid to the gaseous state. They all possess a certain amount of elasticity, a certain amount of compressibility,—in a word, there exist in all bodies common characteristics: so they have given a common name to those possessing these common properties, and called that which constitutes bodies 'matter.' Bodies are not compact, as you may imagine. They are, on the contrary, formed by the union of infinitely small particles, all equal to each other and maintained at distances that are relatively considerable by the force of attraction.

"These infinitely small particles have received the names of atoms or molecules. Imagine a pile of bullets, and remark the empty spaces left between them, and you will have a picture of the formation of bodies. I must acknowledge to you that no one has yet seen the molecules of a body. Their size is so small that no microscope can ever be made keen enough to see them. A wise man has reached this conclusion: That if you were to look at a drop of water through a magnifying instrument which made it appear as large as the whole earth, the molecules which compose this drop of water would seem hardly bigger than bits of bird-shot. Still, this conception of the formation of bodies is proved by certain properties which matter enjoys. Among these properties I must especially single out divisibility. Matter can be divided into parts so small that it is difficult to conceive of them. Gold-beaters, for instance, succeed in making gold-leaf so thin that it is necessary to place sixty thousand one on top of the other to arrive at the thickness of an inch. I will give you two other examples of 'divisibility' that are still more striking. For years, hardly losing any of its weight, a grain of musk spreads a strong odor. In a tubful of water one single drop of indigo communicates its color. The smallness of these particles of musk which strike the sense of smell and of these particles of indigo which color several quarts of water is beyond our imagination to conceive of. And these examples prove that bodies are nothing but a conglomeration of molecules. Now, if lead is heavier than cork, it is because in an equal volume it contains a far more considerable quantity of molecules, and because these molecules are

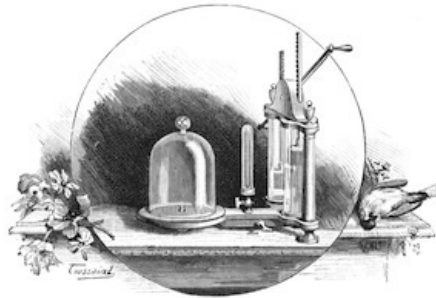
themselves heavier than the molecules of cork. And now I shall stop," said Monsieur Roger, "after this long but necessary explanation. I will continue on the day when Miss Miette will present to me the famous air-pump."

"That will not be very long from now," said Miss Miette to herself.



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## CHAPTER XIV. THE AIR-PUMP.



Monsieur Roger had deferred his explanations for three days. He was awaiting the air-pump which Monsieur Dalize, at Miette's desire, had decided to purchase in Paris. Monsieur Roger judged that this interruption and this rest were necessary. In this way his hearers would not be tired too soon, and their curiosity, remaining unsatisfied for the moment, would become more eager. He was not mistaken; and when a large box containing the air-pump and other objects ordered by Monsieur Roger arrived, a series of cries of astonishment came from the pretty mouth of Miss Miette. Paul Solange, however, remained calm; but Monsieur Roger knew that his interest had been really awakened. They spent the afternoon in unpacking the air-pump, and Monsieur Roger was called upon at once to explain the instrument.

"The machine," he said, "is called an air-pump because it is intended to exhaust air contained in a vase or other receptacle. To exhaust the air in a vase is to make a vacuum in that vase. You will see that this machine is composed of two cylinders, or pump-barrels, out of which there comes a tube, which opens in the centre of this disk of glass. Upon this disk we carefully place this globe of glass; and now we are going to exhaust the air contained in the globe."

"We are going to make a vacuum," said Miette.

"Exactly." And Monsieur Roger commenced to work the lever. "You will take notice," he said, "that when the lever is lowered at the left the round piece of leather placed in the cylinder on the left side is lowered, and that the bit of leather in the right-hand cylinder is raised. In the same way, when the lever is lowered at the right, it is the right-hand piece of leather which is lowered, while the piece of leather at the left is raised in its turn. These round bits of leather, whose importance is considerable, are called pistons. Each piston is hollow and opens into the air on top, while at the bottom, which communicates with that portion of the cylinder situated below the piston, there is a little hole, which is stopped by a valve. This valve is composed of a little round bit of metal, bearing on top a vertical stem, around which is rolled a spring somewhat in the shape of a coil or ringlet. The ends of this spring rest on one side on a little bit of metal, on the other on a fixed rest, pierced by a hole in which the stem of the valve can freely go up and down. When I work the lever, as I am doing now, you see that on the left side the piston lowers itself in

the cylinder, and that the piston on the right is raised. Now, what is going on in the interior of each cylinder? The piston of the left, in lowering, disturbs the air contained in the cylinder,—it forces it down, it compresses it. Under this compression the coiled spring gives way, the round bit of metal is raised, and opens the little hole which puts the under part of the piston in communication with the atmosphere. The air contained in the cylinder passes in this way across the piston and disperses itself in the air which surrounds us. But the spring makes the bit of metal fall back again and closes the communication in the right-hand cylinder as soon as the piston commences to rise and the pressure of the air in the cylinder is not greater than the pressure of the atmosphere outside. Lastly, the tube which unites the cylinders to the glass globe opens at the end of each cylinder, but a little on the side. It is closed by a little cork, carried by a metal stem which traverses the whole piston. When I cause one of the pistons to lower, the piston brings the stem down with it. The cork at once comes in contact with the hole, which closes; the stem is then stopped, but the piston continues to descend by sliding over it. In the other cylinder, in which the piston is raised, it commences by raising the stem, which re-establishes communication with the glass globe; but as soon as the top of the stem comes in contact with the upper part of the cylinder, it stops and the piston glides over it and continues to rise."



"In this fashion the movements of the cork are very small, and it opens and shuts the orifice as soon as one of the pistons begins to descend and the other begins to ascend. Consequently, by working the lever for a certain space of time, I will finish by exhausting the globe of all the air which it contains."

"May I try to exhaust it?" asked Miette, timidly.

"Try your hand, Miss Miette," answered Monsieur Roger.

Miette began to work the lever of the air-pump, which she did at first very easily, but soon she stopped.

"I cannot do it any more," said she.

"Why?"

"Because it is too heavy."

"In fact, it is too heavy," said Monsieur Roger; "but tell me, what is it that is too heavy?"

Miette sought an answer.

"Oh, I do not know. It is the lever or the pistons which have become all of a sudden too heavy."

"Not at all; that is not it. Neither the lever nor the pistons can change their weight."

"Then, what is it that is so heavy?"

"Come, now! Try once more, with all your strength."

Miette endeavored to lower the right-hand side of the lever: she could not succeed.

"Why," said she, "it is, of course, the piston on the left which has become too heavy, as I cannot make it rise again."

"You are right, Miss Miette. It is the piston in the left cylinder which cannot rise; but it has not changed its weight, as I said,—only it has now to support a very considerable weight; and it is that weight which you cannot combat."

"What weight is it?" said Miette, who did not understand.

"The weight of the air."

"The weight of the air? But what air?"

"The air which is above it,—the exterior air; the air which weighs down this piston, as it weighs us down."

"Does air weigh much?"

"If you are very anxious to know, I will tell you that a wine gallon of air weighs about seventy-two grains; and as in the atmosphere—that is to say, in the mass of air which surrounds us—there is a very great number of gallons, you can imagine that it must represent a respectable number of pounds. It has been calculated, in fact, that each square inch of the surface of the soil supports a

weight of air of a little more than sixteen pounds."

"But how is that?" cried Miette. "A while ago there was also a considerable quantity of air above the piston, and yet I could make it go up very easily."

"Certainly, there was above the piston the same quantity of air as now, but there was air also in the globe. Air, like gas, possesses an elastic force,—that is to say, that it constantly endeavors to distend its molecules, and presses without ceasing upon the sides of the vase which contained it, or upon the surrounding air. Now, when you began to work the lever there was still enough air in the globe to balance, through its elastic force, the air outside; and, as the piston receives an almost equal pressure of air from the atmosphere above and from the globe below, it is easily raised and lowered. But while you were working the lever you took air out of the globe, so that at last there arrived a time when so little air remained in this globe that its elastic force acted with little power upon the piston. So the piston was submitted to only one pressure,—that of the atmosphere; and, as I have just told you, the atmosphere weighs heavy enough to withstand your little strength. Still, all the air in the globe is not yet exhausted, and a stronger person, like Master Paul, for example, could still be able to conquer the resistance of the atmosphere and raise the piston."

Paul Solange could not refuse this direct invitation, and he approached the air-pump and succeeded in working the lever, though with a certain difficulty.

Meanwhile, Monsieur Roger was seeking among the physical instruments which had just arrived. He soon found a glass cylinder, whose upper opening was closed by a bit of bladder stretched taut and carefully tied upon the edges.

"Stop, Master Paul," said he: "we are going to exchange the globe for this cylinder, and you will see very readily that the air is heavy. Now take away the globe."

But, though Paul tried his best, he could not succeed in obeying this order. The globe remained firm in its place.

"That is still another proof of the weight of the air," said Monsieur Roger. "The globe is empty of air; and as there is no longer any pressure upon it except from outside,—the pressure of the atmosphere,—Master Paul is unable to raise it."

"He would be able to raise the glass," said Miss Miette, in a questioning tone, "but he cannot lift the air above it?"

"You are exactly right. But you are going to see an experiment which will prove it. First, however, it will be necessary to take away the globe. I am going to ask Miss Miette to turn this button, which is called the key of the air-pump."

Miette turned the key, and then they heard a whistling sound.

"It is the air which is entering the globe," said Monsieur Roger. "Now Master Paul can take the globe away."

That was true. When Paul took away the globe, Monsieur Roger put in its place the cylinder closed by the bit of bladder. Then he worked the handle of the machine again. As the air was withdrawn from the interior of the cylinder, the membrane was heard to crackle. Suddenly it burst, with a sort of explosion, to the great surprise of Miette and the amusement of everybody.

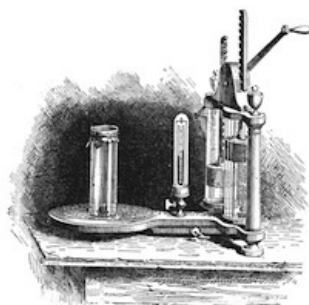
"What is the matter?" said Miette, eagerly.

"The matter is," answered Monsieur Roger, "that the exterior air weighed so heavily upon the membrane that it split it; and that is what I want to show you. The moment arrived when the pressure of the atmosphere was no longer counterbalanced by the elastic force of the air contained in the cylinder. Then that exhausted all the air, and the atmosphere came down with all its weight upon the membrane, which, after resisting for a little while, was torn."

"Is it true, Monsieur Roger," said Miette, "that it is with this machine that you can make smoke fall?"

"Certainly."

"Well, then, won't you show that to us?"



## CHAPTER XV. DROPS OF RAIN AND HAMMER OF WATER.



"I am very willing to show you that," answered Monsieur Roger; "but I must have a candle."

Miette ran to the kitchen and succeeded in obtaining that article which was once so common, and which is now so rare, known as a candle. Monsieur Roger lit the candle and placed it under the glass globe of the air-pump. Then he asked Paul to make a vacuum. At the end of a few minutes the candle went out. Monsieur Roger then told Paul to stop.

"Why has the candle gone out?" asked Miette.

"Because it needs air. Master Paul has just exhausted the air necessary to the combustion of the candle; but the wick still smokes, and we are going to see if the smoke which it produces will rise or fall."

Everybody approached the globe, full of curiosity.

"It falls," cried Miette, "the smoke falls."

And in fact, instead of rising in the globe, the smoke lowered slowly and heavily, and fell upon the glass disk of the air-pump.

"Well," said Monsieur Roger, "you see that I was right. In a vacuum smoke falls: it falls because it no longer finds itself in the midst of air which is heavier than it and forms an obstacle to its fall. In the same way the cloud in the sky above the château would fall if we could exhaust the air which is between it and us."

"I am very glad that we cannot," cried Miette.

"And why are you very glad?" asked Madame Dalize.

"Because, mamma, I don't wish any rain to fall."

"Does Miss Miette think, then," said Monsieur Roger, "that if the cloud fell rain would fall?"

"Certainly," answered Miss Miette, with a certain amount of logic. "When the clouds fall they fall in the form of rain."

"Yes; but supposing that I should exhaust the air which is between the cloud and us, the cloud would not fall in a rain, but in a single and large mass of water."

"Why?"

"Clouds, you doubtless know, are masses of vapor from water. Now, when these vapors are sufficiently condensed to acquire a certain weight, they can no longer float in the atmosphere, and they fall in the form of rain. But they fall in rain because they have to traverse the air in order to fall to the ground. Now, the air offers such a resistance to this water that it is obliged to separate, to divide itself into small drops. If there were no air between the water and the ground, the water would not fall in drops of rain, but in a mass, like a solid body; and I am going to prove that to you, so as to convince Miss Miette."

Among the various instruments unpacked from the box, Monsieur Roger chose a round tube of glass, closed at one end, tapering, and open at the other end. He introduced into this tube a certain quantity of water so as to half fill it. Then he placed the tube above a little alcohol lamp, and made the water boil.

"Remark," said he, "how fully and completely the vapors from the water, which are formed by the influence of heat, force out the air which this tube encloses in escaping by the open end of the tube."

When Monsieur Roger judged that there no longer remained any air in the tube, he begged Monsieur Dalize to hand him the blowpipe. Monsieur Dalize then handed to his friend a little instrument of brass, which was composed of three parts,—a conical tube, furnished with a mouth, a hollow cylinder succeeding to the first tube, and a second tube, equally conical, but narrower, and placed at right angles with the hollow cylinder. This second tube ended in a very little opening.

Monsieur Roger placed his lips to the opening of the first tube, and blew, placing the little



opening of the second tube in front of the flame of a candle, which Monsieur Dalize had just lit. A long and pointed tongue of fire extended itself from the flame of the candle. Monsieur Roger placed close to this tongue of fire the tapering and open end of the tube in which the water had finished boiling. The air, forced out of the blowpipe and thrust upon the flame of the candle, bore to this flame a considerable quantity of oxygen, which increased the combustion and produced a temperature high enough to soften and melt the open extremity of the tube, and so seal it hermetically.

"I have," said Monsieur Roger, "by the means which you have seen, expelled the air which was contained in this tube, and there remains in it only water. In a few moments we will make use of it. But it is good to have a comparison under your eyes. I therefore ask Miss Miette to take another tube similar to that which I hold."

"Here it is," cried Miette.

"Now I ask her to put water into it."

"I have done so."

"Lastly, I ask her to turn it over quickly, with her little hand placed against its lower side in order to prevent the water from falling upon the floor."

Miss Miette did as she was commanded. The water fell in the tube, dividing itself into drops of more or less size. It was like rain in miniature.

"The water, as you have just seen," said Monsieur Roger, "has fallen in Miss Miette's tube, dividing itself against the resistance of the air. In the tube which I hold, and in which there is no longer any air, you will see how water falls."

Monsieur Roger turned the tube over, but the water this time encountered no resistance from the air. It fell in one mass, and struck the bottom of the tube with a dry and metallic sound.

"It made a noise almost like the noise of a hammer," said Paul Solange.

"Exactly," answered Monsieur Roger. "Scientists have given this apparatus the name of the water-hammer." And looking at Miette, who in her astonishment was examining the tube without saying anything, Monsieur Roger added, smiling, "And this hammer has struck Miss Miette with surprise."



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## CHAPTER XVI. AMUSING PHYSICS.



Hearing Monsieur Roger's jest, Miette raised her head, and said,—

"Yes, it is very curious to see water fall like that, in a single mass; and, besides, it fell quicker than the water in my tube."

"Of course: because it did not encounter the resistance of the air. This resistance is very easy to prove; and if Miss Miette will give me a sheet of any kind of paper——"

Miss Miette looked at Monsieur Roger, seeming to be slightly nettled,—not by the errand, but by something else.

Then she went in search of a sheet of letter-paper, which she brought back to Monsieur Roger. He raised his hand and dropped the paper. Instead of falling directly towards the earth, as a piece of lead or stone would do, it floated downward from the right to the left, gently balanced, and impeded in its fall by the evident resistance of the air. When this bit of paper had at last reached the ground, Monsieur Roger picked it up, saying,—

"I am going to squeeze this bit of paper in such a way as to make it a paper ball; and I am going to let this paper ball fall from the same height as I did the leaf."

The paper ball fell directly in a straight line upon the floor.

"And yet it was the same sheet," said he, "which has fallen so fast. The matter submitted to the action of gravity remains the same; there can be no doubt on that point. Therefore, if the sheet of paper falls more quickly when it is rolled up into a ball, it is certainly because it meets with less resistance from the air; and if it meets with less resistance, it is because under this form of a ball it presents only a small surface, which allows it easily to displace the air in order to pass."

"That is so," said Miss Miette, with a certainty which made every one smile.

Miette, astonished at the effect which she had thus produced, looked at her friend Paul, who remained silent, but very attentive.

"Well, Paul," said she, "is not that certain?"

"Yes," answered Paul.

"Hold," returned Monsieur Roger. "I am going to show you an example still more convincing of the resistance of the air,—only I must have a pair of scissors; and if Miss Miette will have the kindness to——"

Miss Miette looked again at Monsieur Roger with a singular air. None the less, she ran off in search of the scissors. Then Monsieur Roger pulled from his pocket a coin, and with the aid of the scissors cut a round bit of paper, a little smaller than the coin. That done, he placed the circular bit of paper flat upon the coin, in such a manner that it did not overlap, and asked Miss Miette to take the coin between her thumb and her finger.

"Now," said he, "let it all fall."

Miette opened her fingers, and the coin upon which he had placed the bit of paper fell. Coin and paper reached the ground at the same time.

"Why," asked Monsieur Roger, "does the paper reach the ground as soon as the coin?"

And as Miette hesitated to answer, Monsieur Roger continued:

"Because the fall of the bit of paper was not interfered with by the resistance of the air."

"Of course," cried Miette, "it is the coin which opened the way. The paper was preserved by the coin from the resistance of the air."

"Exactly so," said Monsieur Roger; "and these simple experiments have led scientists to ask if in doing away entirely with the resistance of the air it would not be possible to abolish the differences which may be observed between the falling of various bodies,—for instance, the paper and the coin, a hair and a bit of lead. And they have decided that in a vacuum—that is to say, when the resistance of the air is abolished—the paper and the coin, the hair and the lead would fall with exactly the same swiftness; all of them would traverse the same space in the same time."



"The hair falls as fast as lead," said Miette, in a tone which seemed to imply, "I would like to see

that."

Monsieur Roger understood the thought of Miette, and answered by saying,—

"Well, I am going to show you that."

He chose a long tube of glass, closed by bits of metal, one of which had a stop-cock. He put in this tube the coin, the round bit of paper, a bit of lead, and a strand of hair from Miss Miette's head. Then he fastened the tube by one of its ends upon the disk of the air-pump and worked the pistons. As soon as he thought that the vacuum had been made, he closed the stop-cock of the tube, to prevent the exterior air from entering. He withdrew the tube from the machine, held it vertically, then turned it briskly upsidedown. Everybody saw that the paper, the coin, the hair, and the lead all arrived at the same time at the bottom of the tube. The experiment was conclusive. Then Monsieur Roger opened the stop-cock and allowed the air to enter into the tube. Again he turned the tube upsidedown: the coin and the bit of lead arrived almost together at the bottom of the tube, but the paper, and especially the strand of hair, found much difficulty on the way and arrived at the bottom much later.

"Why, how amusing that is!" cried Miette; "as amusing as anything I know. I don't understand why Paul wishes to have nothing to do with physical science."

But Miette was mistaken this time, for Paul was now very anxious to learn more.

"Very well," said Monsieur Roger, "as all this has not wearied you, I am, in order to end to-day, going to make another experiment which will not be a bit tiresome, and which, without any scientific apparatus, without any air-pump, will demonstrate to you for the last time the existence of the pressure, of the weight of the atmosphere."

Monsieur Roger stopped and looked at Miette, whose good temper he was again going to put to the test. Then he said,—

"I need a carafe and a hard egg; and if Miss Miette will only be kind enough to——"

This time Miette seemed still more uneasy than ever, more embarrassed, more uncomfortable; still, she fled rapidly towards the kitchen. During her absence, Monsieur Roger said to Madame Dalize,—

"Miette seems to think that I trouble her a little too often."

"That is not what is annoying her, I am certain," replied Madame Dalize; "but I do not understand the true cause. Let us wait."

At this moment Miette returned, with the carafe in one hand, the hard-boiled egg (it was not boiled very hard, however) in the other. Monsieur Roger took the shell off the egg and placed the egg thus deprived of its shell upon the empty carafe, somewhat after the manner of a stopper or cork.



"What I want to do," said he, "is to make this egg enter the carafe."

"Very well," said Miette; "all you have to do is to push from above: you will force the egg down."

"Oh, but nobody must touch it. It must not be a hand that forces it down, but by weight from above. No, the atmosphere must do this."

Monsieur Roger took off the egg, and lit a bit of paper, which he threw into the empty carafe.

"In order to burn," said he, "this paper is obliged to absorb the oxygen of the air in the carafe,—that is to say, it makes a partial vacuum." When the paper had burned for some moments, Monsieur Roger replaced the egg upon the carafe's neck, very much in the manner you would place a close-fitting ground-glass stopper in the neck of a bottle, and immediately they saw the egg lengthen, penetrate into the neck of the carafe, and at last fall to the bottom. "There," said he, "is atmospheric pressure clearly demonstrated. When a partial vacuum had been made in the carafe,—that is to say, when there was not enough air in it to counterbalance or resist the pressure of the exterior air,—this exterior air pressed with all its weight upon the egg and forced it down in very much the same way as Miss Miette wished me to do just now with my hand."

In saying these last words, Monsieur Roger looked towards Miette.

"By the way," he said, "I must apologize to you, Miss Miette, for having sent you on so many errands. I thought I saw that it annoyed you a little bit."

Miss Miette raised her eyes with much surprise to Monsieur Roger.

"But that was not it at all," said she.

"Well, what was it?" asked Monsieur Roger.

And Miette replied timidly, yet sweetly,—

"Why, I only thought that you might stop calling me Miss. If you please, I would like to be one of your very good friends."

"Oh, yes; with very great pleasure, my dear little Miette," cried Monsieur Roger, much moved by this touching and kindly delicacy of feeling, and opening his arms to the pretty and obliging little child of his friends.



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## CHAPTER XVII. WHY THE MOON DOES NOT FALL.



Next evening Monsieur Roger, as well as his friend Monsieur Dalize, seemed to have forgotten completely that there was such a thing as physical science. He sat in a corner and chatted about this thing and that with Monsieur and Madame Dalize. Still, the air-pump was there, and the children touched it, looked at it, and examined the different portions of it.

At last there was a conversation in a low tone between Paul and Miette, and in the midst of the whispering were heard these words, clearly pronounced by the lips of Miette,—

"Ask him yourself."

Then Monsieur Roger heard Paul answer,—

"No, I don't dare to."

Miette then came forward towards her friend Roger, and said to him, without any hesitation,—

"Paul asks that you will explain to him about the tower?"

Monsieur Roger remained a moment without understanding, then a light struck him, and he said,  
—

"Ah! Master Paul wants me to explain to him how I learned the height of the tower Heurtebize?"

"That is it," said Miette.

Paul Solange made an affirmative sign by a respectful movement of the head.

"But," said Monsieur Roger, responding to this sign, "it is physical science, my dear Master Paul, —physical science, you know; and, goodness, I was so much afraid of boring you that both I and Monsieur Dalize had resolved never to approach this subject."

"Still, sir," said Paul, "all that you have said and shown to us was on account of the tower of Heurtebize, and you promised me——"

"That is true," said Monsieur Dalize; "and if you promised, you must keep your word. So explain to Paul how you have been able, without moving, to learn the exact height of that famous tower."

"Come, then, I obey," answered Monsieur Roger.

And, addressing himself to Paul, he said,—

"You will remember that at the beginning of this conversation on gravity I took a little stone and let it fall from my full height. It produced a very feeble shock; but I made you remark that if it were to fall from a greater height the shock would be violent enough to break it."

"Yes," said Paul, "I remember."

"Then, of course, you understand that the violence of the shock of a body against a fixed obstacle depends upon the rate of speed this body possessed at the moment when it encountered the obstacle. The higher the distance from which the body falls, the more violent is the shock,—for its swiftness is greater. Now, the speed of a falling body becomes greater and greater the longer it continues to fall; and, consequently, in falling faster and faster it will traverse a greater and greater space in a given interval of time. In studying the fall of a body we find that in one second it traverses a space of sixteen feet and one inch. In falling for two seconds it traverses—"

"Twice the number of feet," said Miette, with a self-satisfied air.

"Why, no," said Paul; "because it falls faster during the second second, and in consequence travels a greater distance."

"Master Paul is right," replied Monsieur Roger. "It has been found that in falling for two seconds a body falls sixteen feet and one inch multiplied by twice two,—that is to say, sixty-four feet and four inches. In falling three seconds a body traverses sixteen feet and one inch multiplied by three times three,—that is to say, by nine. In falling four seconds it traverses sixteen feet and one inch multiplied by four times four,—that is to say, by sixteen; and so on. This law of falling bodies which learned men have discovered teaches us that in order to calculate the space traversed by a body in a certain number of seconds it is necessary to multiply sixteen feet and one inch by the arithmetical square of that number of seconds. And Master Paul must know, besides, that the square of a number is the product obtained by multiplying this number by itself."

Paul bent his head.

"And now you must also know," continued Monsieur Roger, "how I could calculate the height of the tower of Heurtebize. The stone which you let fall, according to my watch, took two seconds before it reached the soil. The calculation which I had to make was easy, was it not?"

"Yes, sir: it was necessary to multiply sixteen feet and one inch by two times two,—which gives about sixty-four feet and four inches as the height of the tower."

"You are right, and, as you may judge, it was not a very difficult problem."

"Yes," added Monsieur Dalize; "but it was interesting to know why the apple fell, and you have taught us."

"That is true," cried Miette; "only you have forgotten to tell us why the moon does not fall."

"I have not forgotten," said Monsieur Roger; "but I wished to avoid speaking of the attraction of the universe. However, as Miette obliges me, I shall speak. You see that all earthly bodies are subject to a force which has been called gravity, or weight. Now, gravity can also be called attraction. By the word attraction is meant, in fact, the force which makes all bodies come mutually together and adhere together, unless they are separated by some other force. This gravity or attraction which the terrestrial mass exerts upon the objects placed on its surface is felt above the soil to a height that cannot be measured. Learned men have, therefore, been led to suppose that this gravity or attraction extended beyond the limits which we can reach; that it acted upon the stars themselves, only decreasing as they are farther off. This supposition allows it to be believed that all the stars are of similar phenomena, that there is a gravity or attraction on their surface, and that this gravity or attraction acts upon all other celestial bodies. With this frame of thought in his mind, Newton at last came to believe that all bodies attract each other by the force of gravity, that their movements are determined by the force which they exert mutually upon one another, and that the system of the universe is regulated by a single force,—gravity, or attraction."

"But that does not explain to us why the moon does not fall," said Monsieur Dalize.

Monsieur Roger looked at his friend.

"So you also," said he, smiling,— "you also are trying to puzzle me?"

"Of course I am; but I am only repeating the question whose answer Miette is still awaiting."

"Yes," said Miette, "I am waiting. Why does not the moon fall?"

"Well, the moon does not fall because it is launched into space with so great a force that it traverses nearly four-fifths of a mile a second."

Miette ran to open the door of the vestibule. The park was bathed in the mild light of a splendid moon.

"Is it of that moon that you are speaking,—the moon which turns around us?"

"Certainly, as we have no other moon."

"And it turns as swiftly as you say?"

"Why, yes. And do you know why it turns around us, a prisoner of that earth from which it seeks continually to fly in a straight line? It is because——"

Monsieur Roger stopped suddenly, with an embarrassed air.

"What is the matter?" asked Miette.

"Why, I am afraid I have put myself in a very difficult position."

"Why?"



"I have just undertaken to tell you why the moon does not fall. Is not that true?"

"Yes."

"Well, I am obliged to tell you that it does fall."

"Ah, that is another matter!" cried Miette.

"Yes, it is another matter, as you say; and it is necessary that I should speak to you of that other matter. Without that how can I make you believe that the moon does not fall and that it does fall?"

"That would not be easy," said Miss Miette.

"Well, then, imagine a ball shot by a cannon. This ball would go forever in a straight line and with the same swiftness if it were not subject to gravity, to the attraction of the earth. This attraction forces the ball to lower itself little by little below the straight line to approach the earth. At last the time comes when the force of attraction conquers the force which shot the ball, and the latter falls to the earth. This example of the ball may be applied to the moon, which would go forever in a straight line if it were not subject to the attraction of the earth. It shoots in a straight line, ready to flee away from us; but suddenly the attraction of the earth makes itself felt. Then the moon bends downward to approach us, and the straight line which it had been ready to traverse is changed to the arc of a circle. Again the moon endeavors to depart in a straight line, but the attraction is felt again, and brings near to us our unfaithful satellite. The same phenomenon goes on forever, and the straight path which the moon intended to follow becomes a circular one. It falls in every instance towards us, but it falls with exactly the same swiftness as that with which it seeks to get away from us. Consequently it remains always at the same distance. The attraction which prevents the moon from running away may be likened to a string tied to the claws of a cockchafer. The cockchafer flies, seeking to free itself; the string pulls it back towards the child's finger; and very often the circular flight which the insect takes around the finger which holds it represents exactly the circular flight of the moon around the earth."

"But," said Miette, "is there no danger that the moon may fall some time?"

"If the moon had been closer to the earth it would have fallen long ago; but it is more than two hundred and thirty-eight thousand miles away, and, as I have told you, if attraction or gravity acts upon the planets, it loses its power in proportion to the distance at which they are. The same attraction which forces the moon to turn around the earth obliges the earth and the planets to turn around the sun; and the sun itself is not immovable. It flies through space like all the other stars, bearing us in its train, subject also to universal attraction."

Monsieur Roger stopped a moment, then he said,—

"And it is this great law of universal attraction, this law which governs the universe, that Newton

discovered when he asked himself, 'Why does the apple fall?'"

"Still, as for me," said Miette, "I should not have had that idea at all; I should have said quietly to myself, 'The apple fell because it was ripe.'"



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## CHAPTER XVIII.

### A MYSTERIOUS RESEMBLANCE.



The days passed by at the château of Sainte-Gemme quietly and happily. Monsieur Roger, having fulfilled his promise to give the explanation of gravity and of attraction, was careful to make no allusions to scientific matters. He thought it useful and right to let his little hearers find their own pleasures wherever they could. One afternoon he saw Miette and Paul leave the house together. Paul had two camp-stools, while Miette held her friend's album.

"Where are you going?" asked Monsieur Roger.

"We are going to sketch," answered Paul: "at the end of the park."

Miette put on the air of a martyr, and said to Monsieur Roger,—

"I think he is going to sketch me."

"Not at all; come along," replied Paul.

And Miette ran gayly after Paul.

An hour later, Monsieur Roger, in his walk, saw at the turning of a pathway lined by young chestnut-trees a scene which brought a smile to his lips. Two camp-stools were placed in front of each other, some distance apart; upon one of these camp-stools Paul was seated, his album and his pencil between his hands; on the other camp-stool was Miss Miette, posing for a portrait. Monsieur Roger approached.

When Miette saw him, she sat up, and, crossing her little arms, cried, with pretended anger,—

"I told you so: he is going to sketch me."

"Oh, Miette," said Paul, softly, "you have spoiled the pose."

Miette turned towards Paul, and, seeing that she had made him angry, returned to her former attitude without saying a word. Monsieur Roger looked at Miette, so pretty, so restless by disposition, now forcing herself to sit quietly, with an expression of determination upon her face that was half serious and half laughing. Then he cast his eyes upon Paul's album, but at that moment Paul was scratching over with his pencil the sketch which he had begun.

"Never," said he, discouraged, "never shall I be able to catch her likeness."

"That is not astonishing," replied Monsieur Roger. "I was struck at once with the change in her face. Miette in posing does not resemble herself any longer."

"That is true, sir; but why is it?"

"Why, because it is possible that it does not amuse her very much."

Miette began to laugh. Monsieur Roger had guessed aright.

"Oh, stay like that!" cried Paul, seeing Miette's face lighten up with gayety.

"I will remain like this on one condition."

"And what is that?"

"That our friend Roger will remain also with us. I shall have some one to whom I can talk, and you, Paul, will make your sketch at your ease."

"That is understood," said Monsieur Roger, seating himself upon a bank of stones beside the children. At first he lent a rather listless ear to Miette's words, for he was thinking of something else, and he only uttered a word or two in answer, which, however, allowed the little girl to think that she was being listened to. His eyes had travelled from the model to the artist. Since his arrival at Sainte-Gemme Paul's face had slightly changed: his hair, which had been cut short at school, had lengthened, and now fell over his forehead, shading the top of his face and giving him an expression that was slightly feminine; his large eyes, with long, black lashes, went from Miette to the sketch-book with a grave attention which the presence of a third party did not trouble at all. Roger's looks had rested upon Paul, full of that sympathy which the boy had inspired in him the first time he had seen him; but, instead of looking elsewhere at the end of a few minutes, his eyes were riveted upon Paul's face. He eagerly examined every feature of that face, which had suddenly been revealed to him under a new aspect. He had become very pale, and his hands trembled slightly. Miette perceived this sudden change, and, full of uneasiness, cried out,—

"Why, what is the matter?"

Recalled to himself by this exclamation, Monsieur Roger shook his head, passed his hand over his eyes, and answered, striving to smile,—

"Why, there is nothing the matter with me, my dear, except a slight dizziness, caused by the sun no doubt. Don't be uneasy about me. I am going back home."

And Monsieur Roger left them at a rapid pace, cutting across the pathway to get out of sight of the children. He walked like a crazy man; his eyes were wild, his brain full of a strange and impossible idea. When he had reached the other end of the park, sure of being alone, sure of not being seen, he stopped; but then he felt weak, and he allowed himself to fall upon the grass. For a long time he remained motionless, plunged in thought. At last he got up, murmuring,—

"Why, that is impossible. I was a fool."

He was himself again. He had thought over everything, he had weighed everything, and he persuaded himself that he had been the plaything of a singular hallucination. Still reasoning, still talking to himself, he took no notice of where he was going. Suddenly he perceived that he was returning to the spot which he had left. He stopped, and heard the voice of Miette in the distance; then he approached as softly as was possible, walking on tiptoe and avoiding the gravel and the falling leaves. One wish filled his heart,—to see Paul again without being seen. He walked through the woods towards the side whence the voice had made itself heard. The voice of Miette, now very close, said,—

"Let's see, Paul. Is it finished?"

"Yes," answered Paul; "only two minutes more. And this time, thanks to Monsieur Roger, it will be something like you."

Monsieur Roger, hidden behind branches and leaves, came nearer, redoubling his precautions. At last, through an opening in the foliage he perceived Paul Solange. He looked at him with profound attention until the lad, having started off with Miette, was some distance away. When the two children had disappeared, Monsieur Roger took the shaded path he had been following and went towards the château. He walked slowly, his head bent down, his mind a prey to mysterious thoughts. He had seen Paul again, and had studied his face, this time appealing to all his coolness, to all his reasoning power. And now a violent, unconquerable emotion bound him. In vain he tried in his sincerity to believe in a too happy and weak illusion, in a too ardent desire, realized only in his imagination. No, he was forced to admit that what he had just beheld had been seen with the eyes of a reasoning and thinking man whose brain was clear and whose mind was not disordered. However, this thought which had taken possession of him, this overwhelming idea of happiness, was it even admissible? And Monsieur Roger, striving to return to the reality, murmured,—





"It is folly! it is folly!"

Was it not in fact folly which had led him suddenly to recognize in the features of Paul Solange those of Madame Roger La Morlière? Was it not folly to have noticed a mysterious, surprising, and extraordinary resemblance between the face of Paul Solange and the sweet one of her who had been the mother of George? Yes, it was madness, it was impossible. Yet, in spite of all, Monsieur Roger said to himself, deep down in his heart,—

"If it were my son?"



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## CHAPTER XIX. THE FIXED IDEA.



For some days Monsieur Roger made no allusion to the secret which now filled his soul, nor to that strange idea which filled his whole brain. He retired into himself, thinking that this folly which had suddenly come to him would go away as suddenly, and again feeling, in spite of all, the certain loss of a dream which had made him so happy. And still, the more he looked at Paul, which he did only on the sly, not daring to look him in the face, as formerly, for fear of betraying himself, the more and more evident and real did the mysterious resemblance appear to him. The Dalize family had remarked the absence of mind and the wandering look of Monsieur Roger. Still, they thought that that was simply because something had reminded him of his sorrows. Even Paul could not help taking notice of the new attitude which Monsieur Roger had taken up with regard to him. The kindness and sympathy which Monsieur Roger had shown him in the first few

days of his acquaintance had greatly touched the motherless boy, whose father was far away on the other side of the ocean.

Now, for some days, it had seemed to Paul that Monsieur Roger sought to avoid his presence,— he neither spoke to him nor looked at him. Once only Paul had surprised a look which Monsieur Roger had given him, and in this sad look he had discovered an affection so profound that it felt to him almost like a paternal caress. Yet, Paul was forced to acknowledge that his father had never looked at him in that way.

One evening, after dinner, Monsieur Dalize led his friend Roger into the garden in front of the house, and said to him,—

"Roger, my dear friend, you have made us uneasy for some days. Now we are alone. What is the matter with you?"

"Why, nothing is the matter with me," said Monsieur Roger, surprised at the question.

"Why, certainly, something is the matter. What has happened to you?"

"I don't understand what you mean?"

"Roger, you oblige me to tread on delicate ground,—to ask you a painful question."

"Speak."

"Well, my dear friend, the change which we have noticed in you for some time is not my fault, is it? Or does it come from the surroundings in which you find yourself placed?"

"I don't understand."

"I ask if your grief—without your knowing it, perhaps—may not have been revived by the happiness which reigns around you? Perhaps the presence of these children, who nevertheless love you already almost as much as they do me, awakes in your heart a terrible remembrance and cruel regrets?"

"No, no," cried Monsieur Roger; "that is not true. But why do you ask me such questions?"

"Because, my dear friend, you are mentally ill, and I wish to cure you."

"Why, no, I am not. I am not ill either mentally or physically, I swear."

"Don't swear," said Monsieur Dalize; "and do me the kindness to hide yourself for some moments behind this clump of trees. I have witnesses who will convince you that I still have good eyes."

Monsieur Dalize got up, opened the door of the vestibule, and called Miette. She ran out gayly.

"What do you wish, papa?" she said.

"I want to see our friend Roger. Is he not in the parlor with you?"

"No; he always goes his own way. He does not talk to us any longer; and he has had a very funny, sad look for some time. He is not the same at all."



"Very well, my child," said Monsieur Dalize, interrupting the little girl. "Go back to the parlor and send me your brother."

Albert soon arrived.

"You wanted me, father?" said he.

"Yes; I want you to repeat to me what you told your mother this morning."

Albert thought for a moment; then he said,—

"About Monsieur Roger?"

"Yes."

"Well, I told mamma that for some time back I have heard Monsieur Roger walking all night in his room; only this evening I heard him crying."

"That is all that I wish to know, my child. You can go back again."

When Monsieur Dalize was alone, he walked around the clump of trees to rejoin Roger.

"Well," said he, softly, "you have heard. Everybody has noticed your grief. Won't you tell me now what it is that you are suffering, or what secret is torturing you?"

"Yes, I will confide this secret to you," said Monsieur Roger, "because you will understand me, and you will not laugh at your unhappy friend." And Monsieur Roger told the whole truth to his friend Dalize. He told him what a singular fixed idea had possessed his brain; he told him of the strange resemblance which he thought he had discovered between the features of his dear and regretted wife and the face of Paul Solange.

Monsieur Dalize let his friend pour out his soul to him. He said only, with pitying affection, when Monsieur Roger had finished,—

"My poor friend! it is a dream that is very near insanity."

"Alas! that is what I tell myself; and still——"

"And still?" repeated Monsieur Dalize. "You still doubt? Come with me."

He re-entered the château with Roger. When he reached the parlor he went straight to Paul Solange.

"Paul," said he, "to-morrow is the mail, and I shall write to your father."

"Ah, sir," answered Paul, "I will give you my letter; maybe you can put it in yours."

Monsieur Dalize seemed to be trying to think of something.

"How long a time is it," said he, "since I have had the pleasure of seeing your excellent father?"

"Two years, sir; but he will surely come to France this winter."

Monsieur Dalize looked at Roger; then he whispered in his ear,—

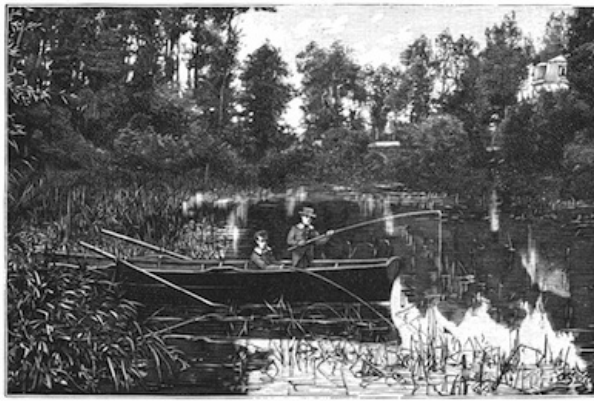
"You have heard."



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## CHAPTER XX.

### FIRE.



Certainly Monsieur Roger had heard, certainly he tried to convince himself; but when his looks fell upon Paul, his reason forsook him and he doubted again, and even he hoped. Some days passed in a semi-sadness that made every one feel uneasy. The children, without knowing why, knew that something had happened which troubled the mutual happiness of their life. Monsieur and Madame Dalize alone understood and pitied their friend Roger. They endeavored to interest him in other things,—but Monsieur Roger refused walks, excursions, and the invitations of the neighbors. He had asked Monsieur Dalize to let him alone for a while, as he felt the need of solitude.

One morning Albert said to his father,—

"Father, Paul and I wish to go with a fishing-party to the farm, as we did last year. Will you allow us to do so?"

"Yes," answered Monsieur Dalize; "but on one condition."

"What is it?"

"That you take Monsieur Roger with you."

Albert looked at his father, and answered,—

"Then you refuse?"

"Why, no,—I only make that condition."

"Yes, father; but as we cannot fulfil the condition, it is equal to a refusal."

"Why cannot you fulfil it? What is there so difficult about it?"

"You know as well as I, my dear father, Monsieur Roger has been for some time very sad, very preoccupied; he wants to remain by himself, and consequently he will refuse to go to the farm."

"Who knows?"

"Well, at all events, I would not dare to ask him."

"Well, then, let Paul do it."

"But what would Paul say?"

"He will say that I am detained here, that I cannot come with you, and that, not thinking it prudent to allow you to go fishing alone, I object to it unless Monsieur Roger will consent to take my place."

"Very well, father," said Albert, in a disappointed tone. "We will see whether Paul succeeds; but I am afraid he will not."

But Paul did succeed. Monsieur Roger could not resist the request so pleasantly made by the boy. That evening, after dinner, they left home to sleep at the farm, which was situated on the borders of the River Yonne. They had to get up at daybreak in order to begin their fishing. The farmers gave up to Monsieur Roger the only spare room they had in the house. Albert and Paul had to sleep in what they called the turret. This turret, the last mossy vestige of the feudal castle, whose very windows were old loop-holes, now furnished with panes of glass, stood against one end of the farm-house. It was divided into three stories: the first story was a place where they kept hay and straw; in the second there slept a young farm-boy; the higher story was reserved for another servant, who was just now absent.

"In war we must do as the warriors do," cried Albert, gayly; "besides, we have not so long to sleep. You may take whichever room you like the best."

"I will take the highest story, if you are willing," answered Paul; "the view must be beautiful."

"Oh, the view! through the loop-holes and their blackened glasses! However, you can climb up on the old platform of the turret if you wish. It is covered with zinc, like the roof of an ordinary house; but, all the same, one can walk upon it. Come, I will show it to you."

The wooden staircase was easily ascended by the boys. When they had reached the room which

Paul was to occupy, Albert pointed his hand towards the ceiling and made Paul remark a large bolt.

"See," said he: "you have only to get upon a chair to draw this bolt and to push the trap-door, which gives admission to the turret. On the roof you will, in fact, see a beautiful view."

"I shall do that to-morrow morning, when I get up," answered Paul.

Albert, after he had said good-night to his friend, descended the staircase and slept in the bed which the farm-boy had yielded to him; the latter was to spend the night upon a bed of hay in the first story.

A distant clock in the country had struck twelve. Monsieur Roger had opened the window of his room, and, being unable to sleep, was thinking, still the prey to the fixed idea, still occupied by the strange resemblance; and now the two names of Paul and George mingled together in his mind and were applied only to the one and the same dear being. Suddenly the odor of smoke came to him, brought on the breeze. In the cloudy night he saw nothing, and still the smoke grew more and more distinct. Every one was asleep at the farm: no light was burning, no sound was heard. Monsieur Roger bent over the window-sill and looked uneasily around him. The loop-holes of the lower story of the turret were illuminated; then sparks escaped from it, soon followed by jets of flame. At the same instant the wooden door which opened into the yard was violently burst open, and Monsieur Roger saw two young people in their night-gowns fleeing together and crying with a loud voice. This was all so quick that Monsieur Roger had had neither the time nor the thought of calling for help. A spasm of fear had seized him, which was calmed, now that Paul and Albert were safe; but the alarm had been given, and the farm-hands had awakened. But what help could they expect? The nearest village was six miles off; the turret would be burned before the engines could arrive. Monsieur Roger had run out with the others to witness this fire which they could not extinguish. He held Albert in his arms, embraced him, and said to him,—

"But, tell me, where is Paul?"

Albert looked around him.

"He must be here,—unless fright has made him run away."

"No, he is not here. But you are sure that he ran out of the tower, are you not?"

"Certainly, since it was he who came and shook me in my bed while I was asleep."

At this moment a young boy in a night-gown came out of the crowd, and, approaching Albert, said,—

"No; it was I, sir, who shook you."

Monsieur Roger looked at the boy who had just spoken, and he felt a horrible fear take possession of him. He saw that it was the farm-boy. It must have been he whom he had seen fleeing a moment before with Albert. But Paul? Had he remained in the turret? And the flames which licked the walls had almost reached the floor where Paul was sleeping. Was the poor boy still asleep? Had he heard nothing?

"A ladder!" cried Monsieur Roger, with a cry of fear and despair.

The ladder was immediately brought; but it was impossible to place it against the turret, whose base was in flames.

Monsieur Roger in a second had examined the battlements which composed the roof. He ran towards the farm-house, climbed up the staircase to the top story, opened a trap-door, and found himself upon the roof. Crawling on his hands and knees, following the ridge of the roof, he reached the turret, and found himself even with the story where Paul Solange was asleep. The loop-hole was before him. With a blow of his elbow he broke the glass; then he cried,—

"Paul! Paul!"

Below the people looked at him in mournful silence. No reply came from the room; he could see nothing through the darkness. Monsieur Roger had a gleam of hope: Paul must have escaped. But a sheet of fire higher than the others threw a sudden light through the loop-hole on the other side.

Monsieur Roger was seized with indescribable anguish. Paul Solange was there in his bed. Was he asleep? Monsieur Roger cried out anew with all his force. Paul remained motionless. Then Monsieur Roger leaned over the roof, and said to the people below,—

"Cry at the top of your voices! Make a noise!"

But the next moment he made a sign to them to be silent,—for Monsieur Roger had felt somebody crawling behind him, somebody who had followed his perilous path. It was Albert Dalize.

"Oh, my friend,—my poor friend!" cried Monsieur Roger; "what can we do? Is it not enough to make you crazy? See! the staircase is in flames. You can hardly pass your arm through the loop-holes. Whether he wakes or not, he is lost." And then he said, with an awful gravity, "Then, it is better he should not awake."

"No," replied Albert, quickly; "there is an opening at the top of the tower."

"There is an opening?"

"Yes, a trap-door, which I showed him only a little while ago, before we went to sleep."

Monsieur Roger raised himself upon the roof to a standing position.

"What are you doing?" cried Albert.

"I am going to try to reach the top of the tower."

"It is useless; the bolt opens in the room. Paul only can open it."

"Paul can open it."

"If he awakes. But how is it he does not awake?"

And in his turn Albert called to his friend.

Paul made no movement. The flames were gaining, growing more and more light, and the smoke was filtering through the plank floor and filling the room.



"Ah, I understand," cried Monsieur Roger, "I understand: he is not sleeping. That is not sleep,—that is asphyxia."

"Asphyxia?" repeated Albert, in a voice choked with fear.

The scene was terrible. There was the boy, a prisoner, who was going to die under the eyes of those who loved him, and separated from them solely by a circle of stone and of fire,—a circle which they could not cross. He was going to die without any knowledge that he was dying. Asphyxia held him in a death-like trance. Albert saw the floor of the room crack and a tongue of flame shoot up, which lighted up the sleeping face of Paul Solange. Then he heard a strange cry from a terrified and awful voice. The voice cried,—

"George! George!"

And it was Monsieur Roger who had twice called that name.



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## CHAPTER XXI. SAVED.



Albert still looked. Then he saw Paul Solange raise himself upon his bed, and, seeing the fire, pass his hands over his eyes and his forehead, jump to the floor, reflect a moment, as if endeavoring to remember something, then seize a chair, get upon it, and pull the bolt of the trap-door. At the same time he remarked that Monsieur Roger was no longer near him. Braving the danger, Monsieur Roger had jumped from the roof, and succeeded in reaching the top of the turret; and now it was he who pulled Paul from the trap-door and gathered him up in his arms. The boy had fainted. Obeying an order shouted by Albert, two farm-boys trusted themselves upon the roof, bringing with them a ladder and ropes. Then Monsieur Roger was able to come down with his precious burden.

Albert lent his aid to the rescuer, and Paul was taken down into the yard. At this moment a carriage arrived, which had been driving at the top of its speed. It stopped at the door of the farm-house. Monsieur Dalize appeared. From the château the flames had been seen by a watchman, who had gone to awake his master. Monsieur Dalize, understanding the danger, frightened at what might be happening over there in that farm-house on fire, under that roof which sheltered his child, his best friend, and Paul Solange, had immediately harnessed a horse, with the aid of the watchman, and, telling him to say nothing to Madame Dalize, had departed at the top of his speed. He arrived in time to see Monsieur Roger and Albert, who were bearing Paul with them. He approached, trembling.

"Paul!" he cried.

"Calm yourself," Monsieur Roger hastened to say: "he has only fainted. It is nothing; but we shall have to take him home."

"The carriage is ready."

"Then everything is for the best."

Paul was seated in the carriage, between Albert and Monsieur Roger. The latter had placed his left arm under Paul's head to sustain him. The poor child was still insensible; but there could be no better remedy for him than the fresh air of the night,—the fresh air which the rapid movement of the carriage caused to penetrate into his lungs. Monsieur Dalize, who drove, turned around frequently, looking at Roger. The latter held in his right hand Paul Solange's hand, and from time to time placed his ear against the boy's breast.

"Well?" said Monsieur Dalize, anxiously.

"His pulse is still insensible," answered Monsieur Roger; "but stop your horse for a moment."

The carriage stopped. Then, being no longer interfered with by the noise, Monsieur Roger again applied his ear, and said,—

"His heart beats; it beats very feebly, but it beats. Now go ahead."

Again the carriage started. At the end of some minutes, Monsieur Roger, who still held Paul's wrist between his fingers, suddenly felt beneath the pulsations of the radial artery. He cried out, with a loud voice, but it was a cry of joy,—

"He is saved!" he said to Monsieur Dalize.

At that very moment Paul Solange opened his eyes; but he closed them again, as if a heavy sleep, stronger than his will, were weighing upon his eyelids. Again he opened them, and looked with an undecided look, without understanding. At that moment they arrived at the house. Everybody was on foot. The fire at the farm had been perceived by others besides the watchman. They had all risen from their beds, and Madame Dalize, awakened by the noise, had, unfortunately, learned the terrible news. She was awaiting in cruel agony the return of her husband. At last she saw him driving the carriage and bringing with him the beings who were dear to her. Paul, leaning on the arms of Monsieur Roger and Albert, was able to cross the slight distance which separated them from the vestibule. There Monsieur Roger made him sit down in an arm-chair, near the window, which he opened wide. Monsieur and Madame Dalize and Albert stood beside Paul, looking at him silently and uneasily; but they were reassured by the expression of Monsieur Roger. With common accord they left him the care of his dear patient. Monsieur Roger was looking at Paul with tender eyes,—an expression of happiness, of joy, illumined his face: and this expression,

which Monsieur Dalize had not seen for long years upon the face of his friend, seemed to him incomprehensible, for he was still ignorant of the extraordinary thing that had happened. At this moment, Miss Miette, in her night-cap, hardly taking time to dress herself, rushed into the vestibule. Her childish sleep had been interrupted by the tumult in the house. She had run down half awake.

"Mamma, Mamma," she cried, "what is the matter?"

Then, as she ran to throw herself upon her mother's knees, she saw the arm-chair and Paul sitting in it. She stopped at once, and, before they had the time or the thought of stopping her, she had taken Paul's hands, saying to him, very sadly,—

"Paul, Paul, are you sick?"

Paul's eyes, which until this time had remained clouded and as if fixed upon something which he could not see, turned to Miette. Little by little they brightened as his senses returned to him: his eyes commenced to sparkle. He looked, and, with a soft but weary voice, he murmured,—

"Miette, my little Miette."



Then he turned his head, trying to find out where it was he found himself, who were the people around him.

"What has happened?" he asked.

Nobody dared to answer. Everybody waited for Monsieur Roger; but Monsieur Roger kept silent. He let nature take care of itself. Indeed, he even hid himself slightly behind Monsieur Dalize. Paul's looks passed over the faces which were in front or beside him; but they did not stop there: they seemed to look for something or some one which they did not meet. Then, with a sudden movement, Paul bent over a little. He saw Monsieur Roger; he started; the blood came back to his face; he tried to speak, and could only let fall a few confused words. But, though they could not understand his words, what they did understand was his gesture. He held out his arms towards Monsieur Roger. The latter advanced and clasped Paul Solange in a fatherly embrace.

The effort made by the sick boy had wearied him. He closed his eyes in sleep; but this time it was a healthy sleep, a refreshing sleep.

Monsieur Roger and Monsieur Dalize took the sleeping Paul up to his room. And Miss Miette, as she regained her boudoir, said to herself, with astonishment,—

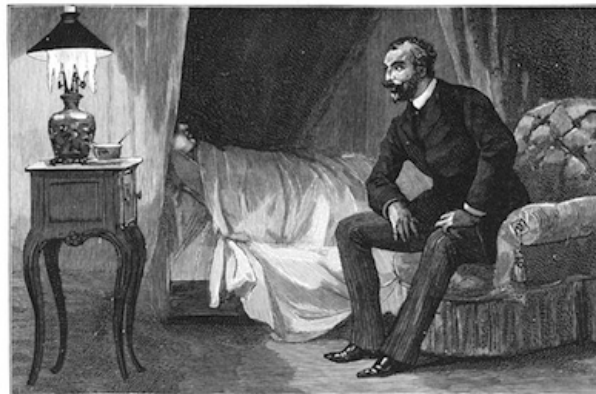
"It is extraordinary! Monsieur Roger embraced Paul as if he were his papa."





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## CHAPTER XXII. GEORGE! GEORGE!



Monsieur Roger stayed up all the remainder of that night by the side of Paul, whose sleep was calm and dreamless, like the sleep which succeeds to some strong emotion, some great fatigue. Paul was still sleeping in the morning when Monsieur Dalize softly turned the handle of the door and entered the room on tiptoe. His entrance was made with so much precaution that Monsieur Roger himself did not hear him.

Monsieur Dalize had some seconds in which to observe Roger. He saw him sitting beside the bed, his eyes fixed upon the child, in a thoughtful attitude. Monsieur Roger was studying the delicate face which lay upon the pillow. He examined its features one by one, and, thinking himself alone, thinking that he would not be interrupted in this examination, he was calling up the mysterious resemblance with which he had already acquainted his friend. But he had not just now begun this study,—he had pursued it all night. The light, however, of the lowered lamp had not been favorable, and the emotion which he felt agitated him still too much to leave his judgment clear. When the morning sun had risen, chasing away all the vague images of the darkness and the doubts of the mind. Roger, having recovered his composure, looked at the child whom he had saved, and asked himself if the child was not his own. He was drawn from these reflections by feeling himself touched upon the shoulder. Monsieur Dalize had approached and asked,—

"Has he passed a good night?"

"Excellent," answered Monsieur Roger, in a low tone; "but we must let him sleep as long as he can. Give orders that no noise shall be made around here and that no one shall enter. He must awake of his own accord. When he awakes he will only feel a slight fatigue."

"Then I am going to give these orders and tell the good news," said Monsieur Dalize.

He retired as softly as he had entered, but by accident, near the door, he stumbled against a chair. He stopped, holding his breath; but Roger made a sign that he could go on. The slight noise had not awakened Paul, or at least had not awakened him completely; he had turned around upon his bed for the first time since he had been placed there. Monsieur Roger, who

never took his eyes off him, understood that he was dreaming. The dream seemed to be a painful one, for some feeble groans and murmurs escaped him. Then upon the face of the sleeping child appeared an expression of great fear. Monsieur Roger did not wish to leave Paul a prey to such a dream. He approached near to raise him a little upon the bed. The moment that Monsieur Roger's two hands softly touched Paul's head, the expression of fear disappeared, the features became quiet and calm, the groans ceased, and suddenly there escaped his lips the single word "Papa."

Monsieur Roger started. With his trembling hands he still sustained the child; he bent over, ready to embrace him, forgetting that the child was sleeping and dreaming. Monsieur Roger was about to utter the name which choked him,— "My son."

Then Paul Solange opened his eyes. He looked up dreamily; then he recognized the face before him, and surprise mingled with affection in his tones.

"Monsieur Roger!" he said.

He looked around him, saw that he was in his own room, and remembered nothing else. He asked,—

"Why are you here, Monsieur Roger?"

Mastering himself, Monsieur Roger answered that he had come to find out how Paul was, as he had seen him suffering the night before.

"I, suffering?" asked Paul. Then he sought to remember, and, all of a sudden, he cried, "The fire over there at the farm!"

Although his memory had not entirely returned, he recollected something. He hesitated to speak. Then, with an anxious voice, he asked,—

"And Albert?"

"Albert," answered Monsieur Roger, "he is below; and everybody is waiting until you come down to breakfast."

"Then there were no accidents?"

"No."

"How fortunate! I will dress myself and be down in a minute."

And, in fact, in a few minutes Paul was ready, and descended leaning on Monsieur Roger's arm.

The latter, as they entered the dining-room, made a sign to them that they should all keep silence: he did not wish that they should fatigue the tired mind of the child with premature questions; but when they were sitting at the table, Paul, addressing Albert, said,—

"Tell me what passed last night. It is strange I scarcely remember."

"No," said Madame Dalize: "we are at table for breakfast, and we have all need for food,—you, Paul, above all. Come, now, let us eat; a little later we may talk."



"It is well said," said Monsieur Dalize.

There was nothing to do but to obey. And, indeed, Paul was glad to do so, for he was very hungry. He had lost so much strength that the stomach for the moment was more interesting to him than the brain. They breakfasted, and then they went out upon the lawn before the chateau, under a large walnut-tree, which every day gave its hospitable shade to the Dalize family and their guests.

"Well, my dear Paul," said Monsieur Dalize, "how are you at present?"

"Very well, indeed, sir, very well," answered Paul. "I was a little feeble when I first awoke, but now,—now——"

He stopped speaking; he seemed lost in thought.

"What is the matter?" asked Albert.

"I am thinking of last night at the farm,—the fire."

"Oh, that was nothing," said Albert.

"But," continued Paul, "how did we get back here?"

"In the carriage. Father came for us and brought us home."

"And how did we leave the farm?"

Monsieur Roger followed with rapt attention the workings of Paul's memory. He was waiting in burning anxiety the moment when Paul should remember. One principal fact, only one thing occupied his attention. Would Paul remember how and by whom he had been borne from the torpor which was strangling him? Would he remember that cry,—that name which had had the miraculous power to awake him, to bring him back to life? If Paul remembered that, then, perhaps— And again Monsieur Roger was a prey to his fixed idea,—to his stroke of folly, as Monsieur Dalize called it.

The latter, besides, knew nothing as yet, and Monsieur Roger counted upon the sudden revelation of this extraordinary fact to shake his conviction. But Paul had repeated his question. He asked,—

"How did we leave the farm-house? How were we saved?"

And as Albert did not know whether he should speak, whether he should tell everything, Paul continued:

"But speak, explain to me: I am trying to find out. I cannot remember; and that gives me pain here." And he touched his head.

Monsieur Roger made a sign to Albert, and the latter spoke:

"Well, do you remember the turret, where we had our rooms? You slept above, I below. Do you remember the trap-door that I showed you? In the middle of the night I felt myself awakened by somebody, and I followed him. In my half sleep I thought that this some one was you, my poor friend; but, alas! you remained above; you were sleeping without fear. Why, it was Monsieur Roger who first saw the danger that you were in."

Paul, while Albert was speaking, had bent his head, seeking in his memory and beginning to put in order his scattered thoughts. When Albert pronounced the name of Monsieur Roger, Paul raised his eyes towards him with a look which showed that he would soon remember.

"And afterwards?" said he.

"And afterwards Monsieur Roger climbed upon the roof, at the risk of his life, and reached the loop-hole which opened into your chamber. He broke the glass of the window; but you did not hear him: the smoke which was issuing through the floor had made you insensible,—had almost asphyxiated you."

"Ah, I remember!" cried Paul. "I was sleeping, and, at the same time, I was not sleeping. I knew that I was exposed to some great danger, but I had not the strength to make a movement. I seemed paralyzed. I heard cries and confused murmurs, sounds of people coming and going. I felt that I ought to rise and flee, but that was impossible. My arms, my legs would not obey me; my eyelids, which I attempted to open, were of lead. I soon thought that everything was finished, that I was lost; and still I was saying to myself that I might be raised out of this stupor. It seemed to me that the efforts of some one outside might be so, that an order, a prayer might give back to my will the power which it had lost; but the stupor took hold of me more and more intensely. I was going to abandon myself to it, when, all of a sudden, I heard myself called. Yes, somebody called me; but not in the same way that I have been called before. In that cry there was such a command, such a prayer, so much faith, that my will at once recovered strength to make my body obey it. I roused myself; I saw and I understood, and, luckily, I remembered the trap-door which you had shown me. I could scarcely lift it; but there was some one there,—yes, some one who saved me."

Paul Solange uttered a great cry.

"Ah," said he, "it was Monsieur Roger!" And he ran to throw himself into the arms which Monsieur Roger extended to him.

Miss Miette profited by the occasion to wipe her eyes, which this scene had filled with big tears in spite of herself. Then she turned to Paul, and said,—

"But the one who called to you? Was it true? It was not a dream?"

"Oh, no; it was some one. But who was it?"

"It was Monsieur Roger," answered Albert.

"And so you understood him?" continued Miette, very much interested. "And he called you loudly by your name, 'Paul! Paul!'"

Paul Solange did not answer. This question had suddenly set him to thinking. No, he had not heard himself called thus. But how had he been called?

Seeing that Paul was silent, Albert answered his little sister's question:

"Certainly," said he, "he called Paul by his name."

Then he interrupted himself, and, remembering all of a sudden:

"No," cried he; "Monsieur Roger called out another name."

"What other name?" asked Monsieur Dalize, much surprised.

"He cried out, 'George! George!'"

Monsieur Dalize turned his head towards Roger and saw the eyes of his friend fixed upon his own. He understood at once. Poor Roger was still a slave to the same thought, the same illusion.

Madame Dalize and Miette, who were acquainted with the sorrows of Monsieur Roger, imagined that in this moment of trouble he had in spite of himself called up the image of his child. Paul, very gravely, was dreamily saying to himself that the name of George was the name which he had heard, and that it was to the sound of this name that he had answered, and he was asking himself the mysterious reason for such a fact.



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## CHAPTER XXIII. A PROOF?



Monsieur Dalize took his friend Roger by the arm, and they walked together down one of the solitary pathways of the park. When they were some distance off from Madame Dalize and the children, Monsieur Dalize stopped, looked his friend squarely in the eyes, and said, in a faltering tone,—

"Then you still think it? You have retained that foolish idea? You think that Paul—?"

"Yes," interrupted Monsieur Roger, in a firm voice, and without avoiding the eyes of his friend, "I think it, and more than that." Then, lowering his head, in a softened tone, but without hesitation, he said, "I think that Paul is my son."

Monsieur Dalize looked at his friend with a feeling of real pity.

"Your son?" he said. "You think that Paul is your son? And on what do you found this improbable,

this impossible belief? Upon a likeness which your sorrowful spirit persists in tracing. Truly, my dear Roger, you grieve me. I thought you had a firmer as well as a clearer head. To whom could you confide such absurd ideas?"

"To you, in the first place, as I have already done," said Monsieur Roger, gravely. "The resemblance which you doubt, and which, in fact, seems impossible to prove, is not a resemblance which I see between Paul and George, but between Paul and her who was his mother; of that I am sure."

"You are sure?"

"Yes; and in speaking thus I am in possession of all my senses, as you see. Now, would you like to know what further clue I have? Perhaps I have one. I will tell it to you."

Here Monsieur Roger interrupted himself.

"No," said he: "you will laugh at me."

"Speak," said Monsieur Dalize. "I am sorry for you, and I shall not laugh at your delusion. Speak. I will listen."

"Well," said Monsieur Roger, "this very morning, when you left the room, the noise that you made troubled the sleep of Paul; a dream passed through his brain, and I followed all its phases. I saw that Paul was going over the terrible scene of the night before; I knew that by the terror of his face and by the murmur of his lips. He evidently thought himself exposed to danger; then it seemed as if he heard something, as if he knew that help was at hand. He made a movement, as if to extend his hands, and from his mouth came this word, 'Papa.'"

Monsieur Roger looked at his friend, who remained silent.

"You have not understood?" he said.

Monsieur Dalize shook his head.

"Ah, but I understood," continued Monsieur Roger; "I am certain that I understood. In his dream Paul—no, no, not Paul, but George, my little George—had heard himself called as ten years ago he had been called at the time of the shipwreck, during the fire on shipboard, and he was answering to that call; and it was to no stranger that he was answering; it was not to Monsieur Roger; no, it was to his father: it was to me."

Monsieur Roger stopped, seeking some other proof which he might furnish to Monsieur Dalize.

The latter was plunged in thought; his friend's faith commenced to shake his doubt. He certainly did not share Roger's idea, but he was saying to himself that perhaps this idea was not so impossible as it would seem at first sight.

Roger continued, hesitating from the moment he had to pronounce the name of Paul Solange:

"You remember exactly the story that Paul told. Were you not struck with it? Did not Paul acknowledge that in his torpor, in his semi-asphyxia, he had called for help, called to his assistance some unknown force which would shake and awake his dazed and half-paralyzed will? And did not this help come, this sudden force, when he felt himself called? Now, how many times I had cried out 'Paul' without waking the child! Paul was not his name; he did not hear it. I had to shout to him, making use of his own name, his real name. I cried out, 'George!' and George heard and understood me. George was saved."

Monsieur Dalize listened attentively: he was following up a train of reasoning. At the end of some moments he answered Monsieur Roger, who was awaiting with impatience the result of his thoughts.

"Alas, my poor friend! in spite of all my reason tells me, I should like to leave to you your hope, but it is impossible. I have seen Paul's father; I know him; I have spoken to him, I have touched him; that father is not a shadow,—he exists in flesh and blood. You have heard Paul himself speak of him. In a few months he will come to Paris; you will see him; and then you will be convinced."

"But have you seen the birth-register of Paul Solange?" asked Monsieur Roger.

"Have I seen it? I may have done so, but I don't remember just now."

"But that register must have been made; it must be in France, in the hands of some one."

"Certainly."

"Where can it be?"

"At the Lyceum, in the docket of the registrar."

"Well, my friend, my dear friend, I must see it. You understand?"

"Yes, I understand. You wish to have under your own eyes the proof of your mistake. You shall have it. As the guardian of Paul Solange, I will write the registrar to send me a copy of that birth-register. Are you satisfied?"

"Yes."

"And now, I ask you to be calm, to keep cool."

"Oh, don't be uneasy about me," answered Monsieur Roger.

Then the two friends rejoined the group which they had left.

Miette rose when she saw Monsieur Roger.

"Ah!" she cried, "Monsieur Roger is going to tell us that."

"That? What?" asked Monsieur Dalize.

"Why, what asphyxia is," answered Miette.

"Ah, my friend," said Monsieur Dalize, turning to Roger, "I will leave the word to you."

"Very well," answered Monsieur Roger. "Asphyxia is,—it is—"

And as Monsieur Roger was seeking for some easy words in which to explain himself, Miette cried out, with a laugh,—

"Perhaps you don't know yourself,—you who know everything?"

"Yes, I know it," answered Monsieur Roger, with a smile; "but, in order to tell you, I must first explain to you what is the formation of the blood, and tell you something of oxygen and carbonic acid, and—"

"Well, tell us," cried Miette, "if you think it will interest us.—It will, won't it, Paul?"

Paul bent his head.

Monsieur Roger saw this gesture, and replied,—

"Well, then, I am going to tell you."



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## CHAPTER XXIV. THE AIR AND THE LUNGS.



"In order to live," continued Monsieur Roger, "you must breathe. You don't doubt that?"

"No," said Miss Miette, seriously.

"Now, respiration consists in the absorption by the blood of some of the oxygen of the air and in breathing out carbonic acid. The oxygen, in combining with the carbon and hydrogen of the blood, excites a real combustion in the lungs, which results in the production of heat and in the exhalation of vapor and carbonic acid."

Monsieur Roger was going to continue in the same scientific tone, when Monsieur Dalize remarked to him that his explanation did not seem to be at all understood by the children.

The latter, a little embarrassed, held their tongues.

"You are right," replied Monsieur Roger, addressing Monsieur Dalize; "that is a silence which is certainly not very flattering. I intend to profit by this lesson by beginning once more at the beginning."

"You are right," said Miette.

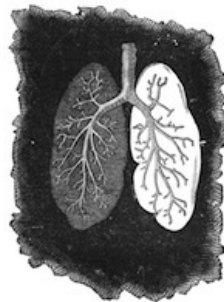
"Well, then, respiration is the very important function whose object is to introduce air into our lungs.

"What are the lungs, and why is it necessary to introduce air into them? And, in the first place, how is this air introduced? Through the mouth and through the nose. Then it passes through the larynx and arrives at a large tube, which is called the trachea, or wind-pipe. It is this tube which, as I shall show you, forms the two lungs. As it enters the chest, this tube branches out into two smaller tubes, which are called the primary bronches. One of these bronches goes to the right, to make the right lung; the other to the left, to make the left lung. Each primary bronche is soon divided into a number of little tubes, called secondary bronches. The secondary bronches divide up into a number of other tubes, which are still smaller; and so on, and so on. Imagine a tree with two branches, one spreading towards the right, and the other towards the left. Upon these two branches grow other branches; upon these other branches still others, and so on. The branches become smaller and smaller until they become mere twigs. Now, imagine these twigs ending in leaves, and you will have some idea of that which is sometimes called the pulmonary tree, with its thousand branches."

"No," said Miette: "bronches."

"Bronches,—you are right," said Monsieur Roger, who could not help smiling at Miss Miette. "The tree which I have taken as a comparison finishes by dividing itself into twigs, which, as I have said, end in leaves. But you know, of course, that the twigs of the pulmonary tree in our breast do not end in leaves. They end in a sort of very small cells, surrounded by very thin walls. These cells are so small that they need a microscope to detect them, and their walls are very, very thin; the cells are all stuck fast together, and together they constitute a spongy mass, which is the lung. Now let us pass to the second question: Why is it necessary to introduce air into the lungs?"

"Yes," said Miette; "let us pass to that."



"The blood, in going out of the heart, circulates to all the parts of the body in order to make necessary repairs; at the same time it charges itself with all the old matter which has been used up and is no longer any good and carries it along. Now, what is it going to do with this old matter? It will burn it. Where will it burn it? In the lungs. Now, there can be no combustion when there is no air. The blood, wishing to burn its waste matter, and wishing also to purify the alimentary principles which the veins have drawn from the stomach, has need of air. Where will it find it? In the lungs. And that is why it is necessary to introduce air into our lungs, or, in other words, that is why we breathe. The lungs are a simple intermediary between the air and the blood. Among the cells of the lungs veins finer than hair wind and turn. These veins gather up the blood filled with waste matter. It is blood of a black color, which is called venous blood. The walls of the veins which transport the blood are so thin that air, under the atmospheric pressure,—this pressure which I have told you all about,—passes through them and into the blood. Then the venous blood charges itself with the oxygen contained in the air, and frees itself from what I have called its waste material, and which is nothing less than carbon. Immediately its aspect changes. This venous blood becomes what is called arterial blood; this black blood becomes rich vermilion,—it is regenerated. It goes out again to carry life to all our organs. Now, this time," asked Monsieur Roger, pausing, "have I made myself understood?"



"Yes," said Miette, speaking both for Paul and for herself; "yes, we have understood,—except when you speak of oxygen, of carbon, and of combustion."

"Oh, I was wrong to speak of them," answered Monsieur Roger, pretending to be vexed.

"That may be," answered Miss Miette, very calmly; "but as you did speak of them, you must tell us what they are."

"Yes, you must, my friend," remarked Monsieur Dalize, taking sides with his little girl.

"Mustn't he, papa? mustn't Monsieur Roger explain?" asked Miette.

"Come, now," said Monsieur Roger, in a resigned tone. "You must know, then, that air is composed of two gases,—oxygen and nitrogen; therefore, when we breathe, we send into our lungs oxygen and nitrogen. You might think, when we throw out this air, when we exhale,—you might think, I say, that this air coming out of our lungs is still composed of oxygen and of nitrogen in the same proportions. Now, it is not so at all. The quantity of nitrogen has not varied, but, in the first place, there is less oxygen, and there is another gas,—carbonic acid gas; where, then, is the oxygen which we have not exhaled, and whence comes this carbonic acid which we did not inhale? Then, besides, in the air exhaled there is vapor. Where does that come from? These phenomena result from the combustion of which I speak; but, in order that you should understand how this combustion occurs, I must explain to you what is oxygen and what is nitrogen. And as it is a long story, you must let me put it off till this evening; then I will talk until you are weary, my dear little Miette."

Miette looked at Albert and Paul, and answered for them with remarkable frankness:

"It will be only right if you do weary us. It is we who asked you, and, besides, we have so often wearied you that it is only right you should have your revenge on us. Still——"

"Still, what?"

"Still, we can trust you," added Miette, laughing, and throwing her arms around Roger's neck.



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## CHAPTER XXV. OXYGEN.



"We were saying that oxygen——" cried Miss Miette, with a smile, that evening, after dinner, seeing that Monsieur Roger had completely forgotten his promise.

"Yes," Monsieur Dalize hastened to add, as he wished to distract his friend from sad thoughts; "yes, my dear Roger, we were saying that oxygen——"

"Is a gas," continued Monsieur Roger, good-humoredly. "Yes, it is a gas; and Miette, I suppose, will want to ask me, 'What is gas?'"

"Certainly," said Miette.

"Well, it is only recently that we have found out, although the old scientists, who called themselves alchemists, had remarked that besides those things that come within reach of our senses there also exists something invisible, impalpable; and, as their scientific methods did not enable them to detect this thing, they had considered it a portion of the spirit land; and indeed



some of the names which they adopted under this idea still remain in common use. Don't we often call alcohol 'spirits of wine'? As these ancients did not see the air which surrounded them, it was difficult for them to know that men live in an ocean of gas, in the same way as fish live in water; and they could not imagine that air is a matter just as much as water is. You remember that universal gravitation was discovered through——"

"The fall of an apple," said Miette.

"Yes; and that was something that every one knew; it was a very common fact that an apple would fall. Well, it was another common fact, another well-known thing, which enabled the Fleming Van Helmont to discover in the seventeenth century the real existence of gases, or at least of a gas. Van Helmont, one winter evening, was struck by the difference between the bulk of the wood which burned on his hearth and the bulk of the ashes left by the wood after its combustion. He wished to examine into this phenomenon, and he made some experiments. He readily found that sixty-two pounds of charcoal left, after combustion, only one pound of ashes. Now, what had become of the other sixty-one pounds? Reason showed him that they had been transformed into something invisible, or, according to the language of the times, into some aërial spirit. This something Van Helmont called 'gaast,' which in Flemish means spirit, and which is the same word as our ghost. From the word gaast we have made our word gas. The gas which Van Helmont discovered was, as we now know, carbonic acid. This scientist made another experiment which caused him to think a good deal, but which he could not explain. Now, we can repeat this experiment, if it will give you any pleasure."

"Certainly," said Miette; "what shall I bring you?"

"Only two things,—a soup-plate and a candle."

Monsieur Roger lit the candle and placed it in the middle of the soup-plate, which he had filled with water. Then he sought among the instruments which had come with the air-pump, and found a little glass globe. He placed the globe over the candle in the middle of the plate. Very soon, as if by a species of suction, the water of the plate rose in the globe; then the candle went out.

"Can Miss Miette explain to me what she has just seen?" said Monsieur Roger.



Miette reflected, and said,—

"As the water rose in the globe, it must have been because the air had left the globe, since the water came to take its place."

"Yes," answered Monsieur Roger; "but the air could not leave the globe, as there is no opening in the globe on top, and below it there is water. It did not leave the globe, but it diminished. Now, tell me why it diminished."

"Ah, I cannot tell you."

"Well, Van Helmont was in just your position. He could not know anything about the cause of this diminution, because he was ignorant of the composition of the air, which was not discovered until the next century by the celebrated French chemist Lavoisier. Now, this is how Lavoisier arrived at this important discovery. In the first place, he knew that metals, when they are calcined,—that is to say, when they are exposed to the action of fire,—increase in weight. This fact had been remarked before his time by Dr. Jehan Rey, under the following circumstances: A druggist named Brun came one day to consult the doctor. Rey asked to be allowed to feel his pulse.

"'But I am not sick,' cried the druggist.

"'Then what are you doing here?' said the doctor.

"'I come to consult you.'

"'Then you must be sick.'

"'Not at all. I come to consult you not for sickness, but in regard to an extraordinary thing which occurred in my laboratory.'

"'What was it?' asked Rey, beginning to be interested.

"'I had to calcine two pounds six ounces of tin. I weighed it carefully and then calcined it, and after the operation I weighed it again by chance, and what was my astonishment to find two pounds and thirteen ounces! Whence come these extra seven ounces? That is what I could not explain to myself, and that is why I came to consult you.'

"Rey tried the same experiment again and again, and finally concluded that the increase of weight came from combination with some part of the air.

"It is probable that this explanation did not satisfy the druggist; and yet the doctor was right. The increase came from the combination of the metal with that part of the air which Lavoisier called oxygen. That great chemist, after long study, declared that air was not a simple body, but that it was a composite formed of two bodies, of two gases,—oxygen and nitrogen. This opinion, running counter as it did to all preconceived ideas, raised a storm around the head of the learned man. He was looked upon as a fool, as an imbecile, as an ignoramus. That is the usual way.

"Lavoisier resolved to show to the unbelievers the two bodies whose existence he had announced. In the experiment of increasing the weight of metals during calcination, an experiment which has been often repeated since Jehan Rey's time, either tin or lead had always been used. Now, these metals, during calcination, absorb a good deal of oxygen from the air, but, once they have absorbed it, they do not give it up again. Lavoisier abandoned tin and lead, and made use of a liquid metal called mercury. Mercury possesses not only the property of combining with the oxygen of the air when it is heated, but also that of giving back this oxygen as soon as the boiling-point is passed. The chemist put mercury in a glass retort whose neck was very long and bent over twice. The retort was placed upon an oven in such a way that the bent end of the neck opened into the top of the globe full of air, placed in a tube also full of mercury. By means of a bent tube, a little air had been sucked out of the globe in such a way that the mercury in the tube, finding the pressure diminished, had risen a slight distance in the globe. In this manner the height of the mercury in the globe was very readily seen. The level of the mercury in the globe was noted exactly, as well as the temperature and the pressure. Everything being now ready for the experiment, Lavoisier heated the mercury in the retort to the boiling-point, and kept it on the fire for twelve days. The mercury became covered with red pellicles, whose number increased towards the seventh and eighth days; at the end of the twelfth day, as the pellicles did not increase, Lavoisier discontinued the heat. Then he found out that the mercury had risen in the globe much higher than before he had begun the experiment, which indicated that the air contained in the globe had diminished. The air which remained in the globe had become a gas which was unfit either for combustion or for respiration; in fact, it was nitrogen. But the air which had disappeared from the globe, where had it gone to? What had become of it?"

"Yes," said Miette, "it is like the air of our globe just now. Where has it gone?"

"Wait a moment. Let us confine ourselves to Lavoisier's experiment."

"We are listening."

"Well, Lavoisier decided that the air which had disappeared could not have escaped from the globe, because that was closed on all sides. He examined the mercury. It seemed in very much the same state. What difference was there? None, excepting the red pellicles. Then it was in the pellicles that he must seek for the air which had disappeared. So the red pellicles were taken up and heated in a little retort, furnished with a tube which could gather the gas; under the action of heat the pellicles were decomposed. Lavoisier obtained mercury and a gas. The quantity of gas which he obtained represented the exact difference between the original bulk of the air in the globe and the bulk of the gas which the globe held at the end of the experiment. Therefore Lavoisier had not been deceived. The air which had disappeared from the globe had been found. This gas restored from the red pellicles was much better fitted than the air of the atmosphere for combustion and respiration. When a candle was placed in it, it burned with a dazzling light. A piece of charcoal, instead of consuming quietly, as in ordinary air, burned with a flame and with a sort of crackling sound, and with a light so strong that the eye could hardly bear it. That gas was oxygen."

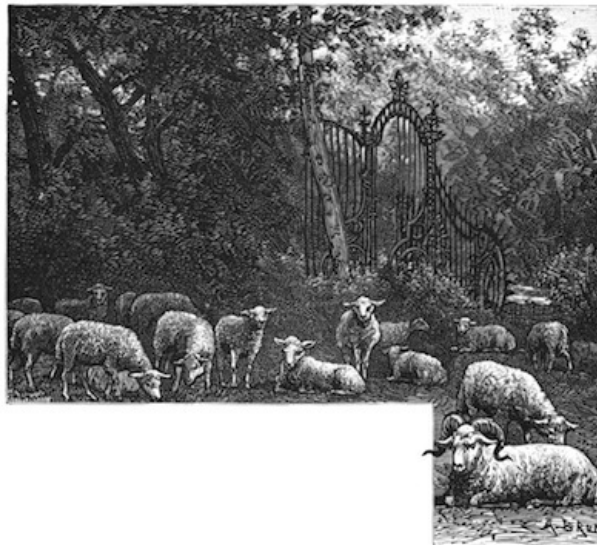
"And so the doubters were convinced," said Miette.

"Or at least they ought to have been," added Monsieur Dalize, philosophically.



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## CHAPTER XXVI. WHY WATER PUTS OUT FIRE.



"You have never seen oxygen any more than you have seen air," continued Monsieur Roger. "You have never seen it, and you never will see it with your eyes,—for those organs are very imperfect. I need not therefore say oxygen is a colorless gas; and yet I will say it to you by force of habit. All books of chemistry begin in this way. Besides this, it is without smell and without taste. Oxygen is extremely well fitted for combustion. A half-extinguished candle—that is, one whose wick is still burning but without flame—will relight instantly if placed in a globe full of oxygen. Almost all the metals, except the precious metals, such as gold, silver, and platinum, burn, or oxydize more or less rapidly, when they are put in contact with oxygen; for, besides those lively combustions, in which metals, or other materials, become hot and are maintained in a state of incandescence, there are other kinds of burning which may be called slow combustions. You have often had under your eyes, without knowing it, examples of these slow combustions. For example, you have seen bits of iron left in the air, or in the water, and covered with a dark-red or light-red matter."

"That is rust," said Miette.

"Yes, that is what they call rust; and this rust is nothing less than the product of the combustion of the iron. The oxygen which is found in the air, or the water, has come in contact with the bit of iron and has made it burn. It is a slow combustion, without flames, but it nevertheless releases some heat. Verdigris, in some of its forms, is nothing less than the product of the combustion——"

"Of copper," interrupted Miette again.

"Miette has said it. These metals burn when they come in contact with the oxygen of the air,—or, in the language of science, they are oxydized; and this oxydation is simple combustion. Therefore, oxygen is the principal agent in combustion. The process which we call burning is due to the oxygen uniting itself to some combustible body. There is no doubt on that subject, for it has been found that the weight of the products of combustion is equal to the sum of the weight of the body which burns and that of the oxygen which combines with it. In the experiment which we have made, if the oxygen has diminished in the globe, if it seems to have disappeared, it is because it has united itself and combined with the carbon of the candle to form the flame. In the same way in Lavoisier's experiment it had combined itself with the mercury to form the red pellicles. The candle had gone out when all the oxygen in the globe had been absorbed; the red pellicles had ceased to form when they found no more oxygen. In this way Lavoisier discovered that the air was formed of a mixture of two gases: the first was oxygen, of which we have just spoken; the second was nitrogen. The nitrogen, which is also a colorless, odorless, and tasteless gas, possesses some qualities that are precisely contrary to those of oxygen. Oxygen is the agent of combustion. Nitrogen extinguishes bodies in combustion. Oxygen is a gas indispensable to our existence, with which our lungs breathe, and which revives our being. The nitrogen, on the contrary, contains no properties that are directly useful to the body. Animals placed in a globe full of nitrogen perish of asphyxia. In other words, they drown in the gas, or are smothered by it. I suppose you will ask me what is the use of this gas, and why it enters into the composition of the air? You will ask it with all the more curiosity when you know that the air contains four times as much nitrogen as oxygen; to be exact, a hundred cubic feet of air contains seventy-nine cubic feet of nitrogen and twenty-one cubic feet of oxygen. Now, the important part that nitrogen plays is to moderate the action of the oxygen in respiration. You may compare this nitrogen mixed with oxygen to the water which you put in a glass of wine to temper it. Nitrogen possesses also another property which is more general: it is one of the essential elements in a certain number of mineral and vegetable substances and the larger portion of animal substances. There are certain compounds containing nitrogen which are indispensable to our food. An animal nourished entirely on food which is destitute of nitrogen would become weak and would soon die."

"Excuse me, Monsieur Roger," said Albert Dalize: "how can nitrogen enter into our food?"

"That is a very good question," added Miette, laughing; "surely you cannot eat nitrogen and you cannot eat gas."

"The question is indeed a very sensible one," answered Monsieur Roger; "but this is how nitrogen enters into our food. We are carnivorous, are we not? we eat meat and flesh of animals. And what flesh do we chiefly eat? The flesh of sheep and of cattle. Sheep and cattle are herbivorous: they feed on herbs, on vegetables. Now, vegetables contain nitrogen. They have taken this nitrogen, either directly or indirectly, from the atmosphere and have fixed it in their tissues. Herbivorous animals, in eating vegetables, eat nitrogen, and we, who are carnivorous, we also eat nitrogen, since we eat the herbivorous animals. We also eat vegetable food, many kinds of which contain more or less nitrogen. Do you understand?"

"Yes, I understand," said Miette.

"There is nobody living who really understands this matter very well, for it is an extremely obscure, though very important, subject," replied Monsieur Roger. "But, to resume our explanation. Besides oxygen and nitrogen, there is also in the air a little carbonic acid and vapor. The carbonic acid will bring us back to the point from which we started,—the phenomenon of breathing. Carbonic acid is a gas formed by oxygen and carbon. The carbon is a body which is found under a large variety of forms. It has two or more varieties,—it is either pure or mixed with impurities. Its varieties can be united in two groups. The first group comprises the diamond and graphite, or plumbago, which are natural carbon. The second group comprises coal, charcoal, and the soot of a chimney, which we may call, for convenience, artificial carbon. When oxygen finds itself in contact with carbonaceous matter,—that is to say, with matter that contains carbon,—and when the surrounding temperature has reached the proper degree of heat, carbonic acid begins to be formed. In the oven and the furnace, coal and charcoal mingle with the oxygen of the air and give the necessary heat; but it is first necessary that by the aid of a match, paper, and kindling-wood you should have furnished the temperature at which oxygen can join with the carbon in order to burn it. That is what we may call an active or a live combustion; but there can also be a slow combustion of carbon,—a combustion without flame, and still giving out heat. It is this combustion which goes on in our body by means of respiration."

"Ah, now we have come around to it!" cried Miette. "That is the very thing I was inquiring about."

"Well, now that we have come around to it," answered Monsieur Roger, "tell me what I began to say to you on the subject of respiration."

"That is not very difficult," answered Miette, in her quiet manner. "You told us that we swallowed oxygen and gave out carbonic acid; and you also said, 'Whence comes this carbonic acid? From combustion.' That is why I said, just now, 'We have come around to it.'"

"Very good,—very good, indeed, only we do not *swallow* oxygen, but we *inhale* it," said Monsieur Dalize, charmed with the cleverness of his little girl.

"What, then, is the cause of this production of carbonic acid?" continued Monsieur Roger. "You don't know? Well, I am going to tell you. The oxygen of the air which we breathe arrives into our

lungs and finds itself in contact with the carbon in the black or venous blood. The carbon contained here joins with the oxygen, and forms the carbonic acid which we breathe out. This is a real, a slow combustion which takes place not only in our lungs,—as I said at first, in order not to make the explanation too difficult,—but also in all the different portions of our body. The air composed of oxygen and nitrogen—for the nitrogen enters naturally with the oxygen—penetrates into the pulmonary cells, spreads itself through the blood, and is borne through the numberless little capillary vessels. It is in these little vessels that combustion takes place,—that is to say, that the oxygen unites with the carbon and that carbonic acid is formed. This carbonic acid circulates, dissolved in the blood, until it can escape out of it. It is in the lungs that it finds liberty. When it arrives there it escapes from the blood, is exhaled, and is at once replaced by the new oxygen and the new nitrogen which arrive from outside. The nitrogen absorbed in aspiration at the same time as the oxygen is found to be of very much the same quantity when it goes out. There has therefore been no appreciable absorption of nitrogen. Now, this slow combustion causes the heat of our body; in fact, what is called the animal-heat is due to the caloric set free at the moment when the oxygen is converted into carbonic acid, in the same way as in all combustion of carbon. In conclusion, I will remind you that our digestion is exercised on two sorts of food,—nitrogenous food and carbonaceous food. Nitrogenous food—like fibrin, which is the chief substance in flesh; albumen, which is the principal substance of the egg; caseine, the principal substance of milk; legumine, of peas and beans—is assimilated in our organs, which they regenerate, which they rebuild continually. Carbonaceous foods—like the starch of the potato, of sugar, alcohol, oils, and the fat of animals—do not assimilate; they do not increase at all the substance of our muscles or the solidity of our bones. It is they which are burned and which aid in burning those waste materials of the venous blood of which I have already spoken. Still, many starchy foods do contain some nutritive principles, but in very small quantity. You will understand how little when you know that you would have to eat about fifteen pounds of potatoes to give your body the force that would be given it by a single pound of beef."

"Oh," said Miette, "I don't like beef; but fifteen pounds of potatoes,—I would care still less to eat so much at once."

"All the less that they would fatten you perceptibly," replied Monsieur Roger; "in fact, it is the carbonaceous foods which fatten. If they are introduced into the body in too great a quantity, they do not find enough oxygen to burn them, and they are deposited in the adipose or fatty tissue, where they will be useless and often harmful. You see how indispensable oxygen is to human life, and you now understand that if respiration does not go on with regularity, if the oxygen of your room should become exhausted, if the lungs were filled with carbonic acid produced by the combustion of fuel outside the body, there would follow at first a great deal of difficulty in breathing, then fainting, torpor, and, finally, asphyxia."

These last words, pronounced by Monsieur Roger with much emotion, brought before them a remembrance so recent and so terrible that all remained silent and thoughtful. It was Miss Miette who first broke the spell by asking a new question of her friend Roger. Asphyxia had recalled to her the fire. Then she had thought of the manner of extinguishing fire, and she said, all of a sudden, her idea translating itself upon her lips almost without consciousness,—

"Why does water extinguish fire?"

Monsieur Roger, drawn out of his thoughts by this question, raised his head, looked at Miette, and said to her,—

"In the first place, do you know what water is?"

"No; but you were going to tell me."

"All right. The celebrated Lavoisier, after having shown that air is not a simple body, but that it is composed of two gases, next turned his attention to the study of water, which was also, up to that time, considered to be an element; that is, a simple body. He studied it so skilfully that he succeeded in showing that water was formed by the combination of two gases."

"Of two gases!—water?" cried Miette.

"Certainly, of two gases. One of these gases is oxygen, which we have already spoken of, and the other is hydrogen."

"Which we are going to speak of," added Miette.

"Of course," answered Monsieur Roger, "since you wish it. But it was not Lavoisier, however, who first discovered hydrogen. This gas had been discovered before his time by the chemists Paracelsus and Boyle, who had found out that in placing iron or zinc in contact with an acid called sulphuric acid, there was disengaged an air "like a breath." This air "like a breath" is what we now call hydrogen. Lavoisier, with the assistance of the chemist Meusnier, proved that it was this gas which in combining with oxygen formed water. In order to do this he blew a current of hydrogen into a retort filled with oxygen. As this hydrogen penetrated into the retort, he set fire to it by means of electric sparks. Two stop-cocks regulated the proper proportions of the oxygen and the hydrogen in the retort. When the combustion took place, they saw water form in drops upon the sides of the retort and unite at the bottom. Water was therefore the product of the combination of hydrogen with oxygen. The following anecdote is told in regard to this combination. A chemist of the last century, who was fond of flattery, was engaged to give some lessons to a young prince of the blood royal. When he came to explain the composition of water,

he prepared before his scholar the necessary apparatus for making the combination of hydrogen and oxygen, and, at the moment when he was about to send the electric spark into the retort, he said, bowing his head,—



"If it please your Royal Highness, this hydrogen and oxygen are about to have the honor of combining before you.'

"I don't know if the hydrogen and the oxygen were aware of the honor which was being done them; but certainly they combined with no more manners than if their spectator was an ordinary boy. Now, I may add, you must not confound combinations with mixtures; thus, air is a mixture of oxygen and nitrogen, while water is a combination of hydrogen and oxygen. This combination is a union of the molecules of the two gases which produces a composite body formed of new molecules. These new molecules are water. Now, this last word recalls to me Miette's question."

"Yes," said the latter: "why does water put out fire?"

"There are two reasons for this phenomenon," said Monsieur Roger: "the first is that water thrown upon the fire forms around the matter in combustion a thick cloud, or vapor, which prevents the air from reaching it. The wood, which was burning—that is to say, which was mingling with the oxygen of the air—finds its communication intercepted. The humid vapor has interposed between the carbon of the wood and the oxygen of the air; therefore, the combustion is forced to stop. Further, water falling upon the fire is transformed, as you very well know, into vapor, or steam. Now, this conversion into vapor necessitates the taking up of a certain quantity of heat. This heat is taken away from the body which is being burned, and that body is thus made much cooler; the combustion therefore becomes less active, and the fire is at last extinguished."

"Very good," said Miette; "but still another question, and I will let you alone."

"You promise?"

"Yes."

"Well, then, what is your last question?"

"Why is a candle put out by blowing on it, and why do they light a fire by doing the same thing?"

"In these two cases there are two very different actions," replied Monsieur Roger: "in the first there is a mechanical action, and in the second a chemical action. In blowing upon a candle the violence of the air which you send out of your mouth detaches a flame which holds on only to the wick. The burning particles of this wick are blown away, and consequently the combustion is stopped. But the case is very different when you blow with a bellows or with your mouth upon the fire in the stove. There the substance in combustion, whether wood or coal, is a mass large enough to resist the violence of the current of air you throw in, and it profits from the air which you send to it so abundantly, by taking the oxygen which it contains and burning up still more briskly.

"Now, that is the answer to your last question; and I must beg you to remember your promise, and ask me no more hard questions to-night."

"Yes, friend Roger," said Miette, "I will leave you alone; you may go to sleep."

"And it will be a well-earned sleep," added Madame Dalize, with the assent of every one.



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## CHAPTER XXVII. PAUL OR GEORGE?



At the end of this long talk every one rose. Monsieur and Madame Dalize, with Monsieur Roger and Albert, walked towards the château. Paul Solange, silent and motionless, followed them with his eyes. When Monsieur Roger reached the step, he turned and made a friendly gesture to Paul, who responded by a bow. His eyes, in resting on Monsieur Roger, had an affectionate, softened, and respectful look. Miette saw it, and was struck by it. She approached, passed her arm in Paul's, and said, softly,—

"You love him very much,—Monsieur Roger?"

"Yes," answered Paul, with surprise.

"You love him very, very much?"

"Yes."

"And he too loves you very well. I can see that. But do you love him as much as if he——?"

And Miette paused, embarrassed a little, feeling that what she was going to say was very important; still, being certain that she was right, she continued:

"As much as if he was—your papa?"

Paul started.

"Yes; you love him as much and perhaps—perhaps more," she cried, seeing Paul start.

"Why do you say things like that to me?" murmured Paul, much moved.

"Because—nothing."

"Why do you think that I love Monsieur Roger in the manner that you have just said?"

"Because——"

"Because what?"

"Well, because I look at my papa just as I see you looking at Monsieur Roger."

Paul tried to hide his embarrassment, and replied,—

"You are foolish."

Then he looked up at Miette, who shook her head and smiled, as if to say that she was not foolish. An idea came to him.

"Miette," said he, softly, "I am going to ask you something."

"Ask it."

"But you will tell it to no one?"

"To no one."

"Well, do you know why Monsieur Roger, at the fire at the farm, called me—called me George?"

"Why, certainly, I know."

"You know?" cried Paul.

"Yes: he called you George because he thought suddenly that his child, his little George, whom he lost in a fire,—in a fire on shipboard——"

Paul Solange listened, opening his eyes very wide.

"Ah, that is true. You don't know anything about it. You were not here when Monsieur Roger told us this terrible thing."

"No, I was not here; but you were here, Miette. Well, speak—tell me all about it."

Then Miette repeated to Paul Monsieur Roger's story; she told him about the departure of Monsieur Roger, his wife, and their little George for America, their voyage on the ship, then the fire at sea. She told about the grief, the almost insane grief, which Monsieur Roger had felt when he saw himself separated from his wife and his son, who had been taken off in a boat, while he remained upon the steamer. Then she told Paul of the despair of Monsieur Roger when he saw that boat disappear and bear down with it to a watery grave those whom he loved.



"At that moment," continued Miette, "Monsieur Roger told us that he cried out 'George! George!' with a voice so loud, so terrified, that certainly his little boy must have heard."

Miette stopped.

"Why, what is the matter, Paul?" she cried: "are you sick?"

For Paul Solange had suddenly become so pale that Miette was scared.

"Not at all," said he; "not at all; but finish your story."

"It is finished."

"How?"

"Poor Monsieur Roger has never again seen his wife or his little George—or at least he saw his wife, whose body had been cast up by the waves, but the body of the little boy remained at the bottom of the sea."

After a silence, Miette added,—

"You now understand how it is that the fire at the farm recalled to him at once the fire on the ship, and why, in his grief, in his fright to see you in so great a danger, he thought of his little boy, and cried 'George!' You understand, don't you?"

Paul remained an instant without answering; then, very gravely, with a pale face and wide open eyes, he said,—

"I understand."

Paul Solange did not sleep the night which followed the day on which he learned all these things. His brain was full of strange thoughts. He was calling up shadowy confused recollections. He sought to go back as far as possible to the first years of his childhood, but his memory was at fault. He suddenly found a dark corner where everything disappeared; he could go no farther; but



now that he knew Monsieur Roger's story, he was certain, absolutely certain that he had answered to the name of George in the fire at the farm. It was that name, that name only, which had suddenly shaken off his torpor and given him the strength to awake; it was that name that had saved him. Feverishly searching in his memory, he said to himself that this name he had heard formerly pronounced with the same loud and terrified voice in some crisis, which must have been very terrible, but which he could not recall; and then, hesitating anxiously, feeling that he was making a fool of himself, he asked himself if it was during the fire on shipboard, of which Miette had spoken, that he had heard this name of George; and little by little, in the silence of the night, this conviction entered and fixed itself in his mind. Then he turned his thoughts upon the way that Monsieur Roger had treated him. Whence this sudden and great affection which Monsieur Roger had shown him? Why that sympathy which he knew to be profound and whose cause he could not explain, as he did not merit it a bit more than his friend Albert? Why had Monsieur Roger so bravely risked his life to save him? Why had his emotion been so great? Lastly, why this cry of "George?"

And Paul Solange arrived at this logical conclusion,—

"If Monsieur Roger loves me so much; if he gave me, at the terrible moment when I came near dying, the name of his son, it must be because I recalled to him his son; it must be because I resemble his little George. And what then?"



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## CHAPTER XXVIII.

### MY FATHER.



When Paul at last fell into an uneasy sleep, the sun had been up for some hours. Monsieur Dalize and his friend Roger went out from the château.

"Has the postman not been here yet?" said Monsieur Dalize to his servant.

"No sir; he will not be here for an hour."

"Very well; we will go to meet him."

And in fact, in his haste, Monsieur Roger carried his friend off to meet the postman.

But days had elapsed since Monsieur Dalize had, according to promise, written to the registrar of

births, to ask him to forward a copy of the register of birth of Paul Solange, and no answer had yet arrived. This silence had astonished Monsieur Dalize and given a hope to Monsieur Roger.

"There must be some reason, don't you see," he said, walking beside his friend. "Some important reason why the registrar has not yet answered your pressing letter."

"A reason, an important reason," replied Monsieur Dalize; "the explanation may be that the registrar is away."

"No; there is some other reason," answered Monsieur Roger with conviction.

Half-way to the station they met the letter-carrier, who said,—

"Monsieur Dalize, there are two letters for you."

The first letter which Monsieur Dalize opened bore the address of the registrar of births. He rapidly read the few lines, then turned towards Roger.

"You are right," said he; "there is a reason. Read."

"I pray *you* read it; I am too much excited," replied Roger.

Monsieur Dalize read as follows:

*"Sir:*

"The researches which I have made in my docket to find the register of birth of Paul Solange must be my excuse for the delay. We have not the register of birth which you ask for, but in its place is a paper so important that I have not the right to part with it; still, I shall be ready to place this paper under your eyes when you come to Paris.

"Yours respectfully," etc.

"I go," said Monsieur Dalize, consulting his watch; "I have just time to catch the train, and I shall return in time for dinner. Go back to the château and tell them that an important letter calls me to Paris."

Monsieur Roger took the hand of his friend with a joy which he could not conceal, and said,—

"Thank you."

"I go to please you," answered Monsieur Dalize, not wishing that his friend should have hopes excited, for failure might leave him more unhappy than ever. "I am going to see this important paper, but I see no reason why it should show that Paul was not the son of Monsieur Solange. So keep calm; you will need all your calmness on my return."

Before leaving, Monsieur Dalize opened the envelope of the second letter; as the first lines caught his eyes, an expression of sorrow and surprise came over his face.

"That is very strange and very sad," said he.

"What is it?" asked Roger.

"It is strange that this letter speaks of Monsieur Solange, the father of Paul, and it is sad that it also brings me bad news."

"Speak," said Roger, quickly.

"This letter is from my successor in the banking house, and it says that Monsieur Solange, of Martinique, has suspended payment."

"Has Monsieur Solange failed?" asked Roger.

"The letter adds that they are awaiting fuller information from the mail that should arrive to-day. You see that my presence in Paris is doubly necessary. Come down to the station to meet me in the coupé at five o'clock, and come alone."

The sudden departure of Monsieur Dalize did not very much astonish the people at the Château, but what did astonish them, and become a subject of remark for all, was the new expression on the face of Monsieur Roger. He seemed extremely moved, but his features showed hope and joy, which had chased away his usual sadness. Madame Dalize inquired what had happened, and Monsieur Roger told her the whole story.

Monsieur Roger hoped, and he was even happier that day than ever to find himself near Paul, because the latter showed himself more affectionate than ever. Long before the appointed hour, Monsieur Roger was at the station, awaiting with impatience the return of Monsieur Dalize. At last the train came in sight, and soon Monsieur Dalize got out of the car.

"Well?" said Roger, with a trembling voice, awaiting the yes or the no on which his happiness or his despair depended. Monsieur Dalize, without answering, led Roger away from the station; then, when they were in the coupé, which started at a brisk pace, Monsieur Dalize threw his arms around his friend, with these words:

"Be happy, it is your son!"

Roger's eyes filled with tears, great big tears, which he could not restrain, tears of joy succeeding to the many tears of sorrow which he had shed. At last he murmured,—

"You have the proofs?"

"I have two proofs, one of which comes in a very sad way."

"What is it?"

"The confession of Monsieur Solange, who wrote to me on his death-bed."

"Unhappy man!"

"Unhappy, yes; but also guilty."

"What do you mean?"

"Well, read first a copy of the paper which took the place of the birth-register of Paul Solange."

Through his tears, Monsieur Roger read as follows:

"This 24th day of December, 1877, before me, Jean-Jacques Solange, French Consul of the Island of Saint-Christopher, in the English Antilles, appeared Jan Carit, captain of the Danish fishing vessel, 'Jutland,' and Steffenz and Kield, who declared to him that on the 15th of December, 1877, finding themselves near the Island of Eleuthera, in the archipelago of the Bahamas, they perceived a raft, from which they took a child of the masculine sex, who seemed to be between two and three years old. We have given him the name of Pierre Paul. In witness whereof, the above-named parties have hereunto set their hands and seals."

When he had finished, Roger cried,—

"There is no doubt,—the date, the place, everything is proof."



"Which would not be sufficient, if I had not this."

And Monsieur Dalize gave to his friend Solange's letter. In this letter Monsieur Solange announced his ruin, and his approaching death from heart-disease; the doctors had given him up, and he begged Monsieur Dalize to tell Paul that he was not his son. Monsieur Solange declared that he was the French Consul at the Island of Saint Christopher when some Danish fishermen, from the Island of Saint Thomas, brought him the child, which they had found in the sea. He and his wife had no children. They determined to adopt the child which had been found. Monsieur Solange confessed that he had been wanting in his duty in not making the necessary search. He excused himself sadly by saying that he was convinced of the death of the parents of the child, and he begged for pardon, as he had wished to bring this child up and make him happy. In finishing, he said that the linen of the child was marked "G. L. M.," and that the boy could pronounce the French words "maman" and "papa."

"I pardon him," said, gravely and solemnly, Monsieur Roger.

The coupé had entered the park, and the two gentlemen alighted before the château, where the family awaited them. Monsieur Dalize advanced towards him who had hitherto been called Paul Solange, and who really was George La Morlière.

"My dear child," said he, "I have news for you,—some very sad news and some very happy news."

Anxious, excited, George came forward. Monsieur Dalize continued:

"You have lost him who was your adopted father,—Monsieur Solange."

"Monsieur Solange is dead!" cried George, bowing his head, overwhelmed at the news.

"But," Monsieur Dalize hastened to add, "you have found your real father."

At these words George raised his head again; his eyes went straight towards those of Monsieur Roger. He ran forward and threw himself in the arms which were opened to him, repeating, between his tears,—

"My father! my father!"

And Miss Miette, who wept, as all the rest did, at this moving spectacle, said, in the midst of her sobs,—

"I knew it; I knew it; I knew it was his papa!"



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