May, 1926

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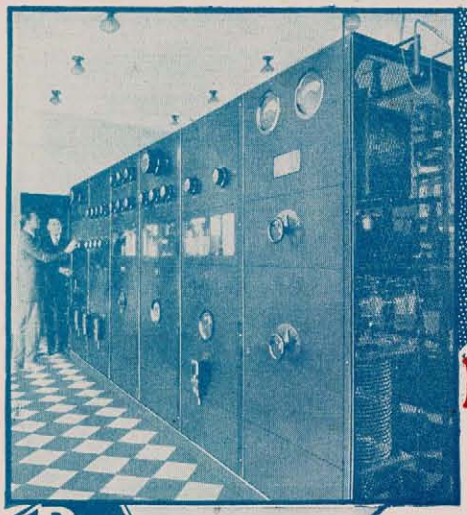

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PORTRAYING HIS IMMORTALITY

AMAZING STORIES

Vol. 1 No. 2
May, 1926

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CONTENTS

Contents for May

A Trip to the Center of the Earth
By Jules Verne 100

Mesmeric Revelation
By Edgar Allan Poe 124

The Crystal Egg
By H. G. Wells 128

The Infinite Vision
By Charles C. Winn 136

The Man From the Atom (*Sequel*)
By G. Peyton Wertenbaker 140

Off On a Comet (*Conclusion*)
By Jules Verne 148

OUR COVER

Illustrates this month's story, *"The Crystal Egg"*, by H. G. Wells. This is a supposed view of the planet Mars, as viewed by Mr. Cave through the Crystal Egg, from the earth.

In Our Next Issue:

"DOCTOR HACKENSAW'S SECRETS", by Clement Fezandié, by popular requests. A new and hitherto unpublished story of the great and illustrious Dr. Hackensaw, which can not fail to hold your interest from start to finish.

"THE RUNAWAY SKYSCRAPER", by Murray Leinster, a story of the Fourth Dimension, in which the great Metropolitan Life skyscraper in New York vanishes into the Fourth Dimension. One of the most surprising tales we have ever read. (This story was scheduled for the May issue, but had to make room for the Jules Verne story).

"THE SCIENTIFIC ADVENTURES OF MR. FOSDICK", by Jack Morgan. Perhaps you did not know it, but there *can* be excellent humor in scientifiction. One of the most excruciatingly funny stories, which at the same time is an excellent piece of scientifiction, is entitled "Mr. Fosdick Invents the Seidlitzmobile."

"A TRIP TO THE CENTER OF THE EARTH", by Jules Verne, (second installment), wherein our heroes have now penetrated to subterranean depths and find a tremendous number of surprises.

"WHISPERING ETHER" by Charles S. Wolfe, a radio story that holds your interest and injects quite a few new thoughts into a well-known subject. One of the greatest short stories we have ever seen. (This story also was due for publication in May, and was crowded out by the conclusion of the Jules Verne story, *"Off On a Comet"*).

Another weird story by Edgar Allan Poe, which we are sure you will like.

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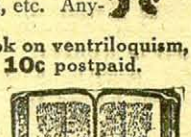

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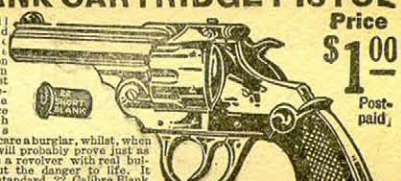

This well made and effective Pistol is modelled on the pattern of the latest type of Revolver, the appearance of which alone is enough to scare a burglar, whilst, when loaded, it will probably prove just as effective as a revolver with real bullets, without the danger to life. It takes the standard .22 Calibre Blank Cartridges, that are obtainable most everywhere. Even the most timid women can use it with perfect safety and frighten a thief without risk to herself or anyone else. **A Great Protection Against Burglars, Tramps and Dogs.** You can have it lying about without the danger attached to other revolvers. We sell large numbers around the 4th of July. Well made of solid Metal. **PRICE ONLY $1.00 Postpaid. Blank Cartridges 22-cal., shipped by express only, 50c per 100. Johnson Smith & Co., Dept. 343, Racine, Wis.**

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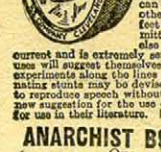

One of these glass vials dropped in a room full of people will cause more consternation than a limburger cheese. The smell entirely disappears in a short time. **10c a Box, 3 Boxes for 25c**

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10c box, 3 boxes for 25c or 75c per doz boxes postpaid.

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VOLUME 1

AMAZING STORIES

THE MAGAZINE OF SCIENTIFICTION

MAY, 1926 NO. 2

HUGO GERNSBACK, F.R.S., *Editor*
DR. T. O'CONOR SLOANE, M. A., Ph.D.; *Associate Editor*
Editorial and General Offices - - - 53 Park Place, New York, N. Y.

Extravagant Fiction Today - - - - - - - - Cold Fact Tomorrow

THANK YOU!

By HUGO GERNSBACK, F.R.S.

THE first issue of AMAZING STORIES has been on the newsstands only about a week, as we go to press with this, the second issue of the magazine; yet, even during this short time, we have been deluged with an avalanche of letters of approval and constructive criticism from practically every section of the country, except the West—as we have not yet had time to hear from it.

We hereby take this medium to thank all our friends for their kind wishes and willingness to cooperate with us. We sincerely regret that we cannot answer each and every letter individually. There are simply too many letters—and we feel that our readers would rather we utilize our efforts in the improvement of the magazine.

After all, it is *your* paper, and we are striving hard to please you. Judging from the various comments, the first issue of AMAZING STORIES was just about right—the stories pleased and the length of the shorter stories and the division of the long ones seemed satisfactory.

And it was with a feeling of gratification that we noted the almost unanimous condemnation of the so-called "sex-appeal" type of story that seems so much in vogue in this country now. Most of our correspondents seemed to heave a great sigh of relief in at last finding a literature that appeals to the imagination, rather than carrying a sensational appeal to the emotions. It is that which justifies our new venture—our expenditure of time and money.

The letters, extracts from which are printed below, seem to best express the general trend of opinion.

Mr. George W. Anderson, of Fairmount, W. Va., in addition to giving us a good suggestion, says:

"Print all scientific facts as related in the stories, in italics. This will serve to more forcefully drive home the idea upon which you have established your magazine. Personally, when I have some such system blazing forth before my eyes I am inclined to stop and consider what I have learned, for future reference."

A. Lee Gladwin, of Ames, Iowa, writes: ". . . . Amazing Stories is entertaining and has food for thought that no other fiction work could begin to compete with."

Raymond E. Dickens, Air Mail Radio Station, Iowa City, Iowa, says:

"I can read these stories over several times and each time get something new from them."

Michael H. Kay, Brooklyn, N. Y., says: "You will generally find that when one has read your magazine he will become so enthusiastic, so elated over his discovery, that he will deem it a pleasure to extol its virtues to his friends. Even now my wife is anxiously waiting for me to finish this first issue, so that she may read it herself."

Lack of space precludes adding to the list indefinitely.

As to the future: Some very valuable suggestions were made—upon which we have acted. There was quite a demand for "Dr. Hackensaw's Secrets." Acting upon this demand, we will, beginning with our next issue, print new and hitherto unpublished Dr. Hackensaw stories. We have a good many of these famous stories by Clement Fezandié. Again, a good many of our readers want some of the stories of Edgar Rice Burroughs. Accordingly, we have contracted for some, to be published in the future. Among the newer works of which we have acquired the publication rights are: *"Die Macht der Drei"* (The Might of the Three), one of the greatest—and perhaps *the* greatest—recent scientifiction story; and *"Feuer am Nordpol"* (The North Pole Fire). Both these works were published in Germany.

We also obtained the rights to an excellent radio story—one of the finest that has ever been written —*"Station X"*, by G. MacLeod Winsor.

"The Messiah of the Cylinder", by Victor Rousseau is another tremendous story, and then, of course, there is H. G. Wells, with his *"The War in the Air."*

There is only one thing that troubles us now: we have more good stories to publish than we have space in which to publish them. And here is where *you* can help. During the next three or four months it is our intention to enlarge the magazine, but only an increased circulation can make this possible. You can do your share by making the magazine known among your friends. If you like AMAZING STORIES, your friends will probably like it too.

If each one of you who reads this could get one friend to buy the next issue of AMAZING STORIES, we would immediately be able to increase the size of the magazine fifty per cent, and thereby give you more material.

The success of AMAZING STORIES is entirely in *your* hands. We shall do our part—we pledge ourselves to do everything to merit your confidence.

A TRIP to the CENTER of the EARTH

By Jules Verne

I read on the eastern side of the huge block of stone, the same characters, half eaten away by the corrosive action of time, the name, to me thousand times accursed.—Arne Saknussem. "Now unbeliever, do you begin to have faith?" cried my uncle. It was impossible for me to answer a single word. The evidence was unanswerable, overwhelming!

Introduction to the Story

HAVING won the attention of the public with "Five Weeks in a Balloon," Jules Verne wrote in rapid succession several truly masterly tales. Of these remarkable inventions of the human mind, "A Trip to the Center of the Earth" was the first to be completed in its present form. It was published in 1864, in a series of books by Verne, denominated "Voyages Extraordinaires." This series, started in that year by the publisher Hetzel, has been continued to recent times.

This particular "Voyage" has sometimes been declared our author's masterpiece. In it he for the first time gives free rein to that bold yet scientifically exact imagination whereby he has constructed for us in fancy the entire universe. There is nothing in all the daring visions of this tale which, even today our scientists would declare impossible. The interior of the earth is still unknown; and there may well be rifts, passages, descending from extinct volcanoes and penetrating far within. There may well be huge cavities, bubbles left in the cooling mass, vast enough to harbor inland seas, and shelter many of the ancient forms of life now extinct upon earth's surface.

The main scientific objection to this, as indeed to most of the more fanciful of Verne's tales, lies in the extravagant means he employs to bring his explorers home again from their reckless ventures. But, as romance obviously demands their return somehow, science discreetly accepts in silence the astonishing accidents and coincidences whereby they escape the doom they have invited.

CHAPTER I

MY UNCLE MAKES A GREAT DISCOVERY

LOOKING back to all that has occurred to me since that eventful day, I am scarcely able to believe in the reality of my adventures. They were truly so wonderful that even now I am bewildered when I think of them.

My uncle was a German, though I am English, he having married my mother's sister. Being very much attached to his fatherless nephew, he invited me to study under him in his home in the fatherland. This home was in a large town, and my uncle was a professor of philosophy, chemistry, geology, mineralogy, and many other ologies.

One day, after passing some hours in the laboratory—my uncle being absent at the time—I suddenly felt the necessity of renovating the tissues—*i. e.*, I was hungry, and was about to rouse up our old French cook, when my uncle, Professor Von Hardwigg, suddenly opened the street door and came rushing upstairs.

Now Professor Hardwigg, my worthy uncle, is by no means a bad sort of man; he is, however, choleric and original. To hear with him means to obey; and scarcely had his heavy feet resounded within our joint domicile than he shouted for me to attend upon him. "Harry—Harry—Harry"

I hastened to obey, but before I could reach his room, jumping three steps at a time, he was stamping his right foot upon the landing. "Harry!" he cried, in a frantic tone, "are you coming up?"

To tell the truth, at that moment I was far more interested in the question as to what was to constitute our dinner than in any problem of science; to me soup was more interesting than sodium, an omelette more tempting than arithmetic, and an artichoke of ten times more value than any amount of asbestos. But my uncle was not a man to be kept waiting; so adjourning all minor questions, I presented myself before him.

He was a very learned man. Now, most persons in this category supply themselves with information, as peddlers do with goods, for the benefit of others, and lay up stores in order to diffuse them abroad for the benefit of society in general. Not so my excellent uncle, Professor Hardwigg; he studied, he consumed the midnight oil, he pored over heavy tomes, and digested huge quartos and folios, and kept the knowledge he acquired to himself. There was a reason, and it may be regarded as a good one, why my uncle objected to display his learning more than was absolutely necessary; he stammered, and when intent upon explaining the phenomena of the heavens, was apt to find himself at fault, and allude in such a vague way to sun, moon, and stars, that few were able to comprehend his meaning. To tell the honest truth, when the right word would not come, it was generally replaced by a very powerful adjective.

In connection with the sciences there are many almost unpronounceable names—names very much resembling those of Welsh villages; and my uncle being very fond of using them, his habit of stammering was not thereby improved. In fact, there were periods in his discourse when he would finally give up and swallow his discomfiture—in a glass of water.

As I said, my uncle, Professor Hardwigg, was a very learned man; and I now add, a most kind relative. I was bound to him by the double ties of affection and interest. I took deep interest in all his doings, and hoped some day to be almost as learned myself. It was a rare thing for me to be absent from his lectures. Like him, I preferred mineralogy to all the other sciences. My anxiety was to gain *real knowledge of the earth.* Geology and mineralogy were to us the main objects of life, and in connection with these studies many a fair specimen of stone, chalk, or ore did we break with our hammers.

But before I state the subject on which my uncle wished to confer with me, I must say a word about his personal appearance. Alas! my readers will see a very different portrait of him at a future time—after he has gone through the fearful adventures yet to be related.

My uncle was fifty years old; tall, thin, and wiry. Large spectacles hid, to a certain extent, his vast, round and goggle eyes, while his nose was irreverently compared to a thin file. So much indeed did it resemble that useful article, that a compass was said in his presence to have made considerable deviation. The truth being told, however, the only article really attracted to my uncle's nose was tobacco.

Another peculiarity of his was, that he always stepped a yard at a time, clenched his fists as if he were going to hit you, and was, when in one of his

IN his immortal story, "A Trip to the Center of the Earth", Jules Verne has quite outdone himself. Not only was Jules Verne a master of the imaginative type of fiction, but he was a scientist of high calibre. Besides this, his intimate knowledge of geography, the customs and peculiarities of the various races, made it possible for him to write with authority on any of these subjects. So when he takes us to the center of the earth, via the route through Iceland, we get the feeling that, somehow, the story is real, and this, after all, is the test of any good story.

Instead of boring a hole into the bowels of the earth, Jules Verne was probably the first to think of taking the reader to unexplored depths through the orifice of an extinct volcano. He argues, correctly, that a dead crater would prove not only the safest, but perhaps the best route for such exploration. No one has as yet explored the very center of the earth, for at no time have we descended deeper than about a mile below the surface of the planet. Who knows, therefore, but that there may be tremendous discoveries ahead of the human race, once we penetrate into the great depths of the globe?

We have no right to assume that life in the interior of the earth is an impossibility. When our deep sea expeditions come home with specimens of fish that live at the bottom of the ocean, and under what appear to be unendurable pressures, where logic would assume there could be no life, we should not judge harshly that there can be no life in the depths of the earth. If there is an entrance to a great unexplored cavity within our planet, you are free to believe that some form of life exists there. Living beings can get along without light, and it is possible that some sort of light of the phosphorescent order can be found there. And, besides, nature has a trick all its own of circumventing impossibilities, as is well witnessed in many deep sea fish, in depths where no light ever penetrates, where many of them are equipped with luminous eyes and other light-giving organs.

peculiar humors, very far from a pleasant companion.

It is further necessary to observe, that he lived in a very nice house, in that very nice street, the Königstrasse in Hamburg. Though lying in the center of a town, it was perfectly rural in its aspect—half wood, half bricks, with old-fashioned gables—one of the few old houses spared by the great fire of 1842. When I say a nice house, I mean a handsome house—old, tottering, and not exactly conformable to English notions: a house a little off the perpendicular and inclined to fall into the neighboring canal; exactly the house for a wandering artist to depict; all the more that you could scarcely see it for ivy and a magnificent old tree which grew over the door.

My uncle was rich; his house was his own property, and he had a considerable private income. To my notion the best part of his possessions was his god-daughter, Gretchen, who unfortunately was away upon a visit on that momentous day. The old cook, the young lady, the Professor and I were the only inmates of his home.

I loved mineralogy, I loved geology. To me there was nothing better than pebbles—and if my uncle had been in a little less of a fury, we should have been the happiest of families. To prove the excellent Hardwigg's impatience, I solemnly declare that when the flowers in the drawing-room pots began to grow, he rose every morning at four o'clock to make them grow quicker by pulling the leaves!

Having described my uncle, I will now give an account of our interview. He received me in his study; a perfect museum, containing every natural curiosity that can well be imagined—minerals, however, predominating. Every one was familiar to me, having catalogued each by my own hand. My uncle, apparently oblivious of the fact that he had summoned me to his presence, was absorbed in a book. He was particularly fond of early editions, tall copies, and unique works.

"Wonderful!" he cried, tapping his forehead. "Wonderful—wonderful!" It was one of those yellow-leaved volumes now rarely found on stalls, and to me it appeared to possess but little value. My uncle, however, was in raptures. He admired its binding, the clearness of its characters, the ease with which it opened in his hand, and repeated aloud, half-a-dozen times, that it was very, very old.

To my fancy he was making a great fuss about nothing, but it was not my province to say so. On the contrary, I professed considerable interest in the subject, and asked him what it was about.

"It is the Heims-Kringla of Snorre Sturlasson," he said, "the celebrated Icelandic author of the twelfth century—it is a true and correct account of the Norwegian princes who reigned in Iceland."

My next question related to the language in which it was written. I hoped at all events it was translated into German. My uncle was indignant at the very thought, and declared he wouldn't give a penny for a translation. His delight was to have found the original work in the Icelandic tongue, which he declared to be one of the most magnificent and yet simple idioms in the world—while at the same time its grammatical combinations were the most varied known to students.

"About as easy as German?" was my insidious remark.

My uncle shrugged his shoulders.

"The Runic letters at all events," I said, "are rather difficult of comprehension."

"It is a Runic manuscript, the language of the original population of Iceland, invented by Odin himself," cried my uncle, angry at my ignorance.

I was about to venture upon some misplaced joke on the subject, when a small scrap of parchment fell out of the leaves. Like a hungry man snatching at a morsel of bread the Professor seized it. It was about five inches by three and was scrawled over in the most extraordinary fashion.

The lines opening the next chapter are an exact facsimile of what was written on the venerable piece of parchment—and have wonderful importance, as they induced my uncle to undertake the most wonderful series of adventures which ever fell to the lot of human beings.

My uncle looked keenly at the document for some moments then declared that it was Runic. The letters were similar to those in the book, but then what did they mean? This was exactly what I wanted to know.

Now, as I had a strong conviction that the Runic alphabet and dialect were simply an invention to mystify poor human nature, I was delighted to find that my uncle knew as much about the matter as I did—which was nothing. At all events, the tremulous motion of his fingers made me think so.

"And yet," he muttered to himself, "it is old Icelandic, I am sure of it."

My uncle ought to have known, for he was a perfect polyglot dictionary in himself. He did not pretend, like a certain learned pundit, to speak the two thousand languages and four thousand idioms made use of in different parts of the globe, but he did know all the more important ones.

It is a matter of great doubt to me now, to what violent measures my uncle's impetuosity might have led him, had not the clock struck two, and our old French cook called out to let us know that dinner was on the table.

"Bother the dinner!" cried my uncle. But I was hungry, so I sallied forth to the dining-room, where I took up my usual quarters. Out of politeness I waited three minutes, but no sign of my uncle, the Professor. I was surprised. He was not usually so blind to the pleasure of a good dinner. It was the acme of German luxury—parsley soup, a ham omelette with sorrel trimmings, veal stewed with prunes, delicious fruit, and sparkling Moselle. For the sake of poring over that musty old piece of parchment, my uncle forbore to share our meal. To satisfy my conscience, I ate for both.

The old cook and housekeeper was nearly out of her mind. After taking so much trouble, to find that her master did not appear at dinner was a sad disappointment—which as she watched the havoc I was making on the viands, became also alarm. If my uncle were to come to table after all?

Suddenly, just as I had consumed the last apple and drunk the last glass of wine, a terrible voice was heard at no great distance. It was my uncle roaring for me to come to him. I made it in very nearly one leap—so loud, so fierce was his tone.

CHAPTER II

THE MYSTERIOUS PARCHMENT

"I declare," cried my uncle, striking the table fiercely with his fist, "I declare to you it is Runic—and contains some wonderful secret, which I must get at, at any price."

I was about to reply, when he stopped me. "Sit down," he said, quite fiercely, "and write to my dictation."

I obeyed. "I will substitute," he said, "a letter of our alphabet for that of the Runic: we will then see what that will produce. Now, begin and make no mistakes."

The dictation commenced with the following incomprehensible result:—

m.rnlls	*esruel*	*seecJde*
sgtssmf	*unteief*	*niedrke*
kt,samn	*atrateS*	*Saodrrn*
emtnael	*nuaect*	*rrilSa*
Atvaar	*.nscrc*	*ieaabs*
ccdrmi	*eeutul*	*frantu*
dt,iac	*oseibo*	*KediiI*

Scarcely giving me time to finish, my uncle snatched the document from my hands and examined it with the most rapt and deep attention.

"I should like to know what it means," he said, after a long period.

I certainly could not tell him, nor did he expect me to—his conversation being uniformly answered by himself.

"I declare it puts me in mind of a cryptograph," he cried, "unless, indeed, the letters have been written without any real meaning; and yet why take so much trouble? Who knows but I may be on the verge of some great discovery?"

My candid opinion was that it was all rubbish! But this opinion I kept carefully to myself, as my uncle's choler was not pleasant to bear. All this time he was comparing the book with the parchment.

"The manuscript volume and the smaller document are written in different hands," he said, "the cryptograph is of much later date than the book; there is an undoubted proof of the correctness of my surmise. The first letter is a double M, which was only added to the Icelandic language in the twelfth century—this makes the parchment two hundred years posterior to the volume."

The circumstances appeared very probable and very logical, but it was all surmise to me.

"To me it appears probable that this sentence was written by some owner of the book. Now who was the owner, is the next important question. Perhaps by great good luck it may be written somewhere in the volume."

With these words Professor Hardwigg took off his spectacles, and, taking a powerful magnifying glass, examined the book carefully. On the fly leaf was what appeared at first to be a blot of ink, but on examination proved to be a line of writing almost effaced by time. This was what he sought. After considerable time, he made out these letters:

"Arne Saknussem!" he cried in a joyous and triumphant tone, "that is not only an Icelandic name, but the name of a learned professor of the sixteenth century, a celebrated alchemist."

I bowed as a sign of respect.

"These alchemists," he continued, "Avicena, Bacon, Lully, Paracelsus, were the true, the only learned men of the day. They made surprising discoveries. May not this Saknussem, nephew mine, have hidden on this bit of parchment some astounding invention? I believe the cryptograph to have a profound meaning—which I must make out."

My uncle walked about the room in a state of excitement almost impossible to describe.

"It may be so, sir," I timidly observed, "but why conceal it from posterity, if it be a useful, a worthy discovery?"

"Why—how should I know? Did not Galileo make a secret of his discoveries in connection with Saturn? But we shall see. Until I discover the meaning of this sentence I will neither eat nor sleep."

"My dear uncle——" I began.

"Nor you either," he added. It was lucky I had taken double allowance that day.

"In the first place," he continued, "there must be a clue to the meaning. If we could find that, the rest would be easy enough."

I began seriously to reflect. The prospect of going without food and sleep was not a promising one, so I determined to do my best to solve the mystery. My uncle, meanwhile, went on with his soliloquy.

"The way to discover it is easy enough. In this document there are one hundred and thirty-two letters, giving seventy-nine consonants to fifty-three vowels. This is about the proportion found in most southern languages, the idioms of the north being much more rich in consonants. We may confidently predict, therefore, that we have to deal with a southern dialect."

Nothing could be more logical.

"Now," said Professor Hardwigg, "to trace the particular language."

"As Shakespeare says, 'that is the question,'" was my rather satirical reply.

"This man Saknussem," he continued, "was a very learned man: now as he did not write in the language of his birth-place, he probably, like most learned men of the sixteenth century, wrote in Latin. If, however, I prove wrong in this guess, we must try Spanish, French, Italian, Greek, and even Hebrew. My own opinion, though, is decidedly in favor of Latin."

This proposition startled me. Latin was my favorite study, and it seemed sacrilege to believe this gibberish to belong to the country of Virgil.

"Barbarous Latin, in all probability," continued my uncle, "but still Latin."

"Very probably," I replied, not to contradict him.

"Let us see into the matter," continued my uncle; "here you see we have a series of one hundred and thirty-two letters, apparently thrown pell-mell upon paper, without method or organization. There are words which are composed wholly of consonants, such as *m.rnlls*, others which are nearly all vowels, the fifth, for instance, which is *unteief*, and one of the last *oseibo*. This appears an extraordinary combination. Probably we shall find that the phrase is arranged according to some mathematical plan. No doubt a certain sentence has been written out and then jumbled up—some plan to which some figure is the clue. Now, Harry, to show your English wit—what is that figure?"

I could give him no hint. My thoughts were indeed far away. While he was speaking I had caught sight of a portrait of my cousin Gretchen, and was wondering when she would return. We were affianced, and loved one another very sincerely. But my uncle, who never thought of such sublunary matters, knew nothing of this. Without noticing my abstraction, the Professor began reading the puzzling cryptograph all sorts of ways, according to some theory of his own. Presently, rousing my wandering attention, he dictated one precious attempt to me.

I mildly handed it over to him. It read as follows:—

messunkaSenrA.icefdoK.segnittamurtn
ecertserrette,rotaivsadua,ednecsedsadne
lacartniiiluJsiratracSarbmutabiledmek
meretarcsilucoIsleffenSnI.

I could scarcely keep from laughing while my uncle, on the contrary, got into a towering passion, struck the table with his fist, darted out of the room, out of the house and then taking to his heels was presently lost to sight.

CHAPTER III

AN ASTOUNDING DISCOVERY

"WHAT is the matter?" cried the cook, entering the room; "when will master have his dinner?"

"Never."

"And, his supper?"

"I don't know. He says he will eat no more, neither shall I. My uncle has determined to fast and make me fast until he reads this abominable inscription," I replied.

"You will be starved to death," she said.

I was very much of the same opinion, but not liking to say so, sent her away, and began some of my usual work of classification. But busy as I made myself, nothing could keep me from thinking alternately of the stupid manuscript and of the pretty Gretchen.

Several times I was tempted to go out, but my uncle would have been angry at my absence. At the end of an hour, my allotted task was done. How to pass the time? I began by lighting my pipe. Like all other students, I delighted in tobacco; and, seating myself in the great armchair, I began to meditate.

Where was my uncle? I could easily imagine him tearing along some solitary road, gesticulating, talking to himself, cutting the air with his cane, and still thinking of the absurd bit of hieroglyphics. Would he hit upon some clue? Would he come home in better humor? While these thoughts were passing through my brain, I mechanically took up the execrable puzzle and tried every imaginable way of grouping the letters. I put them together by twos, by threes, fours, and fives—in vain. Nothing intelligible came out, except that the fourteenth, fifteenth and sixteenth made *ice* in English; the eighty-fourth, eighty-fifth and eighty-sixth, the word *sir;* then at last I seemed to find the Latin words *rota, mutabile, ira, nec, atra.*

"Ha! there seems to be some truth in my uncle's notion," thought I.

Then again I seemed to find the word *luco,* which means sacred grove. Then in the third line I appeared to make out *labiled,* a perfect Hebrew word, and at last the syllables *mére, art, mer,* which were French. It was enough to drive one mad. Four different idioms in this absurd phrase. What connection could there be between ice, sir, anger, cruel, sacred grove, changing, mother, art and sea? The first and the last might, in a sentence connected with Iceland, mean sea of ice. But what of the rest of this monstrous cryptograph?

I was, in fact, fighting against an insurmountable difficulty; my brain was almost on fire; my eyes were strained with staring at the parchment; the whole absurd collection of letters appeared to dance before my vision in a number of black little groups. My mind was possessed with temporary hallucination—I was stifling. I wanted air. Mechanically I fanned myself with the document, of which I saw first the back and then the front.

Imagine my surprise, when glancing at the back of the wearisome puzzle, the ink having gone through, I clearly made out Latin words, and among others *craterem* and *terrestre.*

I had discovered the secret! It came upon me like a flash of lightning. I had got the clue. All you had to do to understand the document was to read it backwards. All the ingenious ideas of the Professor were realized; he had dictated it rightly to me; by a mere accident I had discovered what he so much desired.

My delight, my emotion may be imagined. My eyes were dazzled and I trembled so that at first I could make nothing of it. One look, however, would tell me all I wished to know.

"Let me read," I said to myself, after drawing a long breath. I spread it before me on the table, I passed my finger over each letter, I spelt it through; in my excitement I read it out.

What horror and stupefaction took possession of my soul. I was like a man who had received a knock-down blow. Was it possible that I really read the terrible secret, and it had really been accomplished! A man had dared to do—what?

No living being should ever know "Never!" cried I, jumping up; "Never shall my uncle be made aware of the dread secret. He would be quite capable of undertaking the terrible journey. Nothing would check him, nothing stop him. Worse, he would compel me to accompany him, and we should be lost forever. No; such folly and madness cannot be allowed."

I was almost beside myself with rage and fury. "My worthy uncle is already nearly mad," I cried aloud. "This would finish him. By some accident

he may make the discovery, in which case, we are both lost. Perish the fearful secret—let the flames forever bury it in oblivion.

I snatched up book and parchment, and was about to cast them into the fire, when the door opened and my uncle entered. I had scarcely time to put down the wretched documents before my uncle was by my side. He was profoundly absorbed. His thoughts were evidently bent on the terrible parchment. Some new combination had probably struck him while taking his walk. He seated himself in his arm-chair, and with a pen began to make an algebraical calculation. I watched him with anxious eyes. My flesh crawled as his discovery of the secret became probable. I having discovered the only clue, I knew his combinations were useless. For three mortal hours he continued without speaking a word, without, raising his head, scratching, rewriting, calculating over and over again. I knew that in time he must hit upon the right phrase. The letters of every alphabet have only a certain number of combinations. But then years might elapse before he would arrive at the correct solution.

Still time went on; night came, the sounds in the streets ceased—and still my uncle went on, not even answering our worthy cook when she called us to supper. I did not dare to leave him, so waved her away, and at last fell asleep on the sofa.

When I awoke, my uncle was still at work. His red eyes, his pallid countenance, his matted hair, his feverish hands, his hecticly flushed cheeks, showed how terrible had been his struggle with the impossible, and what fearful fatigue he had undergone during that long sleepless night. It made me quite ill to look at him. Though he was rather severe with me, I loved him, and my heart ached at his sufferings. He was so overcome by one idea that he could not even get into a passion! All his energies were focussed on one point. And I knew that by speaking one little word all this suffering would cease. I could not speak it.

My heart was, nevertheless, inclining towards him. Why, then, did I remain silent? In the interest of my uncle himself. "Nothing shall make me speak," I muttered. "He will want to follow in the footsteps of the other! I know him well. His imagination is a perfect volcano, and to make discoveries in the interests of geology he would sacrifice his life. I will therefore be silent and strictly keep the secret I have discovered. To reveal it would be suicidal. He would not only himself rush to destruction, but drag me with him." I crossed my arms, looked another way and smoked—resolved never to speak.

When our cook wanted to go out to market, or on any other errand, she found the front door locked and the key taken away. Was this done purposely or not? Surely Professor Hardwigg did not intend the old woman and myself to become martyrs to his obstinate will. Were we to be starved to death? A frightful recollection came to my mind. Once we had fed on bits and scraps for a week while he sorted some curiosities. It gave me the cramp even to think of it!

I wanted my breakfast, and I saw no way of getting it. Still my resolution held good. I would starve rather than yield. But the cook began to take me seriously to task. What was to be done? She could not go out; and I dared not.

My uncle continued counting and writing; his imagination seemed to have transported him to the skies. He thought neither of eating nor drinking. In this way twelve o'clock came around. I was hungry, and there was nothing in the house. The cook had eaten the last bit of bread. This could not go on. At two o'clock my sensations were terrible. After all I began to think the document is very absurd. Perhaps it is only a gigantic hoax. Besides, some means could surely be found to keep my uncle back from attempting any such absurd expedition. On the other hand, if he should attempt anything so quixotic, I could not be compelled to accompany him. Another line of reasoning partially decided me. Very likely he would make the discovery himself when I should have suffered starvation for nothing. Under the influence of hunger this reasoning appeared admirable. I determined to tell all.

The question now arose as to how it was to be done. I was still dwelling on the thought when he rose and put on his hat. What! go out and lock us in? Never!

"Uncle," I began.

He did not appear even to hear me.

"Professor Hardwigg," I cried.

"What," he retorted, "did you speak?"

"How about the key?"

"What key—the key of the door?"

"No—of these horrible hieroglyphics."

He looked at me from under his spectacles, and started at the odd expression of my face. Rushing forward, he clutched me by the arm and keenly examined my countenance. His very look was an interrogation. I simply nodded.

With an incredulous shrug of the shoulders, he turned upon his heel. Undoubtedly he thought I had gone mad.

"I have made a very important discovery."

His eyes flashed with excitement. His hand was lifted in a menacing attitude. For a moment neither of us spoke. It is hard to say which was most excited.

"You don't mean to say that you have any idea of the meaning of the scrawl?"

"I do," was my desperate reply. "Look at the sentence as dictated by you."

"Well, but it means nothing," was the angry answer.

"Nothing if you read from left to right, but mark, if from right to left——"

"Backwards!" cried my uncle, in wild amazement. "Oh most cunning Saknussem; and I to be such a blockhead." He snatched up the document, gazed at it with haggard eye, and read it out as I had done. It read as follows:—

In Sneffels Ioculis craterem kem delebat
Umbra Scartaris Julii intra calendas descende.
Audas viator, et terrestre centrum attinges.
Kod feci. Arne Saknussem.

Which dog-Latin being translated, read as follows: "Descend into the crater of Yokul of Sneffels, which the shade of Scartaris covers, before the kalends of July, audacious traveler, and you will reach the center of the earth. I did it.

"ARNE SAKNUSSEM."

My uncle leaped three feet from the ground with joy. He looked radiant and handsome. He rushed about the room wild with delight and satisfaction. He knocked over tables and chairs. He threw his

books about until at last utterly exhausted, he fell into his arm-chair. "What's o'clock?" he asked.

"About three."

"My dinner does not seem to have done me much good," he observed, "Let me have something to eat. We can then start at once. Get my portmanteau ready."

"What for?"

"And your own," he continued. "We start at once."

My horror may be conceived. I resolved however to show no fear. Scientific reasons were the only ones likely to influence my uncle. And there were many against this terrible journey. The very idea of going down to the center of the earth was simply absurd. I determined therefore to argue the point after dinner.

My uncle's rage was now directed against the cook for having no dinner ready. My explanation, however, satisfied him, and giving her the key she soon managed to get sufficient to satisfy our voracious appetites.

During the repast my uncle was rather gay than otherwise. He made some of those peculiar jokes which belong exclusively to the learned. As soon, however, as dessert was over, he called me to his study. We each took a chair on opposite sides of the table.

"Henry," he said, in a soft and winning voice; "I have always believed you ingenious, and you have rendered me a service never to be forgotten. Without you, this great, this wondrous discovery would never have been made. It is my duty, therefore, to insist on your sharing the glory."

"He is in a good humor," thought I; "I'll soon let him know my opinion of glory."

"In the first place," he continued, "you must keep the whole affair a profound secret. There is no more envious race of men than scientific discoverers. Many would start on the same journey. At all events, we will be the first in the field."

"I doubt your having many competitors," was my reply.

"A man of real scientific acquirements would be delighted at the chance. We should find a perfect stream of pilgrims on the traces of Arne Saknussem, if this document were once made public."

"But my dear sir, is not this paper very likely to be a hoax?" I urged.

"The book in which we find it is sufficient proof of its authenticity," he replied.

"I thoroughly allow that the celebrated Professor wrote the line, but only, I believe, as a kind of mystification," was my answer.

Scarcely were the words out of my mouth, when I was sorry I had uttered them. My uncle looked at me with a dark and gloomy scowl, and I began to be alarmed for the results of our conversation. His mood soon changed, however, and a smile took the place of a frown. "We shall see," he remarked, with a decisive emphasis.

"But see, what is all this about yokul, and Sneffels, and this Scartaris? I have never heard anything about them."

"The very point to which I am coming. I lately received from my friend, Augustus Peterman, of Leipzig, a map. Take down the third atlas from the second shelf, series Z, plate 4."

I rose, went to the shelf, and presently returned with the volume indicated.

"This," said my uncle, "is one of the best maps of Iceland. I believe it will settle all your doubts, difficulties and objections."

With a grim hope to the contrary, I stooped over the map.

CHAPTER IV

WE START ON THE JOURNEY

"YOU see, the whole island is made up of volcanoes," said the Professor, "and note that they all bear the name of yokul. The word is Icelandic, and means glacier. In most of the lofty mountains of that region the volcanic eruptions come forth from ice-bound caverns. Hence the name applied to every volcano on this extraordinary island."

"But what does this word Sneffels mean?"

To this question I expected no rational answer. I was mistaken. "Follow my finger to the western coast of Iceland, there you see Reykjawik, its capital. Follow the direction of one of its innumerable fjords or arms of the sea, and what do you see below the sixty-fifth degree of latitude?"

"A peninsula—very like a thigh-bone in shape."

"And in the center of it——?"

"A mountain."

"Well, that's Sneffels."

I had nothing to say.

"That is Sneffels—a mountain about five thousand feet in height, one of the most remarkable in the whole island, and certainly doomed to be the most celebrated in the world, for through its crater we shall reach the Center of the Earth."

"Impossible!" cried I, startled and shocked at the thought.

"Why impossible?" said Professor Hardwigg in his severest tones.

"Because its crater is choked with lava, by burning rocks—by infinite dangers."

"But if it be extinct?"

"That would make a difference."

"Of course it would. There are about three hundred volcanoes on the whole surface of the globe—but the greater number are extinct. Of these Sneffels is one. No eruption has occurred since 1219—in fact it has ceased to be a volcano at all."

After this what more could I say? Yes—I thought of another objection. "But what is all this about Scartaris and the kalends of July——?"

My uncle reflected deeply. Presently he gave forth the result of his reflections in a sententious tone. "What appears obscure to you, to me is light. This very phrase shows how particular Saknussem is in his directions. The Sneffels' mountain has many craters. He is careful therefore to point out the exact one which is the highway into the Interior of the Earth. He lets us know, for this purpose, that about the end of the month of June, the shadow of Mount Scartaris falls upon the one crater. There can be no doubt about the matter."

My uncle had an answer for everything. "I accept all your explanations," I said, "and Saknussem is right. He found out the entrance to the bowels of the earth, he has indicated correctly, but that he or anyone else ever followed up the discovery, is madness to suppose."

"Why so, young man?"

"All scientific teaching, theoretical and practical, shows it to be impossible."

"I care nothing for theories," retorted my uncle.

"But is it not well-known that heat increases one degree for every seventy feet you descend into the earth? which gives a fine idea of the central heat. All the matters which compose the globe are in a state of incandescence; even gold, platinum, and the hardest rocks are in a state of fusion. What would become of us?"

"Don't be alarmed at the heat, my boy."

"How so?"

"Neither you nor anybody else knows anything about the real state of the earth's interior. All modern experiments tend to explode the older theories. Were any such heat to exist, the upper crust of the earth would be shattered to atoms, and the world would be at an end."

A long, learned and not uninteresting discussion followed, which ended in this: "I do not believe in the dangers and difficulties which you, Harry, seem to multiply; and the only way to learn, is like Arne Saknussem, to go and see."

"Well," cried I, overcome at last, "let us go and see. Though how we can do that in the dark is another mystery."

"Fear nothing. We shall overcome these, and many other difficulties. Besides, as we approach the Center, I expect to find it luminous——"

"Nothing is impossible."

"And now that we have come to a thorough understanding, not a word to any living soul. Our success depends on secrecy and despatch."

Thus ended our memorable conference, which roused a perfect fever in me. Leaving my uncle, I went forth like one possessed. Reaching the banks of the Elbe, I began to think. Was all I had heard really and truly possible? Was my uncle in his sober senses, and could the interior of the earth be reached? Was I the victim of a madman, or was he a discoverer of rare courage and grandeur of conception?

To a certain extent I was anxious to be off. I was afraid my enthusiasm would cool. I determined to pack up at once. At the end of an hour, however, on my way home, I found that my feelings had very much changed. "I'm all abroad," I cried; "it's a nightmare—I must have dreamt it."

At this moment I came face to face with Gretchen, whom I warmly embraced. "So you have come to meet me," she said; "how good of you. But what is wrong with you?"

Well, it was no use mincing the matter. I told her all. She listened with awe, and for some minutes she could not speak. "Well?" I at last asked, rather anxiously.

"What a magnificent journey. If I were only a man! A journey worthy of the nephew of Professor Hardwigg. I should look upon it as an honor to accompany him."

"My dear Gretchen, I thought you would be the first to cry out against this mad enterprise."

"No; on the contrary, I glory in it. It is magnificent, splendid—an idea worthy of my father. Harry Lawson, I envy you."

This was, as it were, conclusive. The final blow of all.

When we entered the house we found my uncle surrounded by workmen and porters, who were packing up. He was pulling and hauling at a bell. "Where have you been wasting your time? Your portmanteau is not packed—my papers are not in order—the precious tailor has not brought my clothes, nor my gaiters—the key of my carpet bag is gone!"

I looked at him stupefied. And still he tugged away at the bell. "We are really off, then?" I said.

"Yes—of course, and yet you go out for a stroll, unfortunate boy!"

"And when do we go?"

"The day after to-morrow, at daybreak."

I heard no more; but darted off to my little bedchamber and locked myself in. There was no doubt about it now. My uncle had been hard at work all the afternoon. The garden was full of ropes, rope-ladders, torches, iron clamps, crow-bars, alpenstocks, and pickaxes—enough to load ten men.

I passed a terrible night. I was called early the next day to learn that the resolution of my uncle was unchanged and irrevocable. I also found my cousin and affianced wife as warm on the subject as was her father.

Next day, at five o'clock in the morning, the post-chaise was at the door. Gretchen and the old cook received the keys of the house; and, scarcely pausing to wish anyone good-bye, we started on our adventurous journey into the center of the Earth.

CHAPTER V

FIRST LESSONS IN CLIMBING

AT Altona, a suburb of Hamburg, is the Chief Station of the Kiel railway, which was to take us to the shores of the Belt; and exactly at 7 o'clock we were seated opposite each other in a first-class railway carriage. My uncle said nothing. He was too busy examining his papers, among which of course was the famous parchment, and some letters of introduction from the Danish consul, which were to pave the way to an introduction to the Governor of Iceland. In three hours we reached Kiel, and our baggage was at once transferred to the steamer.

We had now a day before us, a delay of about ten hours, which fact put my uncle in a towering passion. We had nothing to do but to walk about the pretty town and bay. At last, however, we went on board, and at half past ten were steaming down the Great Belt. The next morning we reached Copenhagen, where, scarcely taking time for refreshment, my uncle hurried out to present one of his letters of introduction. It was to the director of the Museum of Antiquities, who having been informed that we were tourists bound for Iceland, did all he could to assist us. One wretched hope sustained me now. Perhaps no vessel was bound for such distant parts.

Alas! a little Danish schooner, the *Valkyrie*, was to sail on the second of June for Reykjawik. The captain, M. Bjarne, was on board, and was rather surprised at the energy and cordiality with which his future passenger shook him by the hand. To him a voyage to Iceland was merely a matter of course. My uncle, on the other hand, considered the event of sublime importance. The honest sailor took advantage of the Professor's enthusiasm to double the fare.

"On Tuesday morning at seven o'clock be on

board," said M. Bjarne, handing us our receipts."

"Excellent! Capital! Glorious!" remarked my uncle as we sat down to a late breakfast; "refresh yourself, my boy, and we will take a run through the town."

Our meal concluded we went to the Kongens-Nye-Torv; to the king's magnificent palace; to the beautiful bridge over the canal near the Museum; to the immense cenotaph of Thorwaldsen with its hideous naval groups; to the castle of Rosenborg; and to all the other lions of the place,—none of which my uncle even saw, so absorbed was he in his anticipated triumphs.

But one thing struck his fancy, and that was a certain singular church steeple situated on the Island of Amak, which is the south-east quarter of the city of Copenhagen. My uncle at once ordered me to turn my steps that way. This church exhibited nothing remarkable in itself; in fact, the worthy Professor had only been attracted to it by one circumstance, which was, that its rather elevated steeple started from a circular platform, after which there was an exterior staircase, which wound round to the very summit. "Let us ascend," said my uncle.

"But I never could climb church towers," I cried, "I am subject to dizziness in my head."

"The very reason why you should go up. I want to cure you of a bad habit."

"But my good sir——"

"I tell you to come. What is the use of wasting so much valuable time?"

It was impossible to dispute the dictatorial commands of my uncle. I yielded with a groan. On payment of a fee, a verger gave us the key. He, for one, was not partial to the ascent. My uncle at once showed me the way, running up the steps like a school-boy. I followed as well as I could, though no sooner was I outside the tower, than my head began to swim. There was nothing of the eagle about me. The earth was enough for me, and no ambitious desire to soar ever entered my mind. Still things did not go badly until I had ascended 150 steps, and was near the platform. Then I began to feel the rush of cold air. I could scarcely stand, but clutching the railings, I looked upwards. The railings were frail enough, but they seemed good compared to those which skirted the terrible winding staircase, that appeared, from where I stood, to ascend to the skies.

"Now then, Harry."

"I can't do it!" I cried, in accents of despair.

"Are you, after all, a coward, sir?" said my uncle in a pitiless tone. "Go up, I say!"

To this there was no reply possible. And yet the keen air acted violently on my nervous system; sky, earth, all seemed to swim round; while the steeple rocked like a ship. My legs gave way like those of a drunken man. I crawled upon my hands and knees; I hauled myself up slowly, crawling like a snake. Presently I closed my eyes, and allowed myself to be dragged upwards.

"Look around you," said my uncle, in a stern voice, "heaven knows what profound abysses you may have to look down. This is excellent practice."

Slowly, and shivering all the while with cold, I opened my eyes. What then did I see? My first glance was upwards at the cold fleecy clouds, which as by some optical delusion appeared to stand still, while the steeple, the weathercock, and our two selves were carried swiftly along. Far away on one side could be seen the grassy plain, while on the other lay the sea bathed in translucent light. The Sund, or Sound as we call it, could be discovered beyond the point of Elsinore, crowded with white sails, which, at that distance, looked like the wings of sea-gulls; while to the east could be discerned the far-off coast of Sweden. The whole appeared a magic panorama.

Faint and bewildered as I was, there was no remedy for it. Rise and stand up I must. Despite my protestations my first lesson lasted quite an hour. When, nearly two hours later, I reached the bosom of mother earth, I was like a rheumatic old man bent double with pain. "Enough for one day," said my uncle, rubbing his hands, "we will begin again to-morrow."

There was no remedy. My lessons lasted five days, and at the end of that period, I ascended blithely enough, and found myself able to look down into the depths below without winking, and even with some degree of pleasure.

CHAPTER VI

OUR VOYAGE TO ICELAND

THE hour of departure came at last. The night before, the worthy Mr. Thompson brought us the most cordial letters of introduction for Count Trampe, Governor of Iceland, for Mr. Pictursson, coadjutor to the bishop, and for M. Finsen, mayor of the town of Reykjawik. In return, my uncle nearly crushed his hands, so warmly did he shake them.

On the second of the month, at two in the morning, our precious cargo of luggage was taken on board the good ship *Valkyrie*. We followed, and were very politely introduced by the captain to a small cabin with two standing bed places, neither very well ventilated nor very comfortable. But in the cause of science men are expected to suffer.

"Well, and have we a fair wind?" cried my uncle, in his most mellifluous accents.

"An excellent wind!" replied Captain Bjarne; "we shall leave the Sound, going free with all sails set." A few minutes afterwards, the schooner started before the wind, under all the canvas she could carry, and entered the channel. An hour later, the capital of Denmark seemed to sink into the waves, and we were at no great distance from the coast of Elsinore. My uncle was delighted; for myself, moody and dissatisfied, I appeared almost to expect a glimpse of the ghost of Hamlet.

"Sublime madman," thought I, "you doubtless, would approve our proceedings. You might perhaps even follow us to the center of the earth, there to resolve your eternal doubts."

"How long will the voyage last?" asked my uncle.

"Well, I should think about ten days," replied the skipper, "unless, indeed, we meet with some north-east gales among the Faroe Islands."

"At all events, there will be no very considerable delay," cried the impatient Professor.

"No, Mr. Hardwigg," said the captain, "no fear of that. At all events, we shall get there some day."

The voyage offered no incident worthy of record.

I bore it very well, but my uncle to his great annoyance, and even shame, was remarkably sea-sick! This *mal de mer* troubled him the more, that it prevented him from questioning Captain Bjarne as to the subject of Sneffels, as to the means of communication, and the facilities of transport. All these explanations he had to adjourn to the period of his arrival. His time meanwhile, was spent lying in bed groaning, and dwelling anxiously on the hoped-for termination of the voyage. I did not pity him.

On the eleventh day we sighted Cape Portland, over which towered Mount Myrdals Yokul, which, the weather being clear, we made out very readily. The cape itself is nothing but a huge mount of granite standing naked and alone to meet the Atlantic waves. The *Valkyrie* kept off the coast, steering to the westward. On all sides were to be seen whole "schools" of whales and sharks. After some hours we came in sight of a solitary rock in the ocean, forming a mighty vault, around which the foaming waves poured with intense fury. The islets of Westman appeared to leap from the ocean, being so low in the water as scarcely to be seen, until you were right upon them. From that moment the schooner was steered to the westward in order to round Cape Reykjaness, the western point of Iceland.

My uncle, to his great disgust, was unable even to crawl on deck, so heavy a sea was on, and thus lost the first view of the Land of Promise. Forty-eight hours later, after a storm which drove us far to sea under bare poles, we came once more in sight of land, and were boarded by a pilot, who, after three hours of dangerous navigation, brought the schooner safely to an anchor in the bay of Faxa before Reykjawik.

My uncle came out of his cabin pale, haggard, thin, but full of enthusiasm, his eyes dilated with pleasure and satisfaction. Nearly the whole population of the town was on foot to see us land. The fact was, that scarcely any one of them but expected some goods by the periodical vessel.

Professor Hardwigg was in haste to leave his prison, or rather as he called it, his hospital; but before he attempted to do so, he caught hold of my hand, led me to the quarter-deck of the schooner, took my arm with his left hand, and pointed inland with his right, over the northern part of the bay, to where rose a high two-peaked mountain—a double cone covered with eternal snow. "Behold," he whispered in an awe-stricken voice, "behold—Mount Sneffels!"

Without further remark, he put his finger to his lips, frowned darkly, and descended into the small boat which awaited us. I followed, and in a few minutes we stood upon the soil of mysterious Iceland!

Scarcely were we fairly on shore when there appeared before us a man of excellent appearance, wearing the costume of a military officer. He was, however, but a civil servant, a magistrate, the governor of the island—Baron Trampe. The Professor knew whom he had to deal with. He therefore handed him the letters from Copenhagen, and a brief conversation in Danish followed, to which I, of course, was a stranger, and for a very good reason, for I did not know the language in which they conversed. I afterwards heard, however, that Baron Trampe placed himself entirely at the beck and call of Professor Hardwigg.

My uncle was also most graciously received by M. Finsen, the mayor, who as far as costume went, was quite as military as the governor, but also from character and occupation quite as pacific. As for his coadjutor, M. Pictursson, he was absent on an episcopal visit to the northern portion of the diocese. We were therefore compelled to defer the pleasure of being presented to him. His absence however, was compensated by the presence of M. Fridriksson, Professor of Natural Science in the College of Reykjawik, a man of invaluable ability. This modest scholar spoke no languages save Icelandic and Latin. When, therefore, he addressed himself to me in the language of Horace, we at once came to understand one another. He was, in fact, the only person that I did thoroughly understand during the whole period of my residence on this benighted island.

Out of three rooms of which his house was composed, two were placed at our service, and in a few hours we were installed with all our baggage, the amount of which rather astonished the simple inhabitants of Reykjawik.

"Now, Harry," said my uncle, rubbing his hands, "all goes well, the worst difficulty is now over."

"How the worst difficulty over?" I cried in fresh amazement.

"Doubtless. Here we are in Iceland. Nothing more remains but to descend into the bowels of the earth."

"Well, sir, to a certain extent you are right. We have only to go down—but, as far as I am concerned, that is not the question. I want to know how we are to get up again."

"That is the least part of the business, and does not in any way trouble me. In the meantime, there is not an hour to lose. I am about to visit the public library. Very likely I may find there some manuscripts from the hand of Saknussem. I shall be glad to consult them."

"In the meanwhile," I replied, "I will take a walk through the town. Will you not likewise do so?"

"I feel no interest in the subject," said my uncle. "What for me is curious in this island, is not what is above the surface, but what is below."

I bowed by way of reply, put on my hat and furred cloak, and went out.

It was not an easy matter to lose onself in the two streets of Reykjawik; I had therefore no need to ask my way. The town lies on a flat and marshy plain, between two hills. A vast field of lava skirts it on one side, falling away in terraces towards the sea. On the other hand is the large bay of Faxa, bordered on the north by the enormous glacier of Sneffels. In the bay the *Valkyrie* was then the only vessel at anchor. Generally there were one or two English or French gunboats, to watch and protect the fisheries in the offing. However, they were now absent on duty.

In three hours my tour was complete. The general impression upon my mind was sadness. No trees, no vegetation, so to speak—on all sides volcanic peaks—the huts of turf and earth—more like roofs than houses. Thanks to the heat of these residences, grass grows on the roof, which grass is carefully cut for hay. I saw but few inhabitants during my excursion, but I met a crowd on the

beach, drying, salting and loading cod-fish, the principal article of exportation. The men appeared robust but heavy, fair-haired like Germans, but of pensive mien—exiles of a higher scale in the ladder of humanity than the Esquimaux, but, I thought, much more unhappy, since with superior perceptions they are compelled to live within the limits of the Polar Circle.

CHAPTER VII

CONVERSATION AND DISCOVERY

WHEN I returned, dinner was ready. This meal was devoured by my worthy relative with avidity and voracity. His shipboard diet had turned his interior into a perfect gulf. The repast, which was more Danish than Icelandic, was in itself nothing, but the excessive hospitality of our host made us enjoy it doubly. The conversation turned upon scientific matters, and M. Fridriksson asked my uncle what he thought of the public library.

"Library, sir?" cried my uncle; "it appears to me a collection of useless odd volumes, and a beggarly amount of empty shelves."

"What!" cried M. Fridriksson; "why, we have eight thousand volumes of most rare and valuable works—some in the Scandinavian language, besides all the new publications from Copenhagen."

"Eight thousand volumes, my dear sir—why, where are they?" cried my uncle.

"Scattered over the country, Professor Hardwigg. We are very studious, my dear sir, though we do live in Iceland. Every farmer, every laborer, every fisherman can both read and write—and we think that books instead of being locked up in cupboards, far from the sight of students, should be distributed as widely as possible. The books of our library are, therefore, passed from hand to hand without returning to the library shelves perhaps for years."

"Then when foreigners visit you, there is nothing for them to see?"

"Well, sir, foreigners have their own libraries, and our first consideration is, that our humbler classes should be highly educated. Fortunately, the love of study is innate in the Icelandic people. In 1816 we founded a Literary Society and Mechanics' Institute; many foreign scholars of eminence are honorary members; we publish books destined to educate our people, and these books have rendered valuable services to our country. Allow me to have the honor, Professor Hardwigg, to enroll you as an honorary member?"

My uncle, who already belonged to nearly every literary and scientific institution in Europe, immediately yielded to the amiable wishes of good M. Fridriksson. "And now," said the latter after many expressions of gratitude and good-will, "if you will tell me what books you expected to find, perhaps I may be of some assistance to you."

I watched my uncle keenly. For a minute or two he hesitated, as if unwilling to speak; to speak openly was, perhaps, to unveil his projects. Nevertheless, after some reflection, he made up his mind. "Well, M. Fridriksson," he said in an easy, unconcerned kind of way, "I was desirous of ascertaining, if among other valuable works, you had any by the learned Arne Saknussem."

"Arne Saknussem!" cried the Professor of Reykjawik; "you speak of one of the most distinguished scholars of the sixteenth century, of the great naturalist, the great alchemist, the great traveler."

"Exactly so."

"One of the most distinguished men connected with Icelandic science and literature."

"As you say, sir——"

"A man illustrious above all."

"Yes, sir, all this is true, but his works?"

"We have none of them."

"Not in Iceland?"

"There are none in Iceland or elsewhere," answered the other, sadly.

"Why so?"

"Because Arne Saknussem was persecuted for heresy, and in 1573 his works were publicly burnt at Copenhagen by the hands of the common hangman."

"Very good! capital!" murmured my uncle, to the great astonishment of the worthy Icelander.

"You said, sir—"

"Yes, yes, all is clear, I see the link in the chain; everything is explained, and I now understand why Arne Saknussem, put out of court, forced to hide his magnificent discoveries, was compelled to conceal beneath the veil of an incomprehensible cryptograph, the secret——"

"What secret?"

"A secret—which," stammered my uncle.

"Have you discovered some wonderful manuscript?"

"No, no, I was carried away by my enthusiasm. A mere supposition."

"Very good, sir. But, really, to turn to another subject, I hope you will not leave our island without examination into its mineralogical riches."

"Well, the fact is, I am rather late. So many learned men have been here before me."

"Yes, yes, but there is still much to be done," cried M. Fridriksson.

"You think so," said my uncle, his eyes twinkling with hidden satisfaction.

"Yes, you have no idea how many unknown mountains, glaciers and volcanoes there are which remain to be studied. Without moving from where we sit, I can show you one. Yonder on the edge of the horizon, you see Sneffels."

"Oh yes, Sneffels," said my uncle.

"One of the most curious volcanoes in existence, the crater of which has been rarely visited."

"Extinct?"

"Extinct for the last five hundred years," was the ready reply.

"Well," said my uncle, who dug his nails into his flesh, and pressed his knees tightly together to prevent himself leaping up with joy. "I have a great mind to begin my studies with an examination of the geological mysteries of this Mount Sneffel—Feisel—what do you call it?"

"Sneffels, my dear sir."

This portion of the conversation took place in Latin, and I therefore understood all that had been said. I could scarcely keep my countenance when I found my uncle so cunningly concealing his delight and satisfaction. I must confess that his artful grimaces, put on to conceal his happiness, made him look like a new Mephistopheles. "Yes, yes," he continued, "your proposition delights me. I will

endeavor to climb to the summit of Sneffels, and, if possible, will descend into its crater."

"I very much regret," continued M. Fridriksson "that my occupation will entirely preclude the possibility of my accompanying you. It would have been both pleasurable and profitable if I could have spared the time."

"No, no, a thousand times no," cried my uncle. "I do not wish to disturb the serenity of any man. I thank you, however, with all my heart. The presence of one so learned as yourself, would no doubt have been most useful, but the duties of your office and profession before everything.

In the innocence of his simple heart, our host did not perceive the irony of these remarks. "I entirely approve your project," he continued after some further remarks. "It is a good idea to begin by examining this volcano. You will make a harvest of curious observations. In the first place, how do you propose to get to Sneffels?"

"By sea. I shall cross the bay. Of course that is the most rapid route.

"Of course. But still it cannot be done."

"Why?"

"We have not an available boat in all Reykjawik," replied the other.

"What is to be done?"

"You must go by land along the coast. It is longer, but much more interesting."

"Then I must have a guide."

"Of course; and I have your very man."

"Somebody on whom I can depend?"

"Yes, an inhabitant of the peninsula on which Sneffels is situated. He is a very shrewd and worthy man, with whom you will be pleased. He speaks Danish like a Dane."

"When can I see him—to-day?"

"No, to-morrow; he will not be here before."

"To-morrow be it," replied my uncle with a deep sigh.

The conversation ended by compliments on both sides. During the dinner my uncle had learned much as to the history of Arne Saknussem, the reasons for his mysterious and hieroglyphical document. He also became aware that his host would not accompany him on his adventurous expedition, and that next day we should have a guide.

CHAPTER VIII

THE EIDER-DOWN HUNTER—OFF AT LAST

THAT evening I took a brief walk on the shore near Reykjawik, after which I returned to an early sleep on my bed of coarse planks, where I slept the sleep of the just. When I awoke I heard my uncle speaking loudly in the next room. I rose hastily and joined him. He was talking in Danish with a man of tall stature, and of perfectly Herculean build. This man appeared to be possessed of very great strength. His eyes, which started rather prominently from a very large head, the face belonging to which was simple and naïve, appeared very quick and intelligent. Very long hair, which even in England would have been accounted exceedingly red, fell over his athletic shoulders. This native of Iceland was active and supple in appearance, though he scarcely moved his arms, being in fact one of those men who despise the habit of gesticulation common to southern people.

Everything in this man's manner revealed a calm and phlegmatic temperament. There was nothing indolent about him, but his appearance spoke of tranquility. He was one of those who never seemed to expect anything from anybody, who liked to work when he thought proper, and whose philosophy nothing could astonish or trouble.

I began to comprehend his character, simply from the way in which he listened to the wild and impassioned verbiage of my worthy uncle. While the excellent Professor spoke sentence after sentence, he stood with folded arms, utterly still, motionless to all my uncle's gesticulations. When he wanted to say no he moved his head from left to right; when he acquiesced, he nodded so slightly that you could scarcely see the undulation of his head. This economy of motion was carried to the length of avarice.

Judging from his appearance it would have been a long time before I would suspect him to be what he was! a mighty hunter. Certainly his manner was not likely to frighten the game. How, then, did he contrive to get at his prey? My surprise was slightly modified when I knew that this tranquil and solemn personage, was only a hunter of the eider-duck, the down of which is, after all, the greatest source of the Icelanders' wealth.

This grave, sententious, silent person, as phlegmatic as an Englishman on the French stage, was named Hans Bjelke. He had called upon us in consequence of the recommendation of M. Fridriksson. He was, in fact, our future guide. It struck me that had I sought the world over, I could not have found a greater contradiction to my impulsive uncle. However, they readily understood one another. Neither of them had any thought about money; one was ready to take all that was offered him, the other ready to offer anything that was asked. It may readily be conceived, then, that an understanding between them was soon reached.

The understanding was, that he was to take us to the village of Stapi, situated on the southern slope of the peninsula of Sneffels, at the very foot of the volcano. Hans, the guide, told us the distance was about twenty-two miles, a journey which my uncle supposed would take about two days. But when my uncle realized that they were Danish miles, of eight thousand yards each, he was obliged to be more moderate in his ideas, and, considering the horrible roads we had to follow, to allow eight or ten days for the journey. Four horses were prepared for us, two to carry the baggage, and two to bear the important weight of myself and uncle. Hans declared that nothing would ever make him climb on the back of any animal. He knew every inch of that part of the coast, and promised to take us the very shortest way.

His engagement with my uncle was by no means to cease with our arrival at Stapi; he was further to remain in his service during the whole time required for the completion of his scientific investigations, at the fixed salary of three rix-dollars a week, being exactly fourteen shillings and two-pence, minus one farthing, English currency. One stipulation, however, was made by the guide—the money was to be paid to him every Saturday night, failing which, his engagement was at an end.

The day of our departure was fixed. My uncle wished to hand the eider-down hunter an advance,

but he refused in one emphatic word—*"Efter,"*—which being translated from Icelandic into plain English means—After.

The treaty concluded, our worthy guide retired without another word. "A splendid fellow," said my uncle; "only he little suspects the marvelous part he is about to play in the history of the world."

"You mean, then," I cried in amazement, "that he shall accompany us?"

"To the Interior of the Earth, yes;" replied my uncle. "Why not?"

There were forty-eight hours more to elapse before we made our final start. Our whole time was taken up in making preparations for our journey. All our industry and ability were devoted to packing every object in the most advantageous manner—the instruments on one side, the arms on the other, the tools here and the provisions there. There were, in fact, four distinct groups.

The instruments were, of course, of the best manufacture:—

1. A centigrade thermometer of Eizel, counting up to 150 degrees, which to me did not appear half enough—or too much. Too hot by half, if the degree of heat was to ascend so high—in which case we should certainly be cooked—not enough, if we wanted to ascertain the exact temperature of springs or of minerals in a state of fusion.

2. A *manometer* worked by the pressure of the atmosphere, an instrument used to ascertain the atmospheric pressure. Perhaps a common barometer would not have done as well, the atmospheric pressure being likely to increase in proportion as we descended below the surface of the earth.

3. A first-class chronometer made by Boissonnas, of Geneva, set at the meridian of Hamburg, from which Germans calculated as the English do from Greenwich.

4. Two compasses, one for horizontal guidance, the other to ascertain the dip.

5. A night glass.

6. Two Ruhmkorf's coils, which, by means of a current of electricity, would ensure us a very excellent, easily carried, and certain means of obtaining light.

7. A voltaic battery on the newest principle.

Our arms consisted of two rifles, with two revolvers. Why these arms were provided it was impossible for me to say. I had every reason to believe that we had neither wild beasts nor savage natives to fear. My uncle, on the other hand, was quite as devoted to his arsenal as to his collection of instruments, and above all was very careful with his provision of fulminating or gun cotton, warranted to keep in any climate, and of which the expansive force was known to be greater than that of ordinary gun-powder.

Our tools consisted of two pickaxes, two crowbars, a silken rope ladder, three iron-shod Alpine stocks, a hatchet, a hammer, a dozen wedges, some pointed pieces of iron, and a quantity of strong rope. You may conceive that the whole made a tolerable parcel, especially when I mention that the ladder itself was three hundred feet long!

Then there came the important question of provisions. The hamper was not very large but more or less satisfactory, for I knew that in concentrated essence of meat and biscuit there was enough to last six months. The only liquid provided by my uncle was scheidam. Of water, not a drop. We had, however, an ample supply of gourds, and my uncle counted on finding water, and enough to fill them, as soon as we commenced our downward journey.

My remarks as to the temperature and quality of such water, and even as to the possibility of none being found, remained wholly without effect.

To make up the exact list of our traveling gear—for the guidance of future travelers—I will add, that we carried a medicine and surgical chest with all apparatus necessary for wounds, fractures and blows: lint, scissors, lancets—a perfect collection of horrible-looking instruments; a number of phials containing ammonia, alcohol, ether, Goulard water, aromatic vinegar, in fact, every possible and impossible drug—finally, all the materials for working the Ruhmkorf coil!

My uncle had also been careful to lay in a goodly supply of tobacco, several flasks of very fine gunpowder, boxes of tinder, besides a large belt crammed full of notes and gold. Good boots rendered water-tight were to be found to the number of six in the tool-box. "My boy, with such clothing, with such boots, and such general equipments," said my uncle, in a state of rapturous delight; "we may hope to travel far."

It took a whole day to put all these matters in order. In the evening we dined with Baron Trampe, in company with the Mayor of Reykjawik, and Doctor Hyaltalin, the great medical man of Iceland. M. Fridriksson was not present. Unfortunately, therefore, I did not understand a word that was said at dinner—a kind of semi-official reception. One thing I can say, my uncle never left off speaking.

The next day our labor came to an end. Our worthy host delighted my uncle, Professor Hardwigg, by giving him a good map of Iceland, a most important and precious document for a mineralogist. Our last evening was spent in a long conversation with M. Fridriksson, whom I liked very much—the more that I never expected to see him or any one else again. After this agreeable way of spending an hour or so, I tried to sleep. In vain; with the exception of a few dozes, my night was miserable.

At five o'clock in the morning I was awakened from the only real half-hour's sleep of the night, by the loud neighing of horses under my window. I hastily dressed myself and went down into the street. Hans was engaged in putting the finishing stroke to our baggage, which he did in a silent, quiet way that won my admiration, and yet he did it admirably well. My uncle wasted a great deal of breath in giving him directions, but worthy Hans took not the slightest notice of his words.

At six o'clock all our preparations were completed, and M. Fridriksson shook hands heartily with us. My uncle thanked him warmly, in the Icelandic language, for his kind hospitality, speaking truly from the heart. As for myself, I put together a few of my best Latin phrases and paid him the highest compliments I could. This fraternal and friendly duty performed, we sallied forth and mounted our horses.

As soon as we were quite ready, M. Fridriksson advanced, and by way of farewell, called after me in the words of Virgil—words which appeared to

have been made for us, travelers starting for an uncertain destination.

"Et quacunque viam dederit fortuna sequamur."

("And whichsoever way fortune provides may we follow it.")

CHAPTER IX

OUR START—WE MEET WITH ADVENTURES BY THE WAY

THE weather was overcast but settled, when we commenced our adventurous and perilous journey. We had neither to fear fatiguing heat nor drenching rain. It was, in fact, real tourist weather. As there is nothing I like better than horse exercise, the pleasure of riding through an unknown country, caused the early part of our enterprise to be particularly agreeable to me. I began to enjoy the exhilarating delight of traveling, a life of desire, gratification and liberty. The truth is, that my spirits rose so rapidly that I began to be indifferent to what had once appeared to be a terrible journey.

"After all," I said to myself, "what do I risk? Simply to take a journey through a curious country, to climb a remarkable mountain, and if the worst comes to the worst, to descend into the crater of an extinct volcano." There could be no doubt that this was all this terrible Saknussem had done. As to the existence of a gallery or of subterraneous passages leading into the interior of the earth, the idea was simply absurd, the hallucination of a distempered imagination. All, then, that may be required of me I will do cheerfully, and will create no difficulty.

It was just before we left Reykjawik that I came to this decision. Hans, our extraordinary guide, went first, walking with a steady, rapid and unvarying step. Our two horses with the luggage followed of their own accord, without requiring whip or spur. My uncle and I came behind, cutting very tolerable figures upon our small but vigorous animals. Hans, on taking his departure from Reykjawik, had followed the line of the sea. We took our way through poor and sparse meadows, which made a desperate effort every year to show a little green. They very rarely succeeded in a good show of yellow. Every now and then a spur of rock came down through the arid ground, leaving us scarcely room to pass. Our horses, however, appeared not only well acquainted with the country, but by a kind of instinct, knew which was the best road. My uncle had not even the satisfaction of urging his steed forward by whip, spur, or voice. It was utterly useless to show any signs of impatience. I could not help smiling to see him look so big on his little horse; his long legs now and then touching the ground made him look like a six-footed centaur.

"Good beast, good beast," he would cry. "I assure you, Harry, that I begin to think no animal is more intelligent than an Icelandic horse. Snow, tempest, impracticable roads, rocks, icebergs—nothing stops him. He is brave; he is sober; he is safe; he never makes a false step, never glides or slips from his path. I dare to say that if any river, any ford has to be crossed—and I have no doubt there will be many—you will see him enter the water without hesitation like an amphibious animal, and reach the opposite side in safety. We must not, however, attempt to hurry him; we must allow him to have his own way, and I will undertake to say that between us we shall do our ten leagues a day."

"We may do so," was my reply, "but what about our worthy guide?"

"I have not the slightest anxiety about him; that sort of person goes ahead without even knowing what he is about. Just look at Hans. He moves so little that it is impossible for him to become fatigued. Besides, if he were to complain of weariness, he could have the loan of my horse. I should have a violent attack of the cramp if I were not to have some sort of exercise. My arms are all right—but my legs are getting a little stiff."

All this while we were advancing at a rapid pace. The country we had reached was already nearly a desert. Here and there could be seen an isolated farm, some solitary boër, or Icelandic house, built of wood, earth, fragments of lava—looking like beggars on the highway of life. These wretched and miserable huts excited in us such pity that we felt half disposed to leave alms at every door. In this country there are no roads, paths are nearly unknown, and vegetation, poor as it was, slowly as it reached its full growth, soon obliterated all traces of the few travelers who passed from place to place.

A few stray cows and sheep were only seen occasionally. What, then, must we expect when we come to the upheaved regions—to the districts broken and roughened from volcanic eruptions and subterraneous commotions?

We were to learn all this in good time. I saw, however, on consulting the map, that we avoided a good deal of this rough country, by following the winding and desolate shores of the sea. In reality, the great volcanic movement of the island, and all its atttendant phenomena, are concentrated in the interior of the island; there, horizontal layers or strata of rocks, piled one upon the other, eruptions of basaltic origin, and streams of lava, have given this country a kind of supernatural reputation.

Little did I expect, however, the spectacle which awaited us when we reached the peninsula of Sneffels, where agglomerations of nature's ruins form a kind of terrible chaos.

Some two hours or more after we had left the city of Reykjawik, we reached the little town called Aoalkirkja, or the principal church. It consists simply of a few houses—not what in England or Germany we should call a hamlet. Hans stopped here one-half hour. He shared our frugal breakfast, answered *yes* and *no* to my uncle's questions as to the nature of the road, and at last when asked where we were to pass the night was as laconic as usual. "Gardar!" was his one-worded reply.

I took occasion to consult the map, to see where Gardar was to be found. After looking keenly I found a small town of that name on the borders of the Hvalfjord, about four miles from Reykjawik. I pointed this out to my uncle, who made a very energetic grimace.

"Only four miles out of twenty-two? Why it is only a little walk."

He was about to make some energetic observation to the guide, but Hans, without taking the slightest notice of him, went in front of the horses, and walked ahead with the same imperturbable phlegm he had always exhibited.

Still traveling over those apparently interminable and sandy prairies, we were compelled to go round the Kollafjord, then following a narrow strip of shore between high rocks and the sea, we came to the "aoalkirkja" of Brantar, and after another mile to "Saurboer Annexia," a chapel of ease, situated on the southern bank of the Hvalfjord. It was four o'clock in the evening and we had traveled four Danish miles, about equal to twenty English.

The fjord was in this place about half-a-mile in width. The sweeping and broken waves came rolling in upon the pointed rocks; the gulf was surrounded by rocky walls—a mighty cliff, three thousand feet in height, remarkable for its brown strata, separated here and there by beds of tufa of a reddish hue. Now, whatever may have been the intelligence of our horses, I had not the slightest reliance upon them, as a means of crossing a stormy arm of the sea. To ride over salt water upon the back of a little horse seemed to me absurd.

"If they are really intelligent," I said to myself, "they will certainly not make the attempt. In any case, I shall trust rather to my own intelligence than theirs."

But my uncle was in no humor to wait. He dug his heels into the sides of his steed, and made for the shore. His horse went to the very edge of the water, sniffed at the approaching wave and retreated.

My uncle, who, sooth to say, was quite an obsinate as the beast he bestrode, insisted on his making the desired advance. This attempt was followed by a new refusal on the part of the horse, who quietly shook his head. This demonstration of rebellion was followed by a volley of words and a stout application of whipcord; also followed by kicks on the part of the horse, which threw its head and heels upwards and tried to throw his rider. At length the sturdy little pony, spreading out his legs in a stiff and ludicrous attitude, got from under the professor's legs, and left him standing, with both feet on a separate stone, like the Collossus of Rhodes.

"Wretched animal!" cried my uncle, suddenly transformed into a foot passenger—and as angry and ashamed as a dismounted cavalry officer on the field of battle.

"*Farja,*" said the guide, tapping him familiarly on the shoulder.

"What, a ferry boat!"

"*Der,*" answered Hans, pointing to where lay the boat in question—"there."

"Well," I cried, much relieved by the information; "so it is."

"Why did you not say so before," cried my uncle; "why not start at once?"

"*Tidvatten,*" said the guide.

"What does he say?" I asked, considerably puzzled by the delay and the dialogue.

"He says tide," replied my uncle, translating the Danish word for my information.

"Of course, I understand—we must wait till the tide serves."

"*For bida?*" asked my uncle.

"*Ja,*" replied Hans.

My uncle frowned, stamped his feet and then followed the horses to where the boat lay. I thoroughly understood and appreciated the necessity for waiting, before crossing the fjord, for that moment when the seas at its highest point, is in a state of slack water. As neither the ebb nor flow can then be felt, the ferry boat was in no danger of being carried out to sea, or dashed upon the rocky coast.

The favorable moment did not come until six o'clock in the evening. Then my uncle, myself, and guide, two boatmen and the four horses got into a very awkward flat-bottom boat. Accustomed as I had been to the steam ferry-boats of the Elbe, I found the long oars of the boatmen but sorry means of locomotion. We were more than an hour in crossing the fjord; but at length the passage was concluded without accident. Half-an-hour later we reached Gardar.

CHAPTER X

TRAVELING IN ICELAND

IT ought, one would have thought, to have been night, even in the sixty-fifth parallel of latitude; but still the nocturnal illumination did not surprise me. For in Iceland, during the months of June and July, the sun never sets. The temperature, however, was very much lower than I expected. I was cold, but even that did not affect me so much as ravenous hunger. Welcome indeed, therefore, was the hut which hospitably opened its doors to us.

It was merely the house of a peasant, but in the matter of hospitality, it was worthy of being the palace of a king. As we alighted at the door the master of the house came forward, held out his hand, and without any further ceremony, signaled to us to follow him. We followed him, for to accompany him was impossible. A long, narrow, gloomy passage led into the interior of this habitation, made from beams roughly squared by the ax. This passage gave ingress to every room. The chambers were four in number—the kitchen, the work-shop, where the weaving was carried on, the general sleeping-chamber of the family, and the best room, to which strangers were especially invited. My uncle, whose lofty stature had not been taken into consideration when the house was built, contrived to knock his head against the beams of the roof.

As soon as we had freed ourselves from our heavy traveling costume, the voice of our host was heard calling to us to come into the kitchen, the only room in which the Icelanders ever make any fire, no matter how cold it may be. My uncle, nothing loath, hastened to obey this hospitable and friendly invitation. I followed.

On our entrance, our worthy host, as if he had not seen us before, advanced ceremoniously, uttered a word which means "be happy," and then kissed both of us on the cheek. His wife followed, pronounced the same word, with the same ceremonial, then the husband and wife, placing their right hands upon their hearts, bowed profoundly.

This excellent Icelandic woman was the mother of nineteen children, who, little and big, rolled, crawled, and walked about in the midst of volumes of smoke arising from the angular fire-place in the middle of the room. Every now and then I could see a fresh white head, with a slightly melancholy expression of countenance, peering at me through the vapor. Both my uncle and myself, however, were very friendly with the whole party, and be-

fore we were aware of it, there were three or four of these little ones on our shoulders, as many on our boxes, and the rest hanging about our legs. Those who could speak kept crying out *saellvertu* in every possible and impossible key. Those who did not speak only made all the more noise.

This concert was interrupted by the announcement of supper. Just then our worthy guide, the eider-duck hunter, came in after seeing to the feeding and stabling of the horses—which consisted in letting them loose to browse on the stunted green of the Icelandic prairies. There was little for them to eat, but moss and some very dry and innutritious grass; next day they were ready before the door, long before we were.

"Welcome," said Hans. Then tranquilly, with the air of an automaton, without any more expression in one kiss than another, he embraced the host and hostess and their nineteen children.

This ceremony concluded to the satisfaction of all parties, we all sat down to table—that is twenty-four of us—somewhat crowded. Those who were more fortunate had only two juveniles on their knees. However, as soon as the inevitable soup was placed on the table, natural taciturnity common even to Icelandic babies, prevailed over all else. Our host filled our plates with a portion of *Lichen* soup of Iceland moss, of by no means disagreeable flavor, an enormous lump of fish floating in sour butter. After that there came some *"skyr,"* a kind of curds of whey, served with biscuits and juniper-berry juice. To drink, we had *"blanda,"*—skimmed milk with water. I was hungry, so hungry, that by way of dessert I finished up with a basin of thick oat-meal porridge.

As soon as the supper was over, the children disappeared, and the grown people sat around the fireplace, on which was placed turf, heather, cow dung and dried fish-bones. As soon as everybody was sufficiently warm, a general dispersion took place, all retiring to their respective couches. Our hostess offered to pull off our stockings and trousers, according to the custom of the country, but as we graciously declined to be so honored, she left us to our bed of dry fodder.

At five in the morning next day we took our leave. My uncle had great difficulty in making them accept a sufficient and proper remuneration. That evening, after fording the Alfa and the Heta, two rivers rich in trout and pike, we were compelled to pass the night in a deserted house, worthy of being haunted by all the fays of Scandinavian mythology. The King of Cold had taken up his residence there, and made us feel his presence all night.

The two following days were remarkable for their lack of any particular incidents. Always the same damp and swampy soil; the same dreary uniformity; the same sad and monotonous aspect of scenery. I confess that fatigue began to tell severely upon me; but my uncle was as firm and as hard as he had been when we started. I could not help admiring both the excellent Professor and the worthy guide; for they appeared to regard this rugged expedition as a mere jaunt!

On Saturday, the 20th of June, at six o'clock in the evening, we reached Budir, a small town picturesquely situated on the shore of the ocean; and here the guide asked for his money. My uncle settled with him immediately. It was now the family of Hans himself, that is to say, his uncles, his cousins-german, who offered us hospitality. We were exceedingly well received, and without taking too much advantage of the goodness of these worthy people, I should have liked very much to have rested with them after the fatigues of the journey. But my uncle, who did not require rest, had no idea of anything of the kind; and despite the fact that next day was Sunday, I was compelled once more to mount my steed.

The soil was again affected by the neighborhood of the mountains, whose granite peered out of the ground like tops of an old oak. We were skirting the enormous base of the mighty volcano. My uncle never took his eyes from off it; he could not keep from gesticulating, and looked at it with a kind of sullen defiance as much as to say "That is the giant I have made up my mind to conquer."

After four hours of steady traveling, the horses stopped of themselves before the door of the presbytery of Stapi. We had reached the foot of the volcano.

CHAPTER XI

WE REACH MOUNT SNEFFELS—THE "REYKIR"

STAPI is a town consisting of thirty huts, built on a large plain of lava, exposed to the rays of the sun, reflected from the volcano. It stretches its humble tenements along the end of a little fjord, surrounded by a basaltic wall of the most singular character. Here we found Nature proceeding geometrically, and working quite after a human fashion, as if she had employed the plummet line, the compass and the rule. If elsewhere she produces grand artistic effects by piling up huge masses without order or connection—if elsewhere we see truncated cones, imperfect pyramids, with an odd succession of lines, here, as if wishing to give a lesson in regularity, and preceding the architects of the early ages, she has erected a severe order of architecture, which neither the splendors of Babylon nor the marvels of Greece ever surpassed. The walls of the fjord, like nearly the whole of the peninsula, consisted of a series of vertical columns, in height about thirty feet. These upright pillars of stone, of the finest proportions, supported an archivault of horizontal columns which formed a kind of half-vaulted roof above the sea. At certain intervals, and below this natural basin, the eye was pleased and surprised by the sight of oval openings through which the outward waves came thundering in volleys of foam. Some banks of basalt, torn from their fastenings by the fury of the waves, lay scattered on the ground like the ruins of an ancient temple—ruins eternally young, over which the storms of ages swept without producing any perceptible effect!

This was the last stage of our journey. Hans had brought us along with fidelity and intelligence, and I began to feel somewhat more comfortable when I reflected that he was to accompany us still farther on our way.

When we halted before the house of the Rector, a small and incommodious cabin, neither handsome nor more comfortable than those of his neighbors, I saw a man in the act of shoeing a horse, a hammer

in his hand, and a leathern apron tied around his waist.

"Be happy," said the eider-down hunter, using his national salutation in his own language.

"Good-dag—good-day!" replied the former, in excellent Danish.

"Kyrkoherde," cried Hans, turning round and introducing him to my uncle.

"The Rector," repeated the worthy Professor; "it appears, my dear Harry, that this worthy man is the Rector, and is not above doing his own work."

During the speaking of these few words the guide intimated to the *Kyrkoherde* what was the true state of the case. The good man, ceasing from his occupation, gave a kind of halloo, upon which a tall woman, almost a giantess, came out of the hut. She was at least six feet high, which in that region is very unusual. My first impression was one of horror. I thought she had come to give us the Icelandic kiss. However, I had nothing to fear, for she did not even show much inclination to receive us into her house.

The room devoted to strangers appeared to me to be by far the worst in the presbytery; it was narrow, dirty and offensive. But there was no choice about the matter. The Rector had no notion of practicing the usual cordial and antique hospitality. My uncle soon became aware of the kind of man he had to deal with. Instead of a worthy and learned scholar, he found a dull, ill-mannered peasant. He therefore resolved to start on his great expedition as soon as possible and spend a few days in the mountains, if necessary.

The preparations for our departure were made the very next day after our arrival at Stapi; Hans now hired three Icelanders to take the place of the horses—which could no longer carry our luggage. However, when these worthy Icelanders had reached the bottom of the crater, they were to go back and leave us to ourselves. This point was settled before they would agree to start. On this occasion, my uncle partially confided in Hans, the eider-duck hunter, and gave him to understand that it was his intention to continue his exploration of the volcano to the last possible limits.

Hans listened calmly, and then nodded his head. To go there, or elsewhere, to bury himself in the bowels of the earth, or to travel over its summit, was all the same to him! As for me, amused and occupied by the incidents of travel, I had begun to forget the inevitable future; but now I was once more brought to realize the actual state of affairs. What was to be done? Run away? But if I really had intended to leave Professor Hardwigg to his fate, it should have been at Hamburg and not at the foot of Sneffels.

One idea above all others began to trouble me: a very terrible idea, and one calculated to shake the nerves of a man far less sensitive than myself. "Let us consider the matter," I said to myself; "we are going to ascend the Sneffels mountain. Well and good. We are about to pay a visit to the very bottom of the crater. Still good. Others have done it and did not perish from that course.

"But that is not the whole matter to be considered. If a road does really present itself by which to descend into the dark and subterraneous bowels of Mother Earth, if this thrice unhappy Saknussem really did tell the truth, we shall most certainly be lost in the midst of the labyrinth of subterranean galleries of the volcano. Now, we have no evidence to prove that Sneffels is really extinct. What proof have we that an eruption is not shortly about to take place? Because the monster has slept soundly since A. D. 1229, does it follow that he is never to wake? If he does wake what is to become of us?"

These were questions worth thinking about, and upon them I reflected long and deeply. I could not lie down in search of sleep without dreaming of eruptions. The more I thought, the more I objected to be reduced to the state of dross and ashes. I could stand it no longer so I determined at last to submit the whole case to my uncle, in the most adroit manner possible, and under the form of some totally irreconcilable hypothesis.

I sought him. I laid before him my fears, and then drew back in order to let him get over his passion at his ease.

"I have been thinking about the matter," he said, in the quietest tone in the world.

What did he mean? Was he at last about to listen to the voice of reason? Did he think of suspending his projects? It was almost too much happiness to be true. I made no remark. I was too anxious not to interrupt him, and so allow him to reflect at his leisure. After some moments he spoke.

"I have been thinking about the matter," he resumed. "Ever since we were at Stapi, my mind has been almost solely occupied with the grave question which you, yourself just submitted to me—for nothing would be unwiser and more inconsistent than to act with imprudence."

"I heartily agree with you, my dear uncle," was my somewhat hopeful rejoinder.

"It is now six hundred years since Sneffels has spoken, but though now reduced to a state of utter silence, he may speak again. New volcanic eruptions are always preceded by perfectly well-known phenomena. I have closely examined the inhabitants of this region; I have carefully studied the soil, and I beg to tell you emphatically, my dear Harry, there will be no eruption at present."

As I listened to his positive affirmations, I was stupefied and could say nothing.

"I see you doubt my word," said my uncle; "follow me."

I obeyed mechanically. Leaving the presbytery, the Professor took a road through an opening in the basaltic rock, which led far away from the sea. We were soon in open country, if we could give such a name to a place all covered with volcanic deposits. The whole land seemed crushed under the weight of enormous stones—of trap, of basalt, of granite, of lava, and of all other volcanic substances.

I could see many spouts of steam rising in the air. These white vapors, called in the Icelandic language *"reykir,"* come from hot water fountains, and indicate by their violence the volcanic activity of the soil. The sight of these appeared to justify my apprehension and I was, therefore, all the more surprised and mortified when my uncle thus addressed me. "You see all this smoke, Harry, my boy?"

"Yes, sir."

"Well, as long as you can see them thus, you have nothing to fear from the volcano."

"How can that be?"

"Be careful to remember this," continued the Professor. "At the approach of an eruption these spouts of vapor redouble their activity—to disappear altogether during the period of volcanic eruption; for the elastic fluids, no longer having the necessary tension, seek refuge in the interior of the crater, instead of escaping through the fissures of the earth. If, then, the steam remains in its normal or habitual state, if their energy does not increase, and if you add to this, the remark, that the wind is not replaced by heavy atmospheric pressure and dead calm, you may be quite sure that there is no fear of any immediate eruption."

"But——"

"Enough, my boy. When science has sent forth her fiat—it is only to hear and to obey."

I came back to the house quite downcast and disappointed. My uncle had completely defeated me with his scientific arguments. Nevertheless, I still had one hope,—that was, when once we were at the bottom of the crater, that it would be impossible in default of a gallery or tunnel, to descend any deeper; and this, despite all the learned Saknussems in the world.

I passed the whole of the following night with a nightmare on my chest!—and, after unheard-of miseries and tortures, found myself in the very depths of the earth, from which I was suddenly launched into planetary space, under the form of an eruptive rock!

Next day, the 23d June, Hans calmly awaited us outside the presbytery with his two companions loaded with provisions, tools and instruments. Two iron-shod staves, two guns, and two large game bags, were reserved for my uncle and myself. Hans, a man who never failed to take even the minutest precautions, had added to our baggage a large skin full of water, as an addition to our gourds. This assured us water for eight days.

It was nine o'clock in the morning when we were ready. The rector and his huge wife, or servant—I never knew which—stood at the door to see us off. They appeared to be about to inflict on us the usual final kiss of the Icelanders. To our supreme astonishment their adieu took the shape of a formidable bill, in which they even counted the use of the pastoral house, really and truly the most abominable and dirty place I ever was in. The worthy couple cheated and robbed us like a Swiss innkeeper, and made us feel, by the sum we had to pay, the splendors of their hospitality. My uncle paid without bargaining. A man who had made up his mind to undertake a voyage into the Interior of the Earth, is not the man to haggle over a few miserable rix-dollars.

This important matter settled, Hans gave the signal for departure, and a few moments later we had left Stapi.

CHAPTER XII

THE ASCENT OF MOUNT SNEFFELS

THE volcano, which was the first stage of our experiment, is about five thousand feet high. Sneffels is the termination of a long range of volcanic mountains, of a character different from the system of the island itself. One of its peculiarities is its two huge pointed summits. From where we started it was impossible to make out the actual outline of the peak against the gray field of sky. All we could distinguish was a vast dome of white, which fell downwards from the head of the giant. The commencement of the great undertaking filled me with awe. Now that we had actually started, I began to believe in the reality of the undertaking!

Our party formed quite a procession. We walked in single file, preceded by Hans, who calmly led us by narrow paths where two persons could by no possibility walk abreast. Conversation was wholly impossible. We had all the more opportunity therefore to reflect, and to admire the awful grandeur of the scene around.

As we advanced, the road became more difficult. The soil was broken and dangerous. The rocks broke and gave way under our feet, and we had to be scrupulously careful in order to avoid dangerous and constant falls. Hans advanced as calmly as if he had been walking over Salisbury Plain; sometimes he would disappear behind huge blocks of stone, and we momentarily lost sight of him. There was a little period of anxiety and then there was a shrill whistle, just to tell us where to look for him.

Occasionally he would take it into his head to stop to pick up lumps of rock, and silently pile them up into small heaps, *in order that we might not lose our way on our return.* He had no idea of the journey we were about to undertake. At all events, the precaution was a good one; though how utterly useless and unnecessary— But I must not anticipate.

Three hours of terrible fatigue, walking incessantly, had only brought us to the foot of the great mountain. This will give some notion of what we had still to undergo.

Suddenly, Hans cried a halt—that is, he made signs to that effect—and a summary kind of breakfast was laid out on the lava before us. My uncle, who now was simply Professor Hardwigg, was so eager to advance, that he bolted his food like a greedy clown. This halt for refreshment was also a halt for repose. The Professor was therefore compelled to wait the good pleasure of his imperturbable guide, who did not give the signal for departure for a good hour. The three Icelanders, as taciturn as their comrade, did not say a word, but went on eating and drinking very quietly and soberly.

From this, our first real stage, we began to ascend the slopes of the Sneffels volcano. Its magnificent snowy night-cap, as we began to call it, by an optical delusion very common in mountains, appeared to me to be close at hand; and yet how many long weary hours must elapse before we reached its summit. What undreamed-of fatigue must we endure!

The stones on the mountain side, held together by no cement of soil, bound together by no roots or creeping herbs, gave way continually under our feet, and went rushing below into the plains, like a series of small avalanches. In certain places the sides of this stupendous mountain were at an angle so steep that it was impossible to climb upwards, and we were compelled to get around these obstacles as best we could. Those who understand Alpine climbing will appreciate our difficulties. Often we were obliged to help each other along by means of our climbing poles.

I must say this for my uncle—he stuck as close

to me as possible. He never lost sight of me, and on many occasions his arm supplied me with firm and solid support. He was strong, wiry, and apparently insensible to fatigue. He had another great advantage—the innate sentiment of equilibrium—for he never slipped or failed in his steps. The Icelanders, though heavily loaded, climbed with the agility of mountaineers.

Looking up every now and then, at the height of the great volcano of Sneffels, it appeared to me impossible to reach the summit on that side—at least if the angle of inclination did not speedily change.

Fortunately, after an hour of difficult climbing, and gymnastic exercises that would have been trying to an acrobat, we came to a vast field of ice, which completely surrounded the bottom of the cone of the volcano. The natives called it the table-cloth, probably for some such reason as the dwellers in the Cape of Good Hope call their mountain, Table Mountain, and their anchorage or roads, Table Bay.

Here, to our mutual surprise, we found an actual flight of stone steps, which considerably assisted our ascent. This singular flight of stairs was, like everything else, volcanic. It had been formed by one of those torrents of stones cast up by the eruptions, of which the Icelandic name is stinâ. If this singular torrent had not been checked in its descent by the peculiar shape of the flanks of the mountain, it would have swept into the sea, and formed new islands. Such as it was, it served us admirably. The abrupt character of the slopes momentarily increased, but these remarkable stone steps, a little less difficult than those of the Egyptian pyramids, were the one simple natural means by which we were enabled to proceed.

About seven in the evening of that day, after having clambered up two thousand of these rough steps, we found ourselves overlooking a kind of spur or projection of the mountain—like a buttress upon which the cone-like crater, properly so called, leaned for support.

The ocean lay beneath us at a depth of more than three thousand two hundred feet—a grand and mighty spectacle. We had reached the region of eternal snows. The cold was keen, searching and intense. The wind blew with extraordinary violence. I was utterly exhausted.

My worthy uncle, the Professor, saw clearly that my legs refused further service, and that, in fact, I was utterly exhausted. Despite his hot and feverish impatience, he decided, with a sigh, upon a halt. He called the eider-duck hunter to his side. That worthy, however, shook his head.

"Ofvanfor," was his sole spoken reply.

"It appears," says my uncle with a woe-begone look, "that we must go higher."

He then turned to Hans, and asked him to give some reason for this decisive response.

"Mistour," replied the guide.

"Ja mistour—yes, the *mistour,"* cried one of the Icelandic guides in a terrified tone.

It was the first time he had spoken.

"What does this mysterious word signify?" I anxiously inquired.

"Look," said my uncle.

I looked down upon the plain below, and I saw a vast, prodigious volume of pulverized pumice-stone, of sand, of dust, rising to the heavens in the form of a mighty water-spout. It resembled the fearful phenomenon of a similar character known to the travelers in the desert of the great Sahara.

The wind was driving it directly towards that side of Sneffels on which we were perched. This opaque veil standing up between us and the sun projected a deep shadow on the flanks of the mountain. If this sand-spout broke over us, we must all be completely destroyed, crushed in its fearful embraces. This extraordinary phenomenon, very common when the wind shakes the glaciers, and sweeps over the arid plains, is in the Icelandic tongue called *mistour.*

"Hastigt, Hastigt!" cried our guide.

Now I certainly knew nothing of Danish, but I thoroughly understood that his gestures were meant to hurry us. The guide turned rapidly in a direction which would take us to the back of the crater, all the while ascending slightly. We followed rapidly, despite our excessive fatigue.

A quarter of an hour later Hans paused to enable us to look back. The mighty whirlwind of sand was spreading up the slope of the mountain to the very spot where we had proposed to halt. Huge stones were caught up, cast into the air, and thrown about as during an eruption. We were happily a little out of the direction of the wind, and therefore out of reach of danger. But for the precaution and knowledge of our guide, our dislocated bodies, our crushed and broken limbs, would have been cast to the wind, like dust from some unknown meteor.

Hans however did not think it prudent to pass the night on the bare side of the cone. We therefore continued our journey in a zigzag direction. The fifteen hundred feet which remained to be climbed took us at least five hours. The turnings and windings, the no-thoroughfares, the marches and marches, turned that insignificant distance into at least three leagues. I never felt such misery, fatigue and exhaustion in my life. I was ready to faint from hunger and cold. At the same time the rarefied air acted painfully upon my lungs.

At last, about eleven at night, when I thought I was gasping my last breath, we reached the summit of Mount Sneffels! it was in an awful state of mind, that despite my fatigue, I paused to behold the sun rise at midnight on the very day of its lowest declension, and enjoyed the spectacle of its ghastly pale rays cast upon the isle which lay sleeping at our feet, before I descended into the crater which was to shelter us for the night.

I no longer wondered at people traveling all the way from England to Norway, to behold this magical and wonderful spectacle.

CHAPTER XIII

THE SHADOW OF SCARTARIS

OUR supper was eaten with ease and rapidity, after which everybody did the best he could for himself within the hollow of the crater. The bed was hard, the shelter unsatisfactory, the situation painful—lying in the open air, 5,000 feet above the level of the sea! Nevertheless, very rarely did I sleep so well as I did that particular night. I did not even dream. So much for the effects of what my uncle called "wholesome fatigue."

Next day, when we awoke under the rays of a bright and glorious sun, we were nearly frozen by the keen air. I left my granite couch and made one of the party to enjoy a view of the magnificent spectacle which unrolled itself, panorama-like, at our feet.

I stood upon the lofty summit of Mount Sneffels' southern peak. Thence I was able to obtain a view of a great part of the island. The optical delusion, common to all lofty heights, raised the shores of the island, while the central portions appeared depressed. It was by no means too great a flight of fancy to believe that a giant picture was stretched out before me. I could see the deep valleys that crossed each other in every direction. I could see precipices looking like sides of wells, lakes that seemed to be changed into ponds, ponds that looked like puddles, and rivers that were transformed into petty brooks. To my right were glaciers upon glaciers, and multiplied peaks, topped with light clouds of smoke.

The undulation of the infinite numbers of mountains, whose snowy summits make them look as though covered by foam, recalled to my memory the surface of a storm-beaten ocean. If I looked towards the west, the ocean lay before me in all its majestic grandeur, a continuation as it were, of these fleecy hill-tops. It was impossible for the eye to distinguish where the land ended and the sea began.

I soon felt that strange and mysterious sensation which is awakened in the mind when looking down from lofty hill tops, and now I was able to do so without any feeling of nervousness, having fortunately hardened myself to that kind of sublime contemplation. I wholly forgot who I was, and where I was. I became intoxicated with a sense of lofty sublimity, without thought of the abysses into which my daring was soon about to plunge me. But I was presently brought back to the realities of life by the arrival of the Professor and Hans, who joined me upon the lofty summit of the peak.

My uncle, turning in a westerly direction, pointed out to me a light cloud of vapor, a kind of haze, with a faint outline of land rising out of the waters. "Greenland!" said he.

"Greenland?" cried I in reply.

"Yes," continued my uncle, who always when explaining anything, spoke as if he were in a Professor's chair; "we are not more than thirty-five leagues distant from that wonderful land. When the great annual break up of the ice takes place, white bears come over to Iceland, carried by the floating masses of ice from the north. This, however, is a matter of little consequence. We are now on the summit of the great, the transcendent Sneffels, and here are its two peaks, north and south. Hans will tell you the name by which the people of Iceland call that on which we stand."

My uncle turned to the imperturbable guide, who nodded and spoke as usual—one word. *"Scartaris."*

My uncle looked at me with a proud and triumphant glance. "A crater," he said, "you hear?"

I did hear, but I was totally unable to make reply.

The crater of Mount Sneffels represented an inverted cone, the gaping orifice apparently half a mile across; the depth, indefinite feet. Conceive what this *hole* must have been like when full of flame and thunder and lightning. The bottom of the funnel-shaped hollow was about five hundred feet in circumference, by which it will be seen that the slope from the summit to the bottom was very gradual, and we were therefore clearly able to get there without much fatigue or difficulty. Involuntarily, I compared this crater to an enormous loaded cannon; and the comparison completely terrified me.

"To descend into the interior of a cannon," I thought to myself, "when perhaps it is loaded, and will go off at the least shock, is the act of a madman."

But there was no longer any opportunity for me to hesitate. Hans, with a perfectly calm and indifferent air, took his usual post at the head of the adventurous little band. I followed without uttering a syllable. I felt like the lamb led to the slaughter.

In order to render the descent less difficult, Hans took his way down the interior of the cone in rather a zigzag fashion, making, as the sailors say, long tracks to the eastward, followed by equally long ones to the west. It was necessary to walk through the midst of eruptive rocks, some of which, shaken in their balance, went rolling down with thundering clamor to the bottom of the abyss. These continual falls awoke echoes of singular power and effect.

Many portions of the cone consisted of inferior glaciers. Hans, whenever he met with one of these obstacles advanced with a great show of precaution, sounding the snow with his long iron pole in order to discover fissures and layers of deep soft snow. In many doubtful or dangerous places, it became necessary for us to be tied together by a long rope in order that should any one of us be unfortunate enough to slip, he would be supported by his companions. This connecting link was doubtless a prudent precaution, but not by any means unattended with danger.

Nevertheless, despite all the manifold difficulties of the descent, along slopes with which our guide was wholly unacquainted, we made considerable progress without accident. One of our great parcels of rope slipped from one of the Iceland porters, and rushed by a short cut to the bottom of the abyss.

By mid-day we were at the end of our journey. I looked upwards, and saw only the upper orifice of the cone, which served as a circular frame to a very small portion of the sky—a portion which seemed to me singularly beautiful. Should I ever again gaze on that lovely sunlit sky!

The only exception to this extraordinary landscape, was the Peak of Scartaris, which seemed lost in the great void of the heavens.

The bottom of the crater was composed of three separate shafts, through which, during periods of eruption, when Sneffels was in action, the great central furnaces sent forth its burning lava and poisonous vapors. Each of these chimneys or shafts gaped open-mouthed in our path. I kept as far away from them as possible, not even venturing to take the faintest peep downwards.

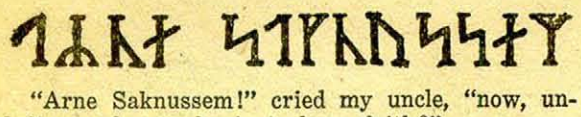
As for the Professor, after a rapid examination of their disposition and characteristics, he became breathless and panting. He ran from one to the other like a delighted school-boy, gesticulating wildly, and uttering incomprehensible and disjointed phrases in all sorts of languages. Hans, the guide,

and his humbler companions seated themselves on some piles of lava and looked silently on. They clearly took my uncle for a lunatic and—waited the result.

Suddenly the Professor uttered a wild, unearthly cry. At first I imagined he had lost his footing, and was falling headlong into one of the yawning gulfs. Nothing of the kind. I saw him, his arms spread out to their widest extent, his legs stretched apart, standing upright before an enormous pedestal, high enough and black enough to bear a gigantic statue of Pluto. His attitude and mien were that of a man utterly stupefied. But his stupefaction was speedily changed to the wildest joy. "Harry! Harry! come here!" he cried; "make haste—wonderful—wonderful!"

Unable to understand what he meant, I turned to obey his commands. Neither Hans, nor the other Icelanders moved a step.

"Look!" said the Professor, in something of the manner of the French general, pointing out the pyramids to his army. And fully partaking his stupefaction, if not his joy, I read on the eastern side of the huge block of stone, the same characters, half eaten away by the corrosive action of time, the name, to me a thousand times accursed—



"Arne Saknussem!" cried my uncle, "now, unbeliever, do you begin to have faith?"

It was totally impossible for me to answer a single word. I went back to my pile of lava, in a state of silent awe. The evidence was unanswerable, overwhelming!

In a few moments, however, my thoughts were far away, back in my German home, with Gretchen and the old cook. What would I have given for one of my cousin's smiles, for one of the ancient domestic's omelettes, and for my own feather bed! How long I remained in this state I know not. All I can say is, that when at last I raised my head from between my hands, there remained at the bottom of the crater only myself, mv uncle and Hans. The Icelandic porters had been dismissed and were now descending the exterior slopes of Mount Sneffels, on their way to Stapi. How heartily did I wish myself with them!

Hans slept tranquilly at the foot of a rock in a kind of rill of lava, where he had made himself a rough and ready bed. My uncle was walking about the bottom of the crater like a wild beast in a cage. I had no desire, neither had I the strength, to move from my recumbent position. Taking example by the guide, I gave way to a kind of painful somnolency, during which I seemed both to hear and feel continual heavings and shudderings in the mountain. In this way we passed our first night in the interior of a crater.

Next morning, a gray, cloudy, heavy sky hung like a funeral-pall over the summit of the volcanic cone. I did not notice it so much from the obscurity that reigned around us, as from the rage with which my uncle was devoured.

I fully understood the reason, and again a glimpse of hope made my heart leap with joy. I will briefly explain the cause. Of the three openings which yawned beneath our steps, only one could have been followed by the adventurous Saknussem. According to the words of the learned Icelander, it was only to be known by that one particular mentioned in the cryptograph, that the shadow of Scartaris fell upon it, just touching its mouth in the last days of the month of June. We were, in fact, to consider the point peak as the stylus of an immense sun-dial, the shadow of which pointed on one given day, like the inexorable finger of fate, to the yawning chasm which led into the interior of the earth.

Now, as often happens in these regions, should the sun fail to burst through the clouds, there can be no shadow. Consequently, no chance of discovering the right aperture. We had already reached the 25th of June. If the kindly heavens would only remain densely clouded for six more days, we should have to put off our voyage of discovery for another year, when there would certainly be one person fewer in the party. I had already had sufficient of the mad and monstrous enterprise.

It would be utterly impossible to depict the impotent rage of Professor Hardwigg. The day passed, and not the faintest outline of a shadow could be seen at the bottom of the crater. Hans, the guide, never moved from his place. He must have been curious to know what we were about, if indeed he could believe we were about anything. As for my uncle, he never addressed a word to me. He was nursing his wrath to keep it warm! His eyes were fixed on the black and foggy atmosphere, his complexion hideous with suppressed passion. Never had his eyes appeared so fierce, his nose so aquiline, his mouth so hard and firm.

On the 26th, no change for the better. A mixture of rain and snow fell during the whole day. Hans very quietly built himself a hut of lava into which he retired like Diogenes into his tub. I took a malicious delight in watching the thousand little cascades that flowed down the side of the cone, carrying with them at times a stream of stones into the "vasty deep" below.

My uncle was almost frantic: to be sure it was enough to make even a patient man angry. He had reached to a certain extent the goal of his desires, and yet he was likely to be wrecked in port.

But if the heavens and the elements are capable of causing us much pain and sorrow, there are two sides to a medal. And there was reserved for Professor Hardwigg a brilliant and sudden surprise which was to compensate him for all his sufferings. Next day the sky was still overcast, but on Sunday, the 29th, the last day but one of the month, with a sudden change of wind and a new moon there came a change of weather. The sun poured its beaming rays to the very bottom of the crater.

Each hillock, every rock, every stone, every asperity of the soil had its share of the luminous effulgence, and its shadow fell heavily on the soil. Among others, to his insane delight, the shadow of Scartaris was marked and clear, and moved slowly with the radiant star of day.

My uncle moved with it in a state of mental ecstasy. At twelve o'clock exactly, when the sun had attained its highest altitude for the day, the shadow fell upon the edge of the central pit!

"Here it is," gasped the Professor in an agony of joy, "here it is—we have found it. Forward, my friends, into the Interior of the Earth."

I looked curiously at Hans to see what reply he

would make to this terrific announcement. *"Forut,"* said the guide tranquilly.

"Forward it is," answered my uncle, who was now in the seventh heaven of delight.

When we were quite ready, our watches indicated thirteen minutes past one!

CHAPTER XIV

THE REAL JOURNEY COMMENCES

OUR real journey commenced. Hitherto our courage and determination had overcome all difficulties. We were fatigued at times; and that was all. Now, unknown and fearful dangers were to be encountered.

I had not as yet ventured to take a glimpse down the horrible abyss into which in a few minutes more I was about to plunge. The fatal moment had, however, at last arrived. I had still the option of refusing or accepting a share in this foolish and audacious enterprise. But I was ashamed to show more fear than the eider-duck hunter. Hans seemed to accept the difficulties of the journey so tranquilly, with such calm indifference, with such perfect recklessness of all danger, that I actually blushed to appear less of a man than he! Had I been alone with my uncle, I should certainly have sat down and argued the point fully; but in the presence of the guide I held my tongue. I gave one moment to the thought of my charming cousin, and then I advanced to the mouth of the central shaft.

It measured about a hundred feet in diameter, which made about three hundred in circumference. I leaned over a rock which stood on its edge, and looked down. My hair stood on end, my teeth chattered, my limbs trembled, I seemed utterly to lose my center of gravity, while my head was in a sort of whirl, like that of a drunken man. There is nothing more powerful than this attraction towards an abyss. I was about to fall headlong into the gaping well, when I was drawn back by a firm and powerful hand. It was that of Hans. I had not taken lessons enough at the Frelser's-kirk of Copenhagen in the art of looking down from lofty eminences without blinking!

However, few as the minutes were during which I gazed down this tremendous and even wondrous shaft, I had a sufficient glimpse of it to give me some idea of its physical conformation. Its sides, which are almost as perpendicular as those of a well, presented numerous projections which doubtless would assist our descent.

It was a sort of wild and savage staircase, without bannister or fence. A rope fastened above, near the surface, would certainly support our weight and enable us to reach the bottom, but how, when we had arrived at its nethermost depth, were we to loosen it above? This was, I thought, a question of some importance.

My uncle, however, was, as usual prepared with expedients. He hit upon a very simple method of obviating this difficulty. He unrolled a cord about as thick as my thumb, and at least four hundred feet in length. He allowed about half of it to go down the pit and catch in a hitch over a great block of lava which stood on the edge of the precipice. This done, he threw the second half after the first.

Each of us could now descend by catching the two cords in one hand. When about two hundred feet below, all the explorer had to do was to let go one end and pull away at the other, when the cord would come falling at his feet. In order to go down farther, all that was necessary was to continue the same operation. Going down thus appeared to me easy enough, it was the coming up that now occupied my thoughts.

"Now," said my uncle, as soon as he had completed this important preparation, "let us see about the baggage. It must be divided into three separate parcels, and each of us must carry one on his back. I allude to the more important and fragile articles." My worthy and ingenious uncle did not appear to consider that we came under that denomination. "Hans," he continued, "you will take charge of the tools and some of the provisions; you, Harry, must take possession of another third of the provisions and of the arms. I will load myself with the rest of the eatables, and with the more delicate instruments."

"But," I exclaimed, "our clothes, this mass of cord and ladders—who will undertake to carry them down?"

"They will go down of themselves."

"And how so?" I asked.

"You shall see." My uncle was not fond of half measures, nor did he like anything in the way of hesitation. Giving his orders to Hans, he had the whole of the non-fragile articles made up into one bundle; and the packet firmly and solidly fastened, was simply pitched over the edge of the gulf.

I heard the moaning of the suddenly displaced air, and the noise of falling stones. My uncle leaning over the abyss followed the descent of his luggage with a perfectly self-satisfied air, and did not rise until it had completely disappeared from sight. "Now then," he cried, "it is our turn."

I put it in good faith to any man of common sense—was it possible to hear this energetic cry without a shudder? The Professor fastened his case of instruments on his back. Hans took charge of the tools, I of the arms. The descent then commenced in the following order: Hans went first, my uncle followed, and I went last. Our progress was made in profound silence—a silence only troubled by the fall of pieces of rock, which breaking from the jagged sides, fell with a roar into the depths below.

I allowed myself to slide, so to speak, holding frantically on the double cord with one hand and with the other keeping myself off the rocks by the assistance of my iron-shod pole. One idea was impressed upon my brain all the time. I feared that the upper support would fail me. The cord appeared to me far too fragile to bear the weight of three such persons as we were, with our luggage. I made as little use of it as possible, trusting to my own agility and doing miracles in the way of feats of dexterity and strength upon the projecting shelves and spurs of lava which my feet seemed to clutch as strongly as my hands.

The guide went first as I have said, and when one of the slippery and frail supports broke from under his feet he had recourse to his usual monosyllabic way of speaking. *"Gif-akt——"*

"Attention—look out," repeated my uncle.

In about half an hour we reached a kind of small terrace formed by a fragment of rock projecting some distance from the sides of the shaft.

Hans now began to haul upon the cord on one side only, the other going as quietly upward as the other came down. It fell at last, bringing with it a shower of small stones, lava and dust, a disagreeable kind of rain or hail.

While we were seated on this extraordinary bench I ventured once more to look downwards. With a sigh I discovered that the bottom was still wholly invisible. Were we, then, going direct to the interior of the earth?

The performance with the cord recommenced, and a quarter of an hour later we had descended another two hundred feet.

I have very strong doubts if the most determined geologist would, during that descent have studied the nature of the different layers of earth around him. I did not trouble my head much about the matter; whether we were among the combustible carbon Silurian, or primitive soils, I neither knew nor cared to know.

Not so the inveterate Professor. He must have taken notes all the way down, for, at one of our halts, he began a brief lecture. "The farther we advance," said he, "the greater is my confidence in the result. The disposition of these volcana strata absolutely confirms the theories of Sir Humphrey Davy. We are still within the region of the primordial soil, the soil in which took place the chemical oxidation of metals becoming inflamed by coming in contact with air and water. I at once regret the old and now for ever exploded theory of a central fire. At all events, we shall soon know the truth."

Such was the conclusion to which he came. I was very far from being in humor to discuss the matter. I had something else to think of. My silence was taken for consent; and still we continued to go down.

At the expiration of three hours, we were, to all appearance, as far off as ever from the bottom of the well. When I looked upwards, however, I could see that the upper orifice was every minute decreasing in size. The sides of the shaft were getting closer and closer together, we were approaching the regions of eternal night!

And still we continued to descend! At length, I noticed that when pieces of stone were detached from the sides of this stupendous precipice, they were swallowed up with less noise than before. The final sound was sooner heard. We were approaching the bottom of the abyss!

As I had been very careful to keep account of all the changes of cord which took place, I was able to tell exactly what was the depth we had reached, as well as the time it had taken. We had shifted the rope twenty-eight times, each operation taking a quarter of an hour, which in all made seven hours. To this had to be added twenty-eight pauses; in all ten hours and a half. We had started at one, it was now, therefore, about eleven o'clock at night.

It does not require great knowledge of arithmetic to know that twenty-eight times two hundred feet makes five thousand six hundred feet in all (more than an English mile).

While I was making this mental calculation a voice broke the silence. It was the voice of Hans. "Halt!" he cried.

I checked myself very suddenly, just at the moment when I was about to kick my uncle on the head.

"We have reached the end of our journey," said the worthy Professor in a satisfied tone.

"What, the interior of the earth?" said I, slipping down to his side.

"No, you stupid fellow! but we have reached the bottom of the well."

"And I suppose there is no farther progress to be made?" I hopefully exclaimed.

"Oh, yes, I can dimly see a sort of tunnel, which turns off obliquely to the right. At all events, we must see about that to-morrow. Let us sup now, and seek slumber as best we may."

I thought it time, but made no observations on that point. I was fairly launched on a desperate course, and all I had to do was to go forward hopefully and trustingly.

It was not quite dark even now, the light filtering down in a most extraordinary manner. We opened the provision bag, ate a frugal supper, and each did his best to find a bed amid the pile of stones, dirt, and lava which had accumulated for ages at the bottom of the shaft. I happened to grope out the pile of ropes, ladders, and clothes which we had thrown down; and upon them I stretched myself. After such a day's labor, my rough bed seemed as soft as down!

For a while I lay in a sort of pleasant trance. Presently, after lying quietly for some minutes, I opened my eyes and looked upwards. As I did so I made out a brilliant little dot, at the extremity of this long, gigantic telescope.

It was a star without scintillating rays. According to my calculation, it must be in the constellation of the Little Bear. After this little bit of astronomical recreation, I dropped into a sound sleep.

CHAPTER XV

WE CONTINUE OUR DESCENT

AT eight o'clock the next morning, a faint kind of dawn awoke us. The thousand and one prisms of the lava collected the light as it passed and brought it to us like a shower of sparks. We were able with ease to see objects around us.

"Well, Harry, my boy," cried the delighted Professor, rubbing his hands together, "what say you now? Did you ever pass a more tranquil night in our house in the König Strasse? No deafening sounds of cart-wheels, no cries of hawkers, no bad language from boatmen or watermen!"

"Well, uncle, we are quiet at the bottom of this well—but to me there is something terrible in this calm."

"Why," said the Professor, hotly, "one would say you were already beginning to be afraid. How will you get on presently? Do you know that as yet, we have not penetrated one inch into the bowels of the earth."

"What can you mean, sir?" was my bewildered and astonished reply.

"I mean to say that we have only just reached the soil of the island itself. This long vertical tube, which ends at the bottom of the crater of Sneffels, ceases here just about on a level with the sea."

"Are you sure, sir?"

"Quite sure. Consult the barometer."

It was quite true that the mercury, after rising gradually in the instrument, as long as our descent

was taking place, had stopped precisely at twenty-nine inches. "You perceive," said the Professor, "we have as yet only to endure the pressure of air. I am curious to replace the barometer by the manometer." The barometer, in fact, would become useless as soon as the weight of the air was greater than that calculated as about the level of the ocean.

"But," said I, "is it not very much to be feared that this ever-increasing pressure may not in the end turn out very painful and inconvenient?"

"No," said he. "We shall descend very slowly, and our lungs will be gradually accustomed to breathe compressed air. It is well known that aëronauts have gone so high as to be nearly without air at all —why, then, should we not accustom ourselves to breathe when we have, say a little too much of it? For myself, I am certain I shall prefer it. Let us not lose a moment. Where is the packet which preceded us in our descent?"

I smilingly pointed it out to my uncle. Hans had not seen it, and believed it caught somewhere above us; "*huppe*" as he phrased it.

"Now," said my uncle, "let us breakfast, and break fast like people who have a long day's work before them."

Biscuit and dried meat, washed down by some mouthfuls of water flavored with schiedam, was the material of our luxurious meal. As soon as it was finished, my uncle took from his pocket a note-book destined to be filled by memoranda of our travels. He had already placed his instruments in order, and this is what he wrote:—Monday, July 1st. Chronometer, 8h. 17m. morning. Barometer, 29 inches. Thermometer, 43 degrees Fahr. Direction, E. S. E.

This last observation referred to the obscure gallery, and was indicated to us by the compass.

"Now, Harry," cried the Professor, in an enthusiastic tone of voice, "we are truly about to take our first step into the Interior of the Earth; once before visited by man since the first creation of the world. You may consider, therefore, that at this precise moment our travels really commence."

As my uncle made this remark, he took in one hand the Ruhmkorf coil apparatus, which hung around his neck, and with the other he put the electric current in communication with the filament of the lantern. And a bright light at once illumined that dark and gloomy tunnel! The effect was magical!

Hans, who carried the second apparatus, had it put into operation too. This ingenious application of electricity to practical purposes enabled us to move along by the light of an artificial day, amid even the flow of the most inflammable and combustible gases.

"Forward!" cried my uncle. Each took up his burden. Hans going first, my uncle following, I going third, we entered the somber gallery! Just as we were about to engulf ourselves in this dismal passage, I lifted up my head, and through the tube-like shaft I saw that Iceland sky I was never to see again! Was it the last I should ever see of any sky?

The stream of lava flowing from the bowels of the earth in 1229, had forced itself a passage through the tunnel. It lined the whole inside with its thick and brilliant coating. The electric light added very greatly to the brilliancy of the effect. The great difficulty of our journey now began. How were we to prevent ourselves from slipping down the steeply-inclined plane? Happily some cracks, abrasures of the soil, and other irregularities, served the place of steps; and we descended slowly, allowing our heavy luggage to slip on before us, at the end of a long cord.

But that which served as steps under our feet, became in other places stalactites. The lava, very porous in certain places, took the form of little round blisters. Crystals of opaque quartz, adorned with limpid drops of natural glass suspended to the roof like lusters, seemed to take fire as we passed beneath them. One would have fancied that the genii of romance were illuminating their underground palaces to receive the sons of men.

"Magnificent! Glorious!" I cried in a moment of involuntary enthusiasm, "what a spectacle, uncle! Do you not admire these variegated shades of lava, which run through a whole series of colors, from reddish brown to pale yellow—by the most insensible degrees? And these crystals, they appear like luminous globes."

"You are beginning to see the charms of travel, Master Harry," cried my uncle. "Wait a bit, until we advance farther. What we have as yet discovered is nothing—onwards, my boy, onwards!"

It would have been a far more correct and appropriate expression, had he said, "let us slide," for we were going down an inclined plane with perfect ease. The compass indicated that we were moving in a south-easterly direction. The flow of lava had never turned to the right or the left. It had the inflexibility of a straight line.

Nevertheless, to my surprise, we found no perceptible increase in heat. This proved the theories of Humphrey Davy to be founded on truth, and more than once I found myself examining the thermometer in silent astonishment. Two hours after my departure it only marked 54 degrees Fahrenheit. I had every reason to believe from this that our descent was far more horizontal than vertical. As for discovering the exact depth to which we had attained, nothing could be easier. The Professor, as he advanced, measured the angles of deviation and inclination; but he kept the result of his observations to himself.

About eight o'clock in the evening, my uncle gave the signal for the night's rest. Hans seated himself on the ground. The lamps were hung to fissures in the lava rock. We were now in a large cavern where air was not wanting. On the contrary it abounded. What could be the cause of this—to what atmospheric agitation could be ascribed this draught? But this was a question which I did not care to discuss just then. Fatigue and hunger made me incapable of reasoning. An almost unceasing march of twelve hours had been kept up not without great exhaustion. I was really and truly worn out; and delighted enough I was to hear the word "Halt."

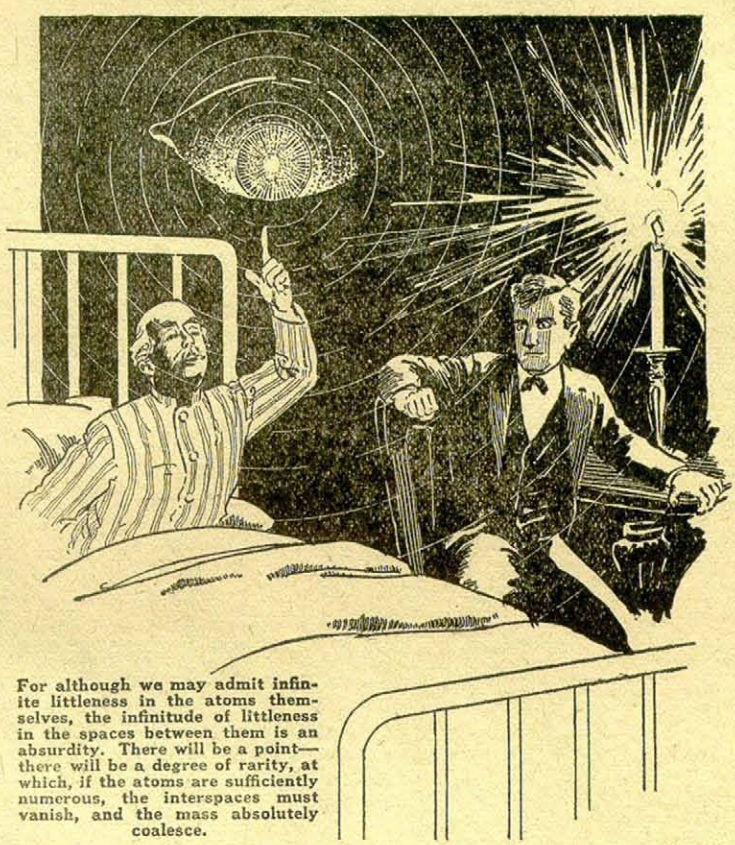
Hans laid out some provisions on a lump of lava, and we each supped with keen relish. One thing, however, caused us great uneasiness—our water reserve was already half exhausted. My uncle had full confidence in finding subterranean resources, but hitherto we had completely failed in doing so. I could not help calling my uncle's attention to the circumstance. "And are you surprised at this total absence of springs?" he said.

(*Continued on page* 135)

MESMERIC REVELATION

By Edgar Allan Poe

WHATEVER doubt may still envelop the *ratoinale* of mesmerism, its startling *facts* are now almost universally admitted. Of these latter, those who doubt are your mere doubters by profession—an unprofitable and disreputable tribe. There can be no more absolute waste of time than the attempt to *prove*, at the present day, that man, by mere exercise of will, can so impress his fellow, as to cast him into an abnormal condition, of which the phenomena resemble very closely those of *death*, or at least resemble them more nearly than they do the phenomena of any other normal condition within our cognizance; that, while in this state, the person so impressed employs only with effort, and then feebly, the external organs of sense, yet perceives, with keenly refined perception, and through channels supposed unknown, matters beyond the scope of the physical organs; that, moreover, his intellectual faculties are wonderfully exalted and invigorated; that his sympathies with the person so impressing him are profound; and, finally, that his susceptibility to the impression increases with its frequency, while, in the same proportion, the peculiar phenomena elicited are more extended and more *pronounced*.



For although we may admit infinite littleness in the atoms themselves, the infinitude of littleness in the spaces between them is an absurdity. There will be a point—there will be a degree of rarity, at which, if the atoms are sufficiently numerous, the interspaces must vanish, and the mass absolutely coalesce.

I say that these—which are the laws of mesmerism in its general features—it would be supererogation to demonstrate; nor shall I inflict upon my readers so needless a demonstration to-day. My purpose at present is a very different one indeed. I am impelled, even in the teeth of a world of prejudice, to detail without comment the very remarkable substance of a colloquy, occurring between a sleep-walker and myself.

I had been long in the habit of mesmerizing the person in question (Mr. Van Kirk), and the usual acute susceptibility and exaltation of the mesmeric perception had supervened. For many months he had been laboring under confirmed phthisis, the more distressing effects of which had been relieved by my manipulations; and on the night of Wednesday, the fifteenth instant, I was summoned to to his bedside.

The invalid was suffering with acute pain in the region of the heart, and breathed with great difficulty, having all the ordinary symptoms of asthma. In spasms such as these he had usually found relief from the application of mustard to the nervous centres, but to-night this had been attempted in vain.

As I entered his room he greeted me with a cheerful smile, and although evidently in much bodily pain, he appeared to be, mentally, quite at ease.

"I sent for you to-night," he said, "not so much to administer to my bodily ailment, as to satisfy me concerning certain psychal impressions which, of late, have occasioned me much anxiety and surprise. I need not tell you how sceptical I have hitherto been on the topic of the soul's immortality. I cannot deny that there has always existed, as if in that very soul which I have been denying, a vague half-sentiment of its own existence. But this half-sentiment at no time amounted to conviction. With it my reason had nothing to do. All attempts at logical inquiry resulted, indeed, in leaving me

IN THE last century mesmerism excited a great deal of attention and that quite famous lady Harriet Martineau, a very celebrated writer in her day and one of the severest critics early America ever had, figured as one of its believers, and here Edgar Allan Poe uses it for a frame work to surround some of his views on spiritual matter and the hereafter. It is a great mistake to take this favorite author as only an agreeable fiction writer, and it is impossible not to feel that had his life been different, had he not been overshadowed by poverty, and had he not led so troubled an existence, he would have figured as an enlightened philosopher, and as one whose views are far removed from the disagreeable pessimism so prevalent of the present day.

more sceptical than before. I had been advised to study Cousin. I studied him in his own works as well as in those of his European and American echoes. The 'Charles Elwood' of Mr. Brownson, for example, was placed in my hands. I read it with profound attention. Throughout I found it logical, but the portions which were not *merely* logical were unhappily the initial arguments of the disbelieving hero of the book. In his summing up it seemed evident to me that the reasoner had not even succeeded in convincing himself. His end had plainly forgotten his beginning, like the government of Trinculo. In short, I was not long in perceiving that if man is to be intellectually convinced of his own immortality, he will never be so convinced by the mere abstractions which have been so long the fashion of the moralists of England, of France, and of Germany. Abstractions may amuse and exercise, but take no hold on his mind. Here upon earth, at least philosophy, I am persuaded, will always in vain call upon us to look upon qualities as things. The will may assent—the soul—the intellect, never.

"I repeat, then, that I only half felt, and never intellectually believed. But latterly there has been a certain deepening of the feeling, until it has come so nearly to resemble the acquiescence of reason, that I find it difficult to distinguish between the two. I am enabled, too, plainly to trace effect to the mesmeric influence. I cannot better explain this my meaning than by the hypothesis that the mesmeric exaltation enables me to perceive a train of ratiocination which, in my abnormal existence, convinces, but which, in full accordance with the mesmeric phenomena, does not extend, except through its *effect*, into my normal condition. In sleep-waking, the reasoning and its conclusion—the cause and its effect—are present together. In my natural state, the cause vanishing, the effect only, and perhaps only partially, remains.

"These considerations have led me to think that some good results might ensue from a series of well-directed questions propounded to me while mesmerized. You have often observed the profound self-cognizance observed by the sleep-waker—the extensive knowledge he displays upon all points relating to the mesmeric condition itself; and from this self-cognizance may be deduced hints for the proper conduct of a catechism."

I consented, of course, to make this experiment. A few passes threw Mr. Van Kirk into the mesmeric sleep. His breathing became immediately more easy, and he seemed to suffer no physical uneasiness. The following conversation then ensued:—V. in the dialogue representing the patient, and P. myself.

P. Are you asleep?

V. Yes—no; I would rather sleep more soundly.

P. [*After a few more passes.*] Do you sleep now?"

V. Yes.

P. How do you think your present illness will result?

V. [*After a long hesitation and speaking as if with effort.*] I must die.

P. Does the idea of death afflict you?

P. [*Very quickly.*] No—no!

P. Are you pleased with the prospect?

V. If I were awake I should like to die, but now it is no matter. The mesmeric condition is so near death as to content me.

P. I wish you would explain yourself, Mr. Van Kirk.

V. I am willing to do so, but it requires more effort than I feel able to make. You do not question me properly.

P. What then shall I ask?

V. You must begin at the beginning.

P. The beginning! but where is the beginning?

V. You know that the beginning is God. [*This was said in a low, fluctuating tone, and with every sign of the most profound veneration.*]

P. What then is God?

V. [*Hesitating for many minutes.*] I cannot tell.

P. Is not God spirit?

V. While I was awake, I knew what you meant by "spirit," but now it seems only a word—such for instance as truth, beauty—a quality, I mean.

P. Is not God immaterial?

V. There is no immateriality—it is a mere word. That which is not matter, is not at all—unless qualities are things.

P. Is God, then, material?

V. No. [*This reply startled me very much.*]

P. What then is he?

V. [*After a long pause and mutteringly.*] I see—but it is a thing difficult to tell. [*Another long pause.*] He is not spirit, for he exists. Nor is he matter, *as you understand it.* But there are *gradations* of matter of which man knows nothing; the grosser impelling the finer, the finer pervading the grosser. The atmosphere, for example, impels the electric principle, while the electric principle permeates the atmosphere. These gradations of matter increase in rarity of fineness, until we arrive at a matter *unparticled* — without particles — undivisible—*one;* and here the law of impulsion and permeation is modified. The ultimate, or unparticled matter, not only permeates all things but impels all things—and thus *is* all things within itself. This matter is God. What men attempt to embody in the word "thought," is this matter in motion.

P. The metaphysicians maintain that all action is reducible to motion and thinking, and that the latter is the origin of the former.

V. Yes; and I now see the confusion of idea. Motion is the action of *mind*—not of *thinking.* The unparticled matter, or God, in quiescence, is (as nearly as we can conceive it) what men call mind. And the power of self-movement (equivalent in effect to human volition) is, in the unparticled matter, the result of its unity and omniprevalence; *how* I know not, and now clearly see that I shall never know. But the unparticled matter, set in motion by law, or quality, existing within itself, is thinking.

P. Can you give me no more precise idea of what you term the unparticled matter?

V. The matters of which man is cognizant, escape the senses in gradation. We have, for example, a metal, a piece of wood, a drop of water, the atmosphere, a gas, caloric, electricity, the luminiferous ether. Now we call all these things matter, and embrace all matter in one general definition; but in spite of this, there can be no two ideas more essentially distinct than that which we attach to a metal, and that which we attach to the luminiferous ether. When we reach the latter, we feel an almost irresistible inclination to class it with spirit, or with

nihility. The only consideration which restrains us is our conception of its atomic constitution; and here, even, we have to seek aid from our notion of an atom, as something possessing, in infinite minuteness, solidity, palpability, weight. Destroy the idea of the atomic constitution, and we should no longer be able to regard the ether as an entity, or at least as matter. For want of a better word we might term it spirit. Take, now, a step beyond the luminiferous ether—conceive a matter as much more rare than the ether, as this ether is more rare than the metal, and we arrive at once (in spite of all the school dogmas) at a unique mass—an unparticled matter. For although we may admit infinite littleness in the atoms themselves, the infinitude of littleness in the spaces between them is an absurdity. There will be a point—there will be a degree of rarity, at which, if the atoms are sufficiently numerous, the interspaces must vanish, and the mass absolutely coalesce. But the consideration of the atomic constitution being now taken away, the nature of the mass inevitably glides into what we conceive as spirit. It is clear, however, that it is as fully matter as before. The truth is, it is impossible to conceive spirit, since it is impossible to imagine what is not. When we flatter ourselves that we have formed its conception, we have merely deceived our understanding by the consideration of infinitely rarefied matter.

P. There seems to me an insurmountable objection to the idea of absolute coalescence;—and that is the very slight resistance experienced by the heavenly bodies in their revolutions through space —a resistance now ascertained, it is true, to exist in *some* degree, but which is, nevertheless, so slight as to have been quite overlooked by the sagacity even of Newton. We know that the resistance of bodies is, chiefly, in proportion to their density. Absolute coalescence is absolute density. Where there are no interspaces, there can be no yielding. An ether, absolutely dense, would put an infinitely more effectual stop to the progress of a star than would an ether of adamant or of iron.

V. Your objection is answered with an ease which is nearly in the ratio of its apparent unanswerability.—As regards the progress of the star, it can make no difference whether the star passes through the ether *or the ether through it.* There is no astronomical error more unaccountable than that which reconciles the known retardation of the comets with the idea of their passage through an ether for, however rare this ether be supposed, it would put a stop to all sidereal revolution in a very far briefer period than has been admitted by those astronomers who have endeavored to slur over a point which they found it impossible to comprehend. The retardation actually experienced is, on the other hand, about that which might be expected from the *friction* of the ether in the instantaneous passage through the orb. In the one case, the retarding force is momentary and complete within itself—in the other it is endlessly accumulative.

P. But in all this—in this identification of mere matter with God—is there nothing of irreverence? [*I was forced to repeat this question before the sleep-waker fully comprehended my meaning.*]

V. Can you say *why* matter should be less reverenced than mind? But you forget that the matter of which I speak is, in all respects, the very "mind" or "spirit" of the schools, so far as regards its high capacities, and is moreover, the "matter" of these schools at the same time. God, with all the powers attributed to spirit, is but the perfection of matter.

P. You assert, then, that the unparticled matter, in motion, is thought?

V. In general, this motion is the universal thoughts of the universal mind. This thought creates. All created things are but the thoughts of God.

P. You say, "in general."

V. Yes. The universal mind is God. For new individualities *matter* is necessary.

P. But you now speak of "mind" and "matter" as do the metaphysicians.

V. Yes—to avoid confusion. When I say "mind," I mean the unparticled or ultimate matter; by "matter," I intend all else.

P. You were saying that "for new individualities matter is necessary."

V. Yes; for mind, existing unincorporate, is merely God. To create individual, thinking beings, it was necessary to incarnate portions of the divine mind. Thus man is individualized. Divested of corporate investure, he were God. Now, the particular motion of the incarnated portions of the unparticled matter is the thought of man, as the motion of the whole is that of God.

P. You say that divested of the body man will be God?

V. [*After much hesitation.*] I could not have said this; it is an absurdity.

P. [*Referring to my notes.*] You *did* say "that divested of corporate investiture man were God."

V. And this is true. Man thus divested *would be* God—would be unindividualized. But he can never be thus divested—at least never *will be*—else we must imagine an action of God returning upon itself —a purposeless and futile action. Man is a creature. Creatures are thoughts of God. It is the nature of thought to be irrevocable.

P. I do not comprehend. You say that man will never put off the body?

V. I say that he will never be bodiless.

P. Explain.

V. There are two bodies—the rudimental and the complete, corresponding with the two conditions of the worm and the butterfly. What we call "death" is but the painful metamorphosis. Our present incarnation is progressive, preparatory, temporary. Our future is perfected, ultimate, immortal. The ultimate life is the full design.

P. But of the worm's metamorphosis we are palpably cognizant.

V. We, certainly—but not the worm. The matter of which our rudimental body is composed is within the ken of the organs of that body; or, more distinctly, our rudimental organs are adapted to the matter of which is formed the rudimental body; but not to that of which the ultimate is composed. The ultimate body thus escapes our rudimental senses, and we perceive only the shell which falls, in decaying, from the inner form; not that inner form itself; but this inner form, as well as the shell, is appreciable by those who have already acquired the ultimate life.

P. You have often said that the mesmeric state very nearly resembles death. How is this?

V. When I say that it resembles death, I mean

that it resembles the ultimate life; for when I am entranced the senses of my rudimental life are in abeyance, and I perceive external things directly, without organs, through a medium which I shall employ in the ultimate, unorganized life.

P. Unorganized?

V. Yes; organs are contrivances by which the individual is brought into sensible relation with particular classes and forms of matter, to the exclusion of other classes and forms. The organs of man are adapted to his rudimental condition, and to that only; his ultimate condition, being unorganized, is of unlimited comprehensions in all points but one —the nature of the volition of God—that is to say, the motion of the unparticled matter. You will have a distinct idea of the ultimate body by conceiving it to be entire brain. This it is *not*; but a conception of this nature will bring you near a comprehension of what it *is*. A luminous body imparts vibration to the luminiferous ether. The vibrations generate similar ones within the retina; these again communicate similar ones to the optic nerve. The nerve conveys similar ones to the brain; the brain, also, similar ones to the unparticled matter which permeates it. The motion of this latter is thought, of which perception is the first undulation. This is the mode by which the mind of the rudimental life communicates with the external world; and this external world is, to the rudimental life, limited through the idiosyncrasy of its organs. But in the ultimate, unorganized life, the external world reaches the whole body (which is of a substance having affinity to brain, as I have said) with no other intervention than that of an infinitely rarer ether than even the luminiferous; and to this ether —in unison with it—the whole body vibrates, setting in motion the unparticled matter which permeates it. It is to the absence of idiosyncratic organs, therefore, that we must attribute the nearly unlimited perception of the ultimate life. To rudimental beings, organs are the cages necessary to confine them until fledged.

P. You speak of rudimental "beings." Are there other rudimental thinking beings than man?

V. The multitudinous conglomeration of rare matter into nebulæ, planets, suns, and other bodies which are neither nebulæ, suns, nor planets, is for the sole purpose of supplying *pabulum* for the idiosyncrasy of the organs of an infinity of rudimental beings. But for the necessity of the rudimental, prior to the ultimate life, there would have been no bodies such as these. Each of these is tenanted by a distinct variety of organic, rudimental, thinking creature. In all, the organs vary with the features of the place tenanted. At death, or metamorphosis, these creatures, enjoying the ultimate life—immortality—and cognizant of all secrets but *the one* act all things and pass everywhere by mere volition:—indwelling, not the stars, which to us seem the sole palpabilities, and for the accommodation of which we blindly deem space created—but that SPACE itself—that infinity of which the truly substantive vastness swallows up the star-shadows —blotting them out as non-entities from the perception of the angels.

P. You say that "but for the *necessity* of the rudimental life, there would have been no stars. But why this necessity?

V. In the inorganic life, as well as in the inorganic matter generally, there is nothing to impede the action of one simple *unique* law—the Divine Volition. With the view of producing impediment, the organic life and matter (complex, substantial, and law-encumbered) were contrived.

P. But again—why need this impediment have been produced?

V. The result of law inviolate is perfection—right—negative happiness. The result of law violate is imperfection, wrong, positive pain. Through the impediments afforded by the number, complexity, and substantiality of the laws of organic life and matter, the violation of law is rendered, to a certain extent, practicable. Thus pain, which in the inorganic life is impossible, is possible in the organic.

P. And to what good end is pain thus rendered possible?

V. All things are either good or bad by comparison. A sufficient analysis will show that pleasure, in all cases, is but the contrast of pain. *Positive* pleasure is a mere idea. To be happy at any one point we must have suffered at the same. Never to suffer would have been never to have been blessed. But it has been shown that in the inorganic life, pain cannot be; thus the necessity for the organic. The pain of the primitive life of Earth is the sole basis of the bliss of the ultimate life in Heaven.

P. Still there is one of your expressions which I find it impossible to comprehend—"the truly *substantive* vastness of infinity."

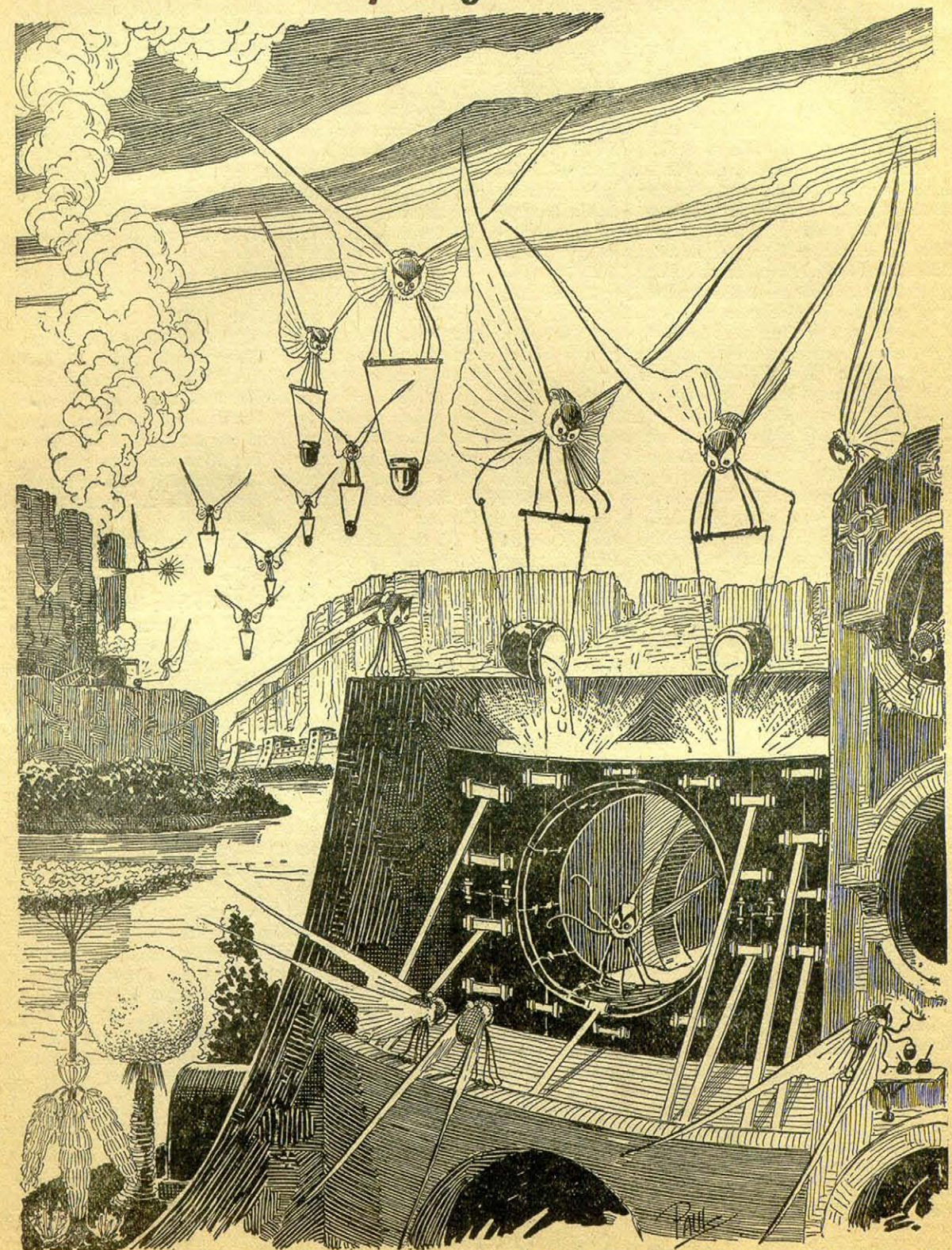
V. This, probably, is because you have no sufficiently generic conception of the term *"substance"* itself. We must not regard it as a quality, but as a sentiment:—it is the perception, in thinking beings, of the adaptation of matter to their organization. There are many things on the Earth which would be nihility to the inhabitant of Venus—many things visible and tangible in Venus, which we could not be brought to appreciate as existing at all. But, to the inorganic beings—to the angels—the whole of the unparticled matter is substance; that is to say, the whole of what we term "space" is to them the truest substantiality—the stars, meantime, through what we consider their materiality, escaping the angelic sense, just in proportion as the unparticled matter, through what we consider its immateriality, eludes the organic.

As the sleep-waker pronounced these latter words in a feeble tone, I observed on his countenance a singular expression, which somewhat alarmed me, and induced me to awake him at once. No sooner had I done this than, with a bright smile irradiating all his features, he fell back upon his pillow and expired. I noticed that in less than a minute afterward his corpse had all the stern rigidity of stone. His brow was of the coldness of ice. Thus, ordinarily, should it have appeared, only after long pressure from Azrael's hand. Had the sleep-waker, indeed, during the latter portion of his discourse, been addressing me from out the region of the shadows?

THE END

The CRYSTAL EGG

By H. G. Wells



Passing up the valley exactly parallel with the distant cliffs, was a broad and mirror-like expanse of water. The air seemed full of squadrons of great birds, manoeuvring in stately curves.

THERE was, until a year ago, a little and very grimy-looking shop near Seven Dials, over which, in weather-worn yellow lettering, the name of "C. Cave, Naturalist and Dealer in Antiquities," was inscribed. The contents of its window were curiously variegated. They comprised some elephant tusks and an imperfect set of chessmen, beads and weapons, a box of glass eyes, two skulls of tigers and one human, several moth-eaten stuffed monkeys (one holding a lamp), an old-fashioned cabinet, a fly-blown ostrich egg or so, some fishing-tackle, and an extraordinary dirty, empty glass fish-tank. There was also, at the moment the story begins, a mass of crystal, worked into the shape of an egg and brilliantly polished. And at that two people, who stood outside the window, were looking, one of them a tall, thin clergyman, the other a black-bearded young man of dusky complexion and unobtrusive costume. The dusky young man spoke with eager gesticulation, and seemed anxious for his companion to purchase the article.

While they were there, Mr. Cave came into his shop, his beard still wagging with the bread and butter of his tea. When he saw these men and the object of their regard, his countenance fell. He glanced guiltily over his shoulder, and softly shut the door. He was a little old man, with pale face and peculiar watery blue eyes; his hair was a dirty grey, and he wore a shabby blue frock-coat, an ancient silk hat, and carpet slippers very much down at the heel. He remained watching the two men as they talked. The clergyman went deep into his trouser pocket, examined a handful of money, and showed his teeth in an agreeable smile. Mr. Cave seemed still more depressed when they came into the shop.

The clergyman, without any ceremony, asked the price of the crystal egg. Mr. Cave glanced nervously towards the door leading into the parlor, and said five pounds. The clergyman protested to his companion as well as to Mr. Cave, that the price was high—it was, indeed, very much more than Mr. Cave had intended to ask, when he had stocked the article—and an attempt at bargaining ensued. Mr. Cave stepped to the shop-door, and held it open. "Five pounds is my price," he said, as though he wished to save himself the trouble of unprofitable discussion. As he did so, the upper portion of a woman's face appeared above the blind in the glass upper panel of the door leading into the parlor, and stared curiously at the two customers. "Five pounds is my price," said Mr. Cave, with a quiver in his voice.

The swarthy young man had so far remained a spectator watching Cave keenly. Now he spoke. "Give him five pounds," he said. The clergyman glanced at him to see if he were in earnest, and, when he looked at Mr. Cave again, he saw that the latter's face was white. "It's a lot of money," said the clergyman, and diving into his pocket, began counting his resources. He had little more than thirty shillings, and he appealed to his companion, with whom he seemed to be on terms of considerable intimacy. This gave Mr. Cave an opportunity of collecting his thoughts, and he began to explain in an agitated manner that the crystal was not, as a matter of fact, entirely free for sale. His two customers were naturally surprised at this, and inquired why he had not thought of that before he began to bargain. Mr. Cave became confused, but he stuck to his story, that the crystal was not in the market that afternoon, that a probable purchaser of it had already appeared. The two, treating this as an attempt to raise the price still further, made as if they would leave the shop. But at this point the parlor door opened, and the owner of the dark fringe and the little eyes appeared.

She was a coarse-featured, corpulent woman, younger and very much larger than Mr. Cave; she walked heavily, and her face was flushed. "That crystal *is* for sale," she said. "And five pounds is a good price for it. I can't think what you're about, Cave, not to take the gentleman's offer!"

Mr. Cave, greatly perturbed by the interruption, looked angrily at her over the rims of his spectacles, and, without excessive assurance, asserted his right to manage his business in his own way. An altercation began. The two customers watched the scene with interest and some amusement, occasionally assisting Mrs. Cave with suggestions. Mr. Cave, hard driven, persisted in a confused and impossible story of an inquiry for the crystal that morning, and his agitation became painful. But he stuck to his point with extraordinary persistence. It was the young Oriental who ended this curious controversy. He proposed that they should call again in the course of two days—so as to give the alleged enquirer a fair chance. "And then we must insist," said the clergyman. "Five pounds." Mrs. Cave took it on herself to apologize for her husband, explaining that he was sometimes "a little odd," and as the two customers left, the couple prepared for a free discussion of the incident in all its bearings.

Mrs. Cave talked to her husband with singular directness. The poor little man, quivering with emotion, muddled himself between his stories, maintaining on the one hand that he had another customer in view, and on the other asserting that the crystal was honestly worth ten guineas. "Why did you ask five pounds?" said his wife. "*Do* let me manage my business my own way!" said Mr. Cave.

Mr. Cave had living with him a step-daughter and a step-son, and at supper that night the transaction was rediscussed. None of them had a very high opinion of Mr. Cave's business meth-

ods, and this action seemed a culminating folly.

"It's my opinion he's refused that crystal before," said the step-son, a loose-limbed lout of eighteen.

"But *Five Pounds!*" said the step-daughter, an argumentative young woman of six-and-twenty.

Mr. Cave's answers were wretched; he could only mumble weak assertions that he knew his own business best. They drove him from his half-eaten supper into the shop, to close it for the night, his ears aflame and tears of vexation behind his spectacles. "Why had he left the crystal in the window so long? The folly of it!" That was the trouble closest to his mind. For a time he could see no way of evading the sale.

After supper his step-daughter and step-son smartened themselves up and went out. His wife retired upstairs and over a little sugar and lemon and so forth, in hot water, reflected upon the business aspects of the crystal. Mr. Cave went into the shop, and stayed there until late, ostensibly to make ornamental rockeries for gold-fish globes but really for a private purpose that will be better explained later. The next day Mrs. Cave found that the crystal had been removed from the window, and was lying behind some second-hand books on angling. She replaced it in a conspicuous position. But she did not argue further about it, as a nervous headache disinclined her from debate. Mr. Cave was always disinclined. The day passed disagreeably. Mr. Cave was, if anything, more absent-minded than usual, and uncommonly irritable withal. In the afternoon, when his wife was taking her customary sleep, he removed the crystal from the window again.

The next day Mr. Cave had to deliver a consignment of dog-fish at one of the hospital schools, where they were needed for dissection. In his absence, Mrs. Cave's mind reverted to the topic of the crystal, and the methods of expenditure suitable to a windfall of five pounds. She had already devised some very agreeable expedients, among others a dress of green silk for herself and a trip to Richmond, when a jangling of the front door bell summoned her into the shop. The customer was an examination coach, who came to complain of the non-delivery of certain frogs asked for on the previous day. Mrs. Cave did not approve of this particular branch of Mr. Cave's business, and the gentleman, who had called in a somewhat aggressive mood, retired after a brief exchange of words—entirely civil so far as he was concerned. Mrs. Cave's eye then naturally turned to the window; for the sight of the crystal was an assurance of five pounds and of her dreams. What was her surprise to find it gone!

She went to the place behind the locker on the counter, where she had discovered it the day before. It was not there; and she immediately began an eager search about the shop.

When Mr. Cave returned from his business about the dog-fish, about a quarter to two in the afternoon, he found the shop in some confusion, and his wife, extremely exasperated and on her knees behind the counter, routing among his taxidermic material. Her face came up hot and angry over the counter, as the jangling bell announced his return, and she forthwith accused him of "hiding it."

"Hid *what?*" asked Mr. Cave.

"The crystal! Where did you hide the crystal?"

At that Mr. Cave, apparently much surprised, rushed to the window. "Isn't it here?" he said. "Great Heavens! what has become of it?"

Just then, Mr. Cave's step-son re-entered the shop from the inner room—he had come home a minute or so before Mr. Cave—and he was blaspheming freely. He was apprenticed to a second-hand furniture dealer down the road, but he had his meals at home, and he was naturally annoyed to find no dinner ready.

But, when he heard of the loss of the crystal, he forgot his meal, and his anger was diverted from his mother to his step-father. Their first idea, of course, was that he had hidden it. But Mr. Cave stoutly denied all knowledge of its fate—freely offering his bedabbled affidavit in the matter—and at last was worked up to the point of accusing, first, his wife and then his step-son of having taken it with a view to a private sale. So began an exceedingly acrimonious and emotional discussion, which ended for Mrs. Cave in a peculiar nervous condition midway between hysterics and amuck, and caused the step-son to be half-an-hour late at the furniture establishment in the afternoon. Mr. Cave took refuge from his wife's emotions in the shop.

In the evening the topic was resumed, with less passion and in a more judicial spirit, under the presidency of the step-daughter. The supper passed unhappily and ended in a painful scene. Mr. Cave gave way at last to extreme exasperation, and went out banging the front door violently. The rest of the family, having discussed him with the freedom which his absence warranted, hunted the house from garret to cellar, hoping to light upon the crystal.

The next day the two customers called again. They were received by Mrs. Cave almost in tears. It transpired that no one *could* imagine all that she had stood from Cave at various times in her married pilgrimage. . . . She also gave a garbled account of the disappearance. The clergyman and the Oriental laughed silently at one another, and said it was extraordinary. As Mrs. Cave seemed disposed to give them the complete history of her life they made to leave the shop. Thereupon Mrs. Cave, still clinging to hope, asked for the clergyman's address, so that, if she could get anything out of Cave, she might communicate it. The address was duly given, but apparently was afterwards mislaid. Mrs. Cave can remember nothing about it.

By the evening of that day, the Caves seem to have exhausted their emotions, and Mr. Cave, who had been out in the afternoon, supped in a gloomy isolation that contrasted pleasantly with the impassioned controversy of the previous days. For some time matters were very badly strained in the Cave household, but neither crystal nor customer reappeared.

Now, without mincing the matter, we must admit that Mr. Cave was a liar. He knew perfectly well where the crystal was. It was in the rooms of Mr. Jacoby Wace, Assistant Demonstrator at St. Catherine's Hospital, Westbourne Street. It stood on the sideboard partially covered by a black velvet cloth, beside a decanter of American whisky. It is from Mr. Wace, indeed, that the particulars upon which this narrative is based were derived. Cave

had taken the thing off to the hospital hidden in the dog-fish sack, and there had pressed the young investigator to keep it for him. Mr. Wace was a little dubious at first. His relationship to Cave was peculiar. He had a taste for singular characters, and he had more than once invited the old man to smoke and drink in his rooms, and to unfold his rather amusing views of life in general and of his wife in particular. Mr. Wace had encountered Mrs. Cave, too, on occasions when Mr. Cave was not at home to attend to him. He knew the constant interference to which Cave was subjected, and having weighed the story judicially, he decided to give the crystal a refuge. Mr. Cave promised to explain the reasons for his remarkable affection for the crystal more fully on a later occasion, but he spoke distinctly of seeing visions therein. He called on Mr. Wace the same evening.

He told a complicated story. The crystal he said had come into his possession with other oddments at the forced sale of another curiosity dealer's effects, and not knowing what its value might be, he had ticketed it at ten shillings. It had hung upon his hands at that price for some months, and he was thinking of "reducing the figure," when he made a singular discovery.

At that time his health was very bad—and it must be borne in mind that, throughout all this experience, his physical condition was one of ebb—and he was in considerable distress by reason of the negligence, the positive ill-treatment even, he received from his wife and step-children. His wife was vain, extravagant, unfeeling, and had a growing taste for private drinking; his step-daughter was mean and over-reaching; and his step-son had conceived a violent dislike for him, and lost no opportunity of showing it. The requirements of his business pressed heavily upon him, and Mr. Wace does not think that he was altogether free from occasional intemperance. He had begun life in a comfortable position, he was a man of fair education, and he suffered, for weeks at a stretch, from melancholia and insomnia. Afraid to disturb his family, he would slip quietly from his wife's side, when his thoughts became intolerable, and wander about the house. And about three o'clock one morning, late in August, chance directed him into the shop.

The dirty little place was impenetrably black except in one spot, where he perceived an unusual glow of light. Approaching this, he discovered it to be the crystal egg, which was standing on the corner of the counter towards the window. A thin ray shot through a crack in the shutters, impinged upon the object, and seemed as it were to fill its entire interior.

It occurred to Mr. Cave that this was not in accordance with the laws of optics as he had known them in his younger days. He could understand the rays being reflected by the crystal and coming to a focus in its interior, but this diffusion jarred with his physical conceptions. He approached the crystal more nearly, peering into it and around it, with a transient revival of the scientific curiosity that in his youth had determined his choice of a calling. He was surprised to find the light not steady, but writhing within the substance of the egg, as though that object was a hollow sphere of some luminous vapor. In moving about to get different points of view, he suddenly found that he had come between it and the ray, and that the crystal none the less remained luminous. Greatly astonished, he lifted it out of the light ray and carried it to the darkest part of the shop. It remained bright for some four or five minutes, then it slowly faded and went out. He placed it in the thin streak of daylight, and its luminousness was almost immediately restored.

So far, at least, Mr. Wace was able to verify the remarkable story of Mr. Cave. He had himself repeatedly held this crystal in a ray of light (which had to be of a smaller diameter than one millimetre). And in a perfect darkness, such as could be produced by velvet wrapping, the crystal did undoubtedly appear very faintly phosphorescent. It would seem, however, that the luminousness was of some exceptional sort, and not equally visible to all eyes; for Mr. Harbinger—whose name will be familiar to the scientific reader in connection with the Pasteur Institute—was quite unable to see any light whatever. And Mr. Wace's own capacity for its appreciation was out of comparison inferior to that of Mr. Cave's. Even with Mr. Cave the power varied very considerably; his vision was most vivid during states of extreme weakness and fatigue.

Now, from the outset this light in the crystal exercised a curious fascination upon Mr. Cave. And it says more for his loneliness of soul than a volume of pathetic writing could do, that he told no human being of his curious observations. He seems to have been living in such an atmosphere of petty spite that to admit the existence of a pleasure would have been to risk the loss of it. He found that as the dawn advanced, and the amount of diffused light increased, the crystal became to all appearance non-luminous. And for some time he was unable to see anything in it, except at night-time, in dark corners of the shop.

But the use of an old velvet cloth, which he used as a background for a collection of minerals, occurred to him, and by doubling this, and putting it over his head and hands, he was able to get a slight luminous movement within the crystal even in the day-time. He was very cautious lest he should be thus discovered by his wife, and he practised this occupation only in the afternoons, while she was asleep upstairs, and then circumspectly in a hollow under the counter. And one day, turning the crystal about in his hands, he saw something. It came and went like a flash, but it gave him the impression that the object had for a moment opened to him the view of a wide and spacious and strange country; and, turning it about, he did, just as the light faded, see the same vision again.

Now, it would be tedious and unnecessary to state all the phases of Mr. Cave's discovery from this point. Suffice that the effect was this: the crystal, being peered into at an angle of about 137 degrees from the direction of the illuminating ray, gave a clear and consistent picture of a wide and peculiar country-side. It was not dream-like at all: it produced a definite impression of reality, and the better the light the more real and solid it seemed. It was a moving picture: that is to say, certain objects moved in it, but slowly in an orderly manner like real things, and, according as the direction of the lighting and vision changed, the picture changed also. It must, indeed, have been like looking through

an oval glass at a view, and turning the glass about to get at different aspects.

Mr. Cave's statements, Mr. Wace assures me, were extremely circumstantial, and entirely free from any of that emotional quality that taints hallucinatory impressions. But it must be remembered that all the efforts of Mr. Wace to see with any similar clarity in the faint opalescence of the crystal were wholly unsuccessful, try as he would. The difference in intensity of the impressions received by the two men was very great, and it is quite conceivable that what was a view to Mr. Cave was a mere blurred nebulosity to Mr. Wace.

The view, as Mr. Cave described it, was invariably of an extensive plain, and he seemed always to be looking at it from a considerable height, as if from a tower or a mast. To the east and to the west the plain was bounded at a remote distance by vast reddish cliffs, which reminded him of those he had seen in some picture; but what the picture was Mr. Wace was unable to ascertain. These cliffs passed north and south—he could tell the points of the compass by the stars that were visible of a night—receding in an almost illimitable perspective and fading into the mists of the distance before they met. He was nearer the eastern set of cliffs, on the occasion of his first vision the sun was rising over them, and black against the sunlight and pale against their shadow appeared a multitude of soaring forms that Mr. Cave regarded as birds. A vast range of buildings spread below him; he seemed to be looking down upon them; and, as they approached the blurred and refracted edge of the picture, they became indistinct. There were also trees curious in shape, and in coloring, a deep mossy green and an exquisite grey, beside a wide and shining canal. And something great and brilliantly colored flew across the picture. But the first time Mr. Cave saw these pictures he saw only in flashes, his hands shook, his head moved, the vision came and went, and grew foggy and indistinct. And at first he had the greatest difficulty in finding the picture again once the direction of it was lost.

His next clear vision, which came about a week after the first, the interval having yielded nothing but tantalizing glimpses and some useful experience, showed him the view down the length of the valley. The view was different but he had a curious persuasion, which his subsequent observations abundantly confirmed, that he was regarding this strange world from exactly the same spot, although he was looking in a different direction. The long facade of the great building, whose roof he had looked down upon before, was now receding in perspective. He recognized the roof. In the front of the facade was a terrace of massive proportions and extraordinary length, and down the middle of the terrace, at certain intervals, stood huge but very graceful masts, bearing small shiny objects which reflected the setting sun. The import of these small objects did not occur to Mr. Cave until some time after, as he was describing the scene to Mr. Wace. The terrace overhung a thicket of the most luxuriant and graceful vegetation, and beyond this was a wide grassy lawn on which certain broad creatures, in form like beetles but enormously larger, reposed. Beyond this again was a richly decorated causeway of pinkish stone; and beyond that, and lined with dense *red* weeds, and passing up the valley exactly parallel with the distant cliffs, was a broad and mirror-like expanse of water. The air seemed full of squadrons of great birds, manoeuvring in stately curves; and across the river was a multitude of splendid buildings, richly coloured and glittering with metallic tracery and facets, among a forest of moss-like and lichenous trees. And suddenly something flapped repeatedly across the vision, like the fluttering of a jewelled fan or the beating of a wing, and a face, or rather the upper part of a face with very large eyes, came as it were close to his own and as if on the other side of the crystal. Mr. Cave was so startled and so impressed by the absolute reality of these eyes, that he drew his head back from the crystal to look behind it. He had become so absorbed in watching that he was quite surprised to find himself in the cool darkness of his little shop, with its familiar odor of methyl alcohol, mustiness, and decay. And, as he blinked about him, the glowing crystal faded, and went out.

Such were the first general impressions of Mr. Cave. The story is curiously direct and circumstantial. From the outset, when the valley first flashed momentarily on his senses, his imagination was strangely affected, and, as he began to appreciate the details of the scene he saw, his wonder rose to the point of a passion. He went about his business listless and distraught, thinking only of the time when he should be able to return to his watching. And then a few weeks after his first sight of the valley came the two customers, the stress and excitement of their offer, and the narrow escape of the crystal from sale, as I have already told.

Now, while the thing was Mr. Cave's secret, it remained a mere wonder, a thing to creep to covertly and peep at, as a child might peep upon a forbidden garden. But Mr. Wace has, for a young scientific investigator, a particularly lucid and consecutive habit of mind. Directly the crystal and its story came to him, and he had satisfied himself, by seeing the phosphorescence with his own eyes, that there really was a certain evidence for Mr. Cave's statements, he proceeded to develop the matter systematically. Mr. Cave was only too eager to come and feast his eyes on this wonderland he saw, and he came every night from half-past eight until half-past ten, and sometimes, in Mr. Wace's absence, during the day. On Sunday afternoons also, he came. From the outset Mr. Wace made copious notes, and it was due to his scientific method that the relation between the direction from which the initiating ray entered the crystal and the orientation of the picture were proved. And, by covering the crystal in a box perforated only with a small aperture to admit the exciting ray, and by substituting black holland for his buff blinds, he greatly improved the conditions of the observations; so that in a little while they were able to survey the valley in any direction they desired.

So, having cleared the way, we may give a brief account of this visionary world within the crystal. The things were in all cases seen by Mr. Cave, and his method of working was invariably to watch the crystal and report what he saw, while Mr. Wace (who as a science student had learned the trick of writing in the dark) wrote a brief note of his report. When the crystal faded, it was put into its box in the proper position and the electric light turned on. Mr. Wace asked questions, and sug-

gested observations to clear up difficult points. Nothing, indeed, could have been less visionary and more matter-of-fact.

The attention of Mr. Cave had been speedily directed to the bird-like creatures he had seen so abundantly present in each of his earlier visions. His first impression was soon corrected, and he considered for a time that they might represent a diurnal species of bat. Then he thought, grotesquely enough, that they might be cherubs. Their heads were round, and curiously human, and it was the eyes of one of them that had so startled him on his second observation. They had broad, silvery wings, not feathered, but glistening almost as brilliantly as a new-killed fish and with the same subtle play of color, and these wings were not built on the plan of bird-wing or bat, Mr. Wace learned, but supported by curved ribs radiating from the body. (A sort of butterfly wing with curved ribs seems best to express their appearance.) The body was small, but fitted with two bunches of prehensile organs, like long tentacles, immediately under the mouth. Incredible as it appeared to Mr. Wace, the persuasion at last became irresistible, that it was these creatures who owned the great quasi-human buildings and the magnificent garden that made the broad valley so splendid. And Mr. Cave perceived that the buildings, with other peculiarities, had no doors, but that the great circular windows, which opened freely, gave the creatures egress and entrance. They would alight upon their tentacles, fold their wings to a smallness almost rod-like, and hop into the interior. But among them was a multitude of smaller-winged creatures, like great dragon-flies and moths and flying beetles, and across the greensward brilliantly-colored gigantic ground-beetles crawled lazily to and fro. Moreover, on the causeways and terraces, large-headed creatures similar to the greater winged flies, but wingless, were visible, hopping busily upon their hand-like tangle of tentacles.

Allusion has already been made to the glittering objects upon masts that stood upon the terrace of the nearer building. It dawned upon Mr. Cave, after regarding one of these masts very fixedly on one particularly vivid day, that the glittering object there was a crystal exactly like that into which he peered. And a still more careful scrutiny convinced him that each mast in a vista of nearly twenty carried a similar object.

Occasionally one of the large flying creatures would flutter up to one, and, folding its wings and coiling a number of its tentacles about the mast, would regard the crystal fixedly for a space,—sometimes for as long as fifteen minutes. And a series of observations, made at the suggestion of Mr. Wace, convinced both watchers that, so far as this visionary world was concerned, the crystal into which they peered actually stood at the summit of the endmost mast on the terrace, and that on one occasion at least one of these inhabitants of this other world had looked into Mr. Cave's face while he was making these observations.

So much for the essential facts of this very singular story. Unless we dismiss it all as the ingenious fabrication of Mr. Wace, we have to believe one of two things; either that Mr. Cave's crystal was in two worlds at once, and that, while it was carried about in one, it remained stationary in the other, which seems altogether absurd; or else that it had some peculiar relation of sympathy with another and exactly similar crystal in this other world, so that what was seen in the interior of the one in this world was, under suitable conditions, visible to an observer in the corresponding crystal in the other world; and *vice versa*. At present, indeed, we do not know of any way in which two crystals could so come *en rapport*, but nowadays we know enough to understand that the thing is not altogether impossible. This view of the crystals as *en rapport* was the supposition that occurred to Mr. Wace, and to me at least it seems extremely plausible. . .

And where was this other world? On this, also, the alert intelligence of Mr. Wace speedily threw light. After sunset, the sky darkened rapidly—there was a very brief twilight interval indeed—and the stars shone out. They were recognizably the same as those we see, arranged in the same constellations. Mr. Cave recognized the Bear, the Pleiades, Aldebaran, and Sirius; so that the other world must be somewhere in the solar system, and, at the utmost only a few hundreds of millions of miles from our own. Following up this clue, Mr. Wace learned that the midnight sky was a darker blue even than our midwinter sky, and that the sun seemed a little smaller. *And there were two small moons!*—"like our moon but smaller, and quite differently marked"—one of which moved so rapidly that its motion was clearly visible as one regarded it. These moons were never high in the sky, but vanished as they rose; that is, every time they revolved they were eclipsed because they were so near their primary planet. And all this answers quite completely, although Mr. Cave did not know it, to what must be the condition of things on Mars.

Indeed, it seems an exceedingly plausible conclusion that peering into this crystal, Mr. Cave did actually see the planet Mars and its inhabitants. And, if that be the case, then the evening star that shone so brilliantly in the sky of that distant vision, was neither more nor less than our own familiar earth.

For a time the Martians—if they were Martians—do not seem to have known of Mr. Cave's inspection. Once or twice one would come to peer, and go away very shortly to some other mast, as though the vision was unsatisfactory. During this time Mr. Cave was able to watch the proceedings of these winged people without being disturbed by their attentions, and, although his report is necessarily vague and fragmentary, it is nevertheless very suggestive. Imagine the impression of humanity a Martian observer would get who, after a difficult process of preparation and with considerable fatigue to the eyes, was able to peer at London from the steeple of St. Martin's Church for stretches, at longest, of four minutes at a time. Mr. Cave was unable to ascertain if the winged Martians were the same as the Martians who hopped about the causeways and terraces, and if the latter could put on wings at will. He several times saw certain clumsy bipeds, dimly suggestive of apes, white and partially translucent, feeding among certain of the lichenous trees, and once some of these fled before one of the hopping, round-headed Martians. The latter caught one in its tentacles, and then the picture faded suddenly and left Mr. Cave most tantalizingly

in the dark. On another occasion a vast thing, that Mr. Cave thought at first was some gigantic insect, appeared advancing along the causeway beside the canal with extraordinary rapidity. As this drew nearer Mr. Cave perceived that it was a mechanism of shining metals and of extraordinary complexity. And when he looked again, it had disappeared.

After a time Mr. Wace aspired to attract the attention of the Martians, and the next time that the strange eyes of one of them appeared close to the crystal Mr. Cave cried out and sprang away, and they immediately turned on the light and began to gesticulate in a manner suggestive of signalling. But when at last Mr. Cave examined the crystal again the Martian had departed.

These observations had progressed thus far in early November, and then Mr. Cave, feeling that the suspicions of his family about the crystal were allayed, began to take it to and fro with him in order that, as occasion arose in the daytime or night, he might comfort himself with what was fast becoming the most real thing in his existence.

In December Mr. Wace's work in connection with a forthcoming examination became heavy, the sittings were reluctantly suspended for a week, and for ten or eleven days—he is not quite sure which—he saw nothing of Cave. He then grew anxious to resume these investigations, and, the stress of his seasonal labors being abated, he went down to Seven Dials. At the corner he noticed a shutter before a bird fancier's window, and then another at a cobbler's. Mr. Cave's shop was closed.

He rapped and the door was opened by the stepson in black. He at once called Mrs. Cave, who was, Mr. Wace could not but observe, in cheap but ample widow's weeds of the most imposing pattern. Without any very great surprise Mr. Wace learned that Cave was dead and already buried. She was in tears, and her voice was a little thick. She had just returned from Highgate. Her mind seemed occupied with her own prospects and the honorable details of the obsequies, but Mr. Wace was at last able to learn the particulars of Mr. Cave's death. He had been found dead in his shop in the early morning, the day after his last visit to Mr. Wace, and the crystal had been clasped in his stone-cold hands. His face was smiling, said Mrs. Cave, and the velvet cloth from the minerals lay on the floor at his feet. He must have been dead five or six hours when he was found.

This came as a great shock to Wace, and he began to reproach himself bitterly for having neglected the plain symptoms of the old man's ill-health. But his chief thought was of the crystal. He approached that topic in a gingerly manner, because he knew Mrs. Cave's peculiarities. He was dumbfounded to learn that it was sold.

Mrs. Cave's first impulse, directly Cave's body had been taken upstairs, had been to write to the mad clergyman who had offered five pounds for the crystal, informing him of its recovery; but after a violent hunt in which her daughter joined her, they were convinced of the loss of his address. As they were without the means required to mourn and bury Cave in the elaborate style the dignity of an old Seven Dials inhabitant demands, they had appealed to a friendly fellow-tradesman in Great Portland Street. He had very kindly taken over a portion of the stock at a valuation. The valuation was his own and the crystal egg was included in one of the lots. Mr. Wace, after a few suitable consolatory observations, a little off-handedly proffered perhaps, hurried at once to Great Portland Street. But there he learned that the crystal egg had already been sold to a tall, dark man in grey. And there the material facts in this curious, and to me at least very suggestive, story come abruptly to and end. For a time Mr. Wace remained in the shop, trying the dealer's patience with hopeless questions, venting his own exasperation. And at last, realizing abruptly that the whole thing had passed out of his hands, had vanished like a vision of the night, he returned to his own rooms, a little astonished to find the notes he had made still tangible and visible upon his untidy table.

His annoyance and disappointment were naturally very great. He made a second call (equally ineffectual) upon the Great Portland Street dealer, and he resorted to advertisements in such periodicals as were likely to come into the hands of a bric-a-brac collector. He also wrote letters to *The Daily Chronicle* and *Nature*, but both these periodicals, suspecting a hoax, asked him to reconsider his action before they printed, and he was advised that such a strange story, unfortunately so bare of supporting evidence, might imperil his reputation as an investigator. Moreover, the calls of his proper work were urgent. So that after a month or so, save for an occasional reminder to certain dealers, he had reluctantly to abandon the quest for the crystal egg, and from that day to this it remains undiscovered. Occasionally, however, he tells me, and I can quite believe him, he has bursts of zeal, in which he abandons his more urgent occupation and resumes the search.

Whether or not it will remain lost for ever, with the material and origin of it, are things equally speculative at the present time. If the present purchaser is a collector, one would have expected the enquiries of Mr. Wace to have reached him through the dealers. He has been able to discover Mr. Cave's clergyman and "Oriental"—no other than the Rev. James Parker and the young Prince of Bosso-Kuni in Java. I am obliged to them for certain particulars. The object of the Prince was simply curiosity—and extravagance. He was so eager to buy, because Cave was so oddly reluctant to sell. It is just possible that the buyer in the second instance was simply a casual purchaser and not a collector at all, and the crystal egg, for all I know, may at the present moment be within a mile of me, decorating a drawing room or serving as a paper-weight—its remarkable functions all unknown. Indeed, it is partly with the idea of such a possibility that I have thrown this narrative into a form that will give it a chance of being read by the ordinary consumer of fiction.

My own ideas in the matter are practically identical with those of Mr. Wace. I believe the crystal on the mast in Mars and the crystal egg of Mr. Cave's to be in some physical, but at present quite inexplicable, way *en rapport*, and we both believed further that the terrestrial crystal must have been—possibly at some remote date—sent hither from that planet, in order to give the Martians a near view of our affairs. Possibly the fellows to the crystals in the other masts are also on our globe. No theory of hallucination suffices for the facts.

A Trip to the Center of the Earth

By JULES VERNE

(Continued)

"Doubtless—I am very uneasy on the point. We have certainly not enough water to last us five days."

"Be quite easy on that matter," continued my uncle. "I answer for it we shall find plenty of water—in fact, far more than we shall want."

"But when?"

"When we once get through this crust of lava. How can you expect springs to force their way through these solid stone walls?"

"But what is there to prove that this concrete mass of lava does not extend to the center of the earth? I don't think we have as yet done much in a vertical way."

"What puts that into your head, my boy?" asked my uncle, mildly.

"Well, it appears to me that if we had descended very far below the level of the sea—we should find it rather hotter than we have."

"According to your system," said my uncle; "but what does the thermometer say?"

"Scarcely 15 degrees by Reaumur, which is only an increase of 9 degrees since our departure."

"Well, and what conclusion does that bring you to?" inquired the Professor.

"The deduction I draw from this is very simple. According to the most exact observations, the augmentation of the temperature of the interior of the earth is 1 degree for every hundred feet. But certain local causes may considerably modify this figure. The difference evidently depends on the conductibility of certain rocks. In the neighborhood of an extinct volcano, it has been remarked that the elevation of temperature was only 1 degree in every 125 feet. Let us, then, go upon this calculation—which is most favorable—and calculate."

"Calculate away, my boy."

"Nothing easier," said I, pulling out my note-book and pencil. "Nine times one hundred and twenty-five feet, make a depth of eleven hundrd and twenty-five feet."

"Archimedes could not have spoken more geometrically."

"Well?"

"Well, according to my observations, we are at least ten thousand feet below the level of the sea."

"Can it be possible?"

"Either my calculation is correct, or there is no truth in figures."

The calculations of the Professor were perfectly correct. We were already six thousand feet deeper down in the bowels of the earth than anyone had ever been before. The lowest known depth to which man had hitherto penetrated was in the mines of Kitz-Bahl, on the Tyrol, and those of Wuttemburg in Bohemia.

The temperature, which should have been eighty-one, was in this place only fifteen. This was a matter for serious consideration.

(To be continued in our June issue)

To Our Readers

SOME of our readers seem to have obtained the erroneous idea that AMAZING STORIES publishes only reprints, that is, stories that have appeared in print before. This is not the case. We have a great number of new manuscripts on hand at the present time, and are buying quite a good many more.

Today, more than at any other time, is the day of Scientifiction. Authors, great and small, are taking more and more to this type of fiction, and we are getting an excellent supply of stories right along. Our only problem at the present time is to find room enough to publish all the good ones.

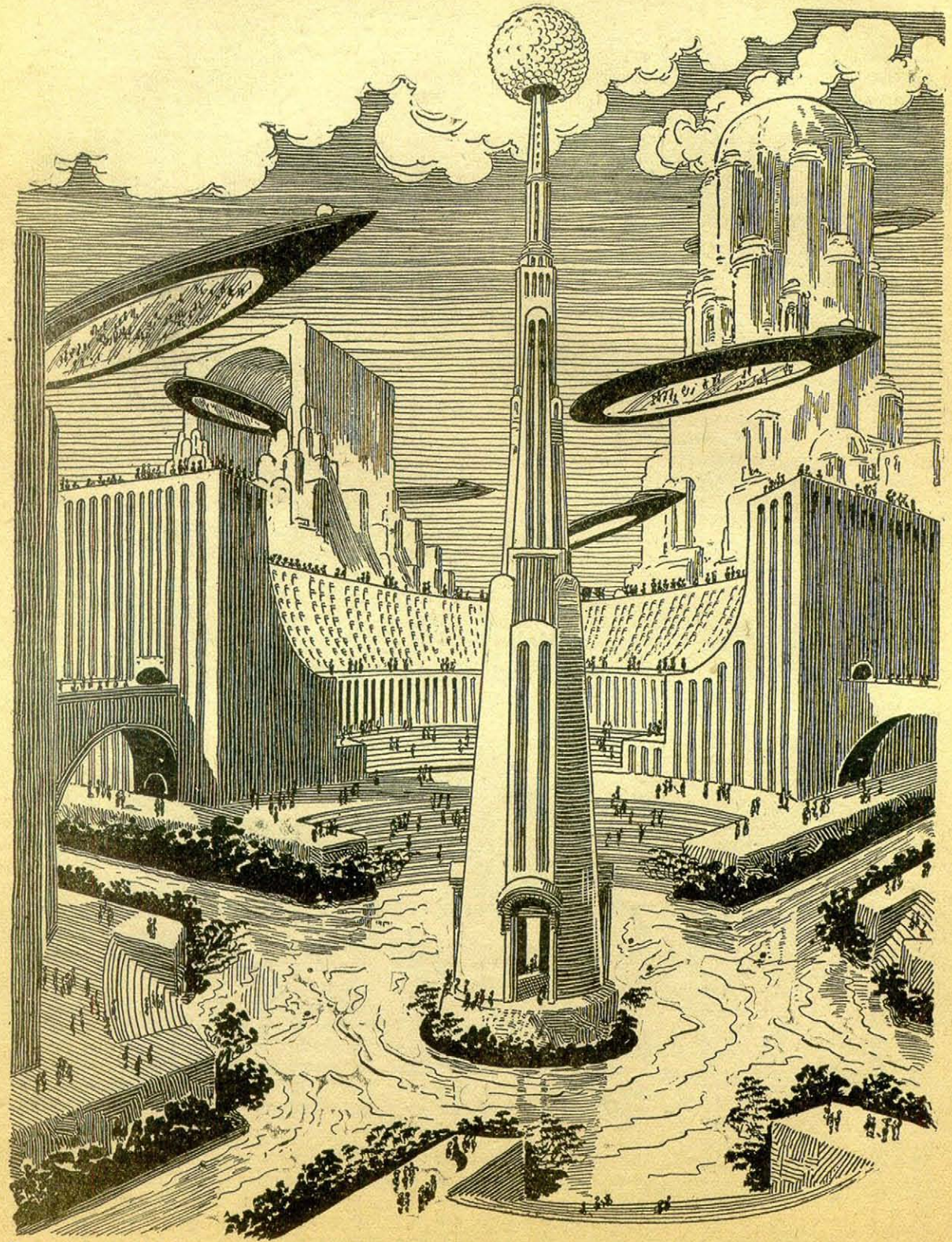
If you or your friends know how to write a scientifiction story, the editors will be only too glad to look them over. At the present time, only rather short stories are required, as we are well stocked up for some time to come with serials and long stories.

If, on the other hand, you have heard of a good scientifiction story that may have appeared in print at some time or other, and which you think should be published in AMAZING STORIES, we shall be grateful to hear from you. We have an index of most scientific stories that have ever been published, but of course we can not know all of them. If you know of a good one, or have one in your possession, we will be more than glad to have you send it in, or put us in touch with the persons or parties who have such stories.

—EDITOR.

The INFINITE VISION

By Charles C. Winn



They were looking down upon great buildings a thousand feet in height, above which swarms of enormous airships darted gracefully through the air. And the decks were covered with tiny figures!

I TELL you, gentlemen, this is a pretty pass of affairs. Here all the other branches of science are open to practically an unlimited development, while Astronomy is nearly strapped because of one thing—that we have apparently reached the limit of development of the telescope, as evidenced by these plates here. Something must be done. Can't any of you suggest anything?" and the speaker paused and glared around the table.

It was a meeting of the *International Astronomical Society,* gathered to discuss the results of the trial of the giant forty foot mercury reflector telescope which had recently been completed in the great Holton Observatory, situated high up among the South American Andes.

Evidently the results had been none too satisfactory, as evidenced by the grave and thoughtful expressions of the company. Holton, the chairman, with his none too good ordinary humor, was fast working up to a literal tirade of rage.

"Possibly zee mercury reflector might be satisfactorily eemproved," mildly suggested Flambeau, the noted Frenchman, in response to Holton's heated demand.

That individual gave a snort of disgust, and his wiry red hair fairly bristled, as he spat out his withering reply.

"What, that d—— thing! Why that thing is perfected as far as it lies within the power of mortal man to do it. But look at this plate—magnified enough, but as far as detail goes——! Looks like a striped pancake to me. Vibrationless action, H——! You can't entirely eliminate vibration in any machine. And look what microscopic ripples did in this case. Yes, I'd like to see you do anything with that crazy thing. And if you are fools enough to try it, after spending a million dollars with these results, why I absolutely refuse to have anything to do with it. I quit."

An uneasy silence followed this outburst. Not a man was present but who realized that, in spite of his eccentricities, Henry F. Holton was the greatest astronomical authority of the day. Consequently, no one had the temerity to oppose his views.

All through this stormy session, a tall dark man of about thirty-five sat patiently listening to the discourse. Glenn Faxworthy was, in all probability, the greatest scientific genius present at the meeeting that day. Not only was he proficient in Astronomy, but to an even greater degree in Physics and Chemistry. He had disclosed some remarkable things in his day, this quiet forceful man. Curiously enough, however, he had chosen to keep them to himself, biding the day when their revelation might be doubly effective.

Finally when the tenseness of the silence was becoming acute, he arose and addressed the meeting.

"Gentlemen," he said, "put a million dollars available at my hands and I will build you a telescope which will reveal the molecules of the rocks of the moon."

AT THE opposite extremes of the investigations of scientists are the studies of the electron and nucleus and quantum which have crowned such scientists as Milligan and Bohr and Rutherford with reputations which will never die. But on the other end of things we are surrounded by the Stellar Universe where miles are too small to be taken into account, and where the light-year, which is an inconceivable number of miles for the ordinary mind, is the unit of distance, and into this great Stellar Universe the observers of the "International Astronomical Society" are striving to penetrate with their gigantic telescope mounted on the great observatory on the summit of the Andes Mountains. What did they see? What secrets were revealed to them? We have no more to say. Read the story.

THE PREPARATION

A COLD moon was rising over the snow-capped summits of the Andes Range. Upon one of the highest peaks stood the gigantic Holton Observatory, situated in the most favorable location of the world for making observations.

On the steps of the huge concrete building two men stood in earnest conversation. One of them was short and red-haired, with bright blue eyes that snapped belligerently behind thick horn-rimmed spectacles. His companion, tall and dark, had about him an indefinable atmosphere of quiet force and dignity.

For ten years these men had been engaged in intensive labor, the one preparing the huge structure for the reception of the delicate apparatus which his companion was laboring to perfect in a great laboratory far off in the States.

Six months ago he had arrived with it. From that time, with the assistance of a small crew of men, they had worked almost night and day installing it. Only that day had they made the final adjustments which rendered it capable of the mighty function it was to perform.

For some moments the two stood, silently regarding the great looming bulk which contained all their hopes. Then the tall dark man, raising his eyes, glanced at a great red star, which shone threateningly, unblinkingly in the zenith. He spoke shortly to his companion, and together the two entered the structure.

Two hours later they emerged, their faces transfigured with the light of great revelation. What they saw that night only ten others have seen, from that day until this.

* * *

Twenty-four hours later the same men entered the building again. This time, however, they were accompanied by ten others, the greatest scientists of three continents. Harlton, the English physicist, was there; Coron, the American chemist; Flambeau, the Frenchman, together with the heads of the four greatest observatories of the world, and others.

In the center of the room to which they were conducted, stood the massive mercury reflector, the subject of the torrid discussion of ten years before. But now it was strangely altered. No longer was it set immovably upon giant pivots, pointing unalterably, to a single spot in the heavens. Now it was fitted into a ponderous equatorial mounting as delicately balanced as a precious chronometer. And its shining surface no longer needed rapid rotation to maintain its perfect parabolical form. The liquid

metal was now set as rigid as steel. The master hand of the physicist had given it eternal solidity.

The party gazed in silence and wonder for a moment at the collossal creation of the human mind, and then turned and followed their guides up a long flight of stairs to a large room under the center of the huge dome.

It was a marvelous room, filled with an intricate complication of ingenious apparatus. Upon one side was banked series after series of vacuum tubes, mounted upon long panels of shining bakelite. Another wall was completely hidden by a huge switchboard, studded with a seemingly endless array of switches, control knobs, rheostats and levers.

In the center of the floor was mounted a shining silver screen about six feet square. Looking down upon it, the men could see the reflection of a strange piece of apparatus pointing directly down upon it, from the ceiling above.

For some moments the party stood gazing in mute wonderment at their surroundings. Then Faxworthy, as you may have guessed the identity of the tall dark man, spoke to them in his quiet level voice.

THE TELESCOPE

"GENTLEMEN," he said, "here before you lies the results of ten years of intensive labor by Mr. Holton and myself—the product of the million dollars with which you so kindly provided me. Whether you have received an ample return on your investment, only you can judge to-night. However, I do not expect you to be disappointed."

Then walking over to the board, he threw one of the switches. Instantly the low hum of an electric motor was heard from below.

"The power comes from a good-sized hydro-electric plant down on the other side of the mountain," he explained. "It was Holton's idea. And," he added, smiling gently, "Holton was an invaluable factor in the construction of the mounting for the reflector and other requisite auxiliary apparatus. If we are successful tonight, he shares all honors."

Then, turning to the board again, he moved a lever which brought the aperture of the huge dome around to the east. Another switch, and upon the very apex of the dome, mounted upon a small steel tower, a weird piece of apparatus, much resembling a huge X-ray tube sprang into life, unseen to the watchers below. Then, guided by the master hand, it swung upward until it pointed full upon the rising moon.

Faxworthy spoke again. "Gentlemen, I now have the reflector in the room below trained upon the moon. Watch the screen closely."

He threw another switch. A low hum came from above, which speedily grew in pitch to a piercing whine, which soon became inaudible to the listeners below.

He turned a control knob, and two of the vacuum tubes lighted up. Simultaneously a strange beam of luminescence shot downward from the apparatus above.

Gazing down upon the screen the men saw an object that riveted their immediate attention. There, as though floating upon the silvery depths, was a beautifully detailed image of the moon.

Rapturously the group looked upon it. Then Faxworthy, with a dexterous twist of his wrist, snapped two more of the tubes into the circuit. The first image faded away, and was replaced by one, filling the entire screen. Then, as bulb after bulb flashed in, the screen showed only portions of the golden surface, and the image grew more and more detailed. Now only one great mountain was visible to the watchers; now only a portion of that mountain; now only a half dozen rocks upon its surface, and finally the surface of one rock.

Then the scientist, with an admonition to his companions, threw in a switch which brought the last bank of tubes simultaneously into light.

The former vision faded away, and in its place appeared a whirling mass of transparent spheres, visible only by the opalescent light reflected from their surfaces.

MOON'S MOLECULES

"GENTLEMEN," said Faxworthy, his usually quiet voice trembling slightly with emotion, "here you see the quartz molecules of one of the rocks on the surface of our satellite. I can only hope that the sight will repay you for the money, which you so kindly provided."

A subdued murmur of approbation was the only reply he received from the enchanted group of scientists, as they rapturously watched the flitting shapes before them.

For some moments they stood, struck with the wonder of it. Then Faxworthy abruptly pulled open the switches, and the image faded from the screen.

"Perhaps you would like a brief explanation of the apparatus, before we engage in the final test of the evening," he suggested, at the same time glancing at his watch.

There was a general nodding of heads in assent and he began. "As you probably know, I have been engaged in research work in Physics and Chemistry, from the age of twenty. During that time I have made some discoveries on these subjects, certain of which have proven very useful in this present undertaking. Up to this time I have revealed their nature to no one except Holton, who has been completely in my confidence. If you will excuse me, gentlemen, I will soon be back with you." And he disappeared up a ladder, leading to a room higher up in the center of the dome.

In a moment he returned, holding something tightly clasped in his hand. Opening it, he disclosed a small flat tube, filled with a reddish viscid liquid, in the extremities of which were sealed several fine platinum wires.

"This tube, gentlemen," explained the scientist, "is the very heart of the apparatus you see about you. Without it, all would be entirely useless. It contains a quantity of a previously unknown element, which I call Lucium. It took me and my laboratory assistants twenty years to isolate the amount of Lucium you see in the tube.

"The essential fact is that this element has the same properties as selenium, only in a million times more sensitive a degree. In absolute darkness it is an absolute non-conductor of electricity, but let the tiniest ray of light strike it—though that ray came across the universe—the substance immediately becomes proportionately conductive. Within the light-proof room above, the light from the mercury reflector comes to a focus upon this tube. I shall not

attempt to explain the process by which the electrical impressions are generated, amplified, translated again into light, and finally projected to the screen below. It is far too intricate, and would require hours to explain satisfactorily. Due to the lack of time, neither shall I relate the circumstances of the discovery of this element further than to tell you that I was curious as to the cause of a bright violet line, which occasionally flashed into the spectrum of a rare ore that I was analyzing."

OBSERVING MARS

THEN drawing his watch from his pocket, he continued impressively: "In twenty-five minutes, the planet Mars will have reached its closest possible approach to the Earth. Then we shall learn her secret. If you will pardon me a moment, I will return the lucium to its proper place."

He was soon back, and even as he returned, the sound of distant thunder became plainly audible in the clear mountain air.

"One of the summer thunder storms common among these mountains is coming up," he explained simply. "I will adjust the reflector now, lest it give us trouble when it arrives."

"But, Monsieur, it will spoil the observation! Even when it recedes, zee air currents will be atrocious!" cried Flambeau in the first words he had spoken that night.

Faxworthy made no verbal reply, but motioned them out upon a small balcony on the east wall of the structure. He pointed his finger to the moon, which was being slowly obscured. Following his motion, the others gazed in the same direction. What they saw was a ghostly cylinder of faint luminescence issuing from the small tower on the roof, and reaching outward into space as far as the eye could see!

"The dispelling ray," briefly explained their guide. "The ether waves of the fortieth octave which have the property of expelling all matter from their path. The range of this ray in the atmosphere is about six hundred miles, and as long as the telescope aligns in its path, it effectually eliminates all interference from atmospheric or meteorologic conditions."

The wondering silence that followed was broken only by a stifled "Mon Dieu!" from Flambeau. That one man could have produced so many wonders seemed almost incredible to the group of distinguished scientists.

The silence was not broken, even as their guide led them back to the control room. Swiftly he brought the colossal telescope to the zenith, where the great red star still steadily gleamed. Synchronically the unearthly band of light on the dome swung upward until it came to rest in the same direction.

Again the first two vacuum tubes flashed into light; again that strange beam of luminescence shot down from the ceiling, and there came into being upon the screen the image of a great red star, magnified to the diameter of a baseball. Two more of the tubes, and the image doubled in size. Now a complicated network of delicate lines could be discerned upon its dull crimson surface.

Two at a time, the vacuum tubes were switched into the circuit, and ever the image increased in size and detail. Soon it covered the entire screen. Now only sections of the surface were visible, and slowly the sections grew less in extent, as they grew plainer and plainer in detail. Now the view was from the apparent distance of a million miles, now a thousand, now five hundred.

And slowly the delicate lines had grown in breadth, until only two of them, now broad ochre bands two feet wide, intersected in the middle of the screen, in the form of a large circular spot. The center of this spot was thickly strewn with small black dots, which glistened sharply as they reflected the sun's rays.

MARS AT 10,000 FEET

THEN without warning, Faxworthy snapped on all but two of the remaining tubes in the bank. Instantly the image on the screen faded into obscurity, and in its place appeared a wondrous scene. There, as though from a ten thousand foot bird's-eye view, stretched a great city.

They were looking down upon great buildings a thousand feet in height, above which swarms of enormous airships darted gracefully through the air. And the decks were covered with tiny figures!

The last two bulbs flashed into life, and the view came to the apparent distance of fifty feet. *The tiny figures were men.* Perfect men of wonderful physique, with finely chiseled faces. They were clad in a raiment resembling that in which Caesar's legion were dressed centuries ago. There were women also, all of glorious form and feature, robed in exquisitely colored gowns, which gleamed in the sunlight with a myriad opalescent tints.

The last two tubes again faded into darkness, and the view receded to the original ten-thousand foot scene.

With an almost imperceptible movement of his hand upon a lever, he brought the landscape flashings across the screen in a glorious panorama.

And while they viewed the surface of the dying planet from pole to pole, the storm that had been rising came up and settled over the top of the mountain. Lightnings flashed, and thunder shook the observatory, but so engrossed were they in the wondrous scene before them, and so protected from interruption by the silent, ghastly ray without, that they were completely oblivious to the disturbance.

Now a vast, red, sandy desert was sweeping across the screen, now a waterway, now another city (always situated at the intersection of two canals), and so from the distance of thirty-three millions of miles, they viewed the surface of the planet from ice clad north to ice clad south. Suddenly the lofty summit of a great mountain capped with an enormous black blotch swept across their vision.

With skillful hand, Faxworthy brought the image back to the center of the screen. The black blotch was a huge building completely covering the top of the mountain, and towering five hundred feet into the air—an almost exact replica of the building in which they stood. *And from its top an enormous ray of unearthly luminescence shot sharply out into space!* Again the last two bulbs flashed into light, and they looked down into the polished bowl of an enormous concave mirror two hundred feet in diameter.

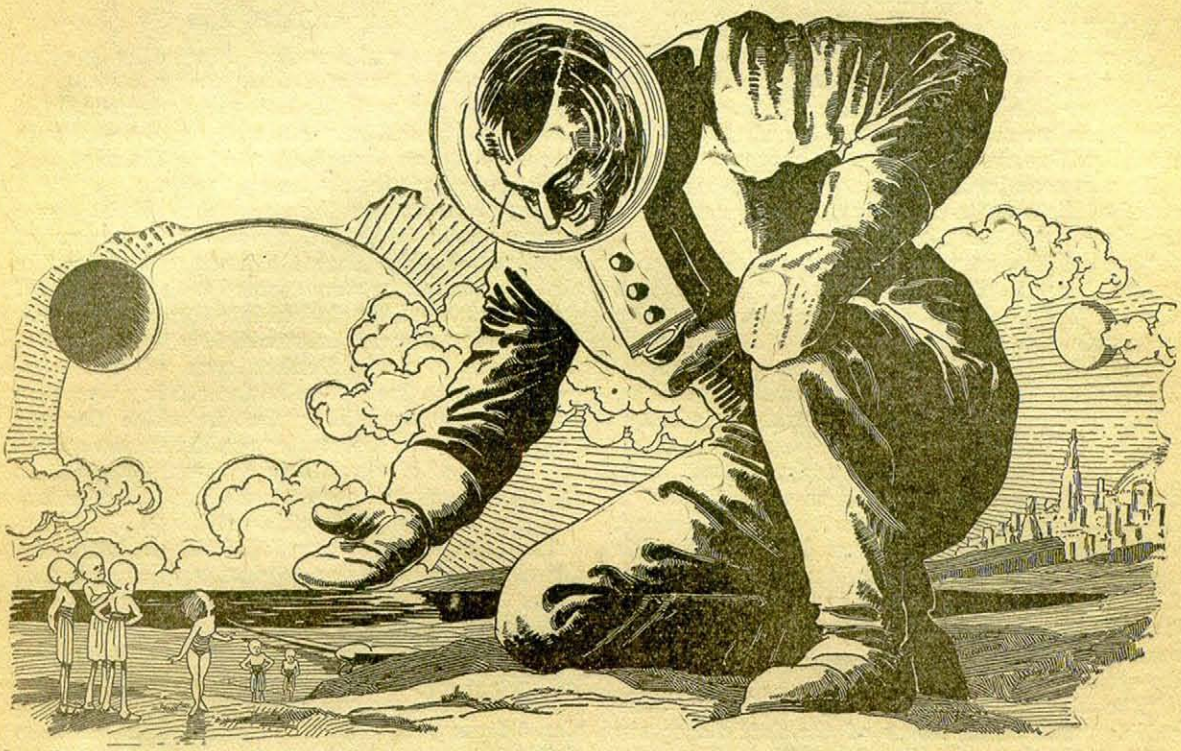
"You see," said the scientists significantly, "unseen eyes are ever watching us from space, and they have been doing so for countless ages."

(*Continued on page* 147)

The MAN from the ATOM

By G. Peyton Wertenbaker

(Sequel)



I was half inclined to stop my growth for a few minutes, but instead I knelt down far enough away from her for safety, and I smiled, waving my arm like some huge, clumsy, ridiculous giant.

What Went Before

PROFESSOR MARTYN was an inventor of genius, and Kirby—one of the very few friends he had—was always a willing test object for many of his inventions. Somewhat even to his own surprise, Professor Martyn invents a machine whereby anyone can at will, either increase or diminish in size, and Kirby agrees—with foreboding in his heart—to test the machine. It is put into operation by merely pressing the middle button on this little machine, which is attached with straps, over his chest. He is fitted with an elastic suit, specially made for the purpose of keeping out intense cold or heat and retaining an even degree of temperature. He begins to increase in size and soon is so large that he just naturally slips away from the Earth and goes off into ultra-planetary space. After the first rush of excitement, Kirby becomes alarmed about it all and decides to come back to Earth. He presses the right button and immediately begins to diminish in size. But he has traveled so fast and is so far away that he becomes panic-stricken and decides to press the "stop" button. The velocity of his motion is so great that he travels for hundreds of miles more before he can stop. Then he suddenly finds himself coming up out of water—floating. He swims ashore, but he is so exhausted, he falls right off to sleep. When he awakes, he gets into a state of utter despair, for instead of being on the Earth, he finds himself on some unknown planet. He rages and fumes around for some time and finally decides to decrease to a size small enough to enable him to go back to earth and forthwith sets out to find the same nebula through which he originally left the Earth. He cannot find it and does not reach the Earth, but lands instead on a strange planet, with strange inhabitants, so far advanced in intellect that he feels like a savage among them. He does not understand their language and cannot understand their customs. He is there alone in utter desolation and despair, ever pining for those he left behind, whom he can never hope to see again.

PART TWO: THE RETURN

I NEVER hoped—never dreamed, when I wrote the tale you have read, that I should ever see the earth again. Who in the universe could have hoped against all the knowledge of insuperable fate which had come to me? Who could hope to overcome Time and Space, to recapture that which was gone forever? Yet it is just this that I have done—or something very like it. And it is a story a thousand times more fantastic, more impossible, than the story of my journey. And like that it is true.

When I last wrote, I was living in a state of awful quiescence upon a planet of the star Delni—I do not know yet what it would be called here, or whether it is even existent now for us. Perhaps I exaggerated a little my position, but that was before I had met Vinda. Vinda—shall I ever see her again? I leave to-morrow—but will she be there?

I saw little enough of that world, and what little I did see I shall not attempt to describe here, for it will all go into the report I am drawing up, with Martyn's aid, for a scientific magazine. But when I pressed the bottom button again, and the stars began to grow large, the planets to become visible as they circled in their paths, I had no desire except to sleep. With a reckless abandon that gave no thought for the consequences, I came close to one of the planets and waited for it to grow larger. How can I describe the mad humor of my situation, lying there in space with a world, a living world, revolving a few inches from my chest? I could look down over it as you would down over a model or a globe of the world. I felt a wild desire to put my finger into its great seas, and I could imagine to myself the consternation they would feel—if there were inhabitants—when the awful tempest and the tidal waves came to them. It was just such a desire as we feel sometimes in church, to shout a heresy or to throw something at the priest, not because we are heretics or because we dislike the priest, but for some inexplicable reason—an impulse. Fortunately, I did not surrender to that impulse. But I laughed a great hysterical laugh, and it must have been like the laughter of a god reverberating through the universe, dying thinly away in unimaginable reaches of the distance.

IN this instalment we find the hero a prisoner on the unknown planet, the inhabitants of which are very much advanced and far superior to the people of the Earth—in intellect and science. His life among these people is not a happy one. Through the interception of a beautiful young girl, some of the best scientists there evolve a method whereby our hero can return to earth. They figure on the basis of Einstein's theory of the curvature of time—if one goes on far enough, he will eventually return to where he started from—or in other words "the world having lived and died will live again and die again." It takes millions of years to complete a cycle, but because of the many times increased speed with which our hero travels, because of his enormous size, they are able to figure his return to a time very nearly corresponding the year in which he left the Earth. Read this imaginative sequel and see how he succeeds, and how he likes the Earth after he comes back.

All this time the planet was growing bigger. It was not long before I was able, with the most fascinating acrobatic antics, to propel myself far enough away to place my feet almost upon it. Still it grew—or should I drop this playing with appearances, and say that I shrank? In any case, its heavily veiled face with clouds became vaster and more vast, until it must have been about my own height in diameter. Then I let my feet push through the clouds until they were resting lightly upon the surface. A few minutes later I began to feel for the first time since my departure that my own size was returning to me, the size that God intended I should have. It was then that I turned Martyn's "gravity" switch, rather undecided what would happen, and caring very little, I suppose. Nothing did happen.

The clouds came closer and closer toward my face, mounting up over my body and growing each moment more billowy and more illimitable. In a little while they had enveloped my face, and a few minutes later they were above me.

It is now, I know, the moment when a writer of romances would introduce some great horrible bird that fought him in the air, or two armies of rival air-men who fought about him. Unfortunately or fortunately, as you will, nothing of that sort happened to me; and, if it had, I think I should have been too sleepy to be interested. Instead, I looked down upon long, rolling plains of golden grain. There were no forests, or even trees, that I could see. The ocean came to within a few inches of my feet, and far away across it, I caught a bright tiny glitter that might have been a city. There seemed to be no mountains, only a few low hills. The sunlight very seldom penetrated through the clouds in all its opulent splendor, but the world was no less bright for that, since its sun was very huge. There seemed to be a clear, diffused, bluish sort of light over the face of the planet.

I need not detail all my thoughts and emotions as I grew smaller, coming closer and closer to the ground. They were confused, meaningless feelings, and I have no memory of them except as a mood half way between a dull sorrow for the loss of my true earth and a dull wonder at the exotic beauty of this earth I had come upon. In a little while, however, I had shut off the machine and was decreasing more gently in size. Once I turned it on again for a moment, finding that I had miscalculated, but I quickly turned it off. During what seemed to me hours, I shrank little by little with increasing slowness, until I stood only a little taller than the grain of the long fields. There was nothing about me by which I could gauge my desired height, so I decided to let myself remain as I was until I had slept. Without any thought for possible differences in the atmospheres of this world and that of my own to which I had become accustomed, I feverishly pulled off my globular helmet and my suit. I was greeted with a great breath of cool air from the sea, and I stood for many minutes bathing in its fresh purity. Then, with a sigh, I sank down into the soft grain, and, watching the tall stalks rippling above me in the wind, I fell asleep.

When I awoke, it was dark. There were no stars to be seen and no moon, but there was a faint radiance, a phosphorescence, upon the grain in

which I lay. I did not rise for a long while, for I was thinking hopelessly of the futility of my life with my world gone, of the new life I should have to build up here, learning everything all over again as though I were a baby. After a while, knowing the madness such thoughts as these might lead me to, I tried to dismiss them, and I stood up. I was amazed at first to discover the grain about a foot above my head now, for it had been at least two feet below my head when I had gone to sleep. Surely it had not grown a yard during the night? I soon realized, however, that it was I who had grown a little smaller, as the machine continued to move with increasing slowness. I now removed the tiny instrument, which I had kept on after taking off the suit, lest it should come to harm.

I was puzzled to know how I might reach civilization, if there was civilization. But, remembering the sea, I set off in the direction I thought it lay, carrying the suit and the machine, both extraordinarily light. I walked for a large part of the night. I did not realize just how far the ocean might be, since I remembered it as no more than a few inches from my huge foot. I was fairly certain after walking many miles that I must have taken the wrong direction. But no. A little while before the dawn I heard the faint sound of its breakers, and I soon was able to see it from the top of a hill.

When I reached the beach, I once more perceived the light of the city, assuming that it was a city, across the water. Of course, I could not see the flashing structures themselves, but an intense golden radiance spread itself over the sky, as though it might really have been the moon rising.

I walked along the beach until dawn, and then I went on for a large part of the morning, trying to reach a point upon the shore that would be directly opposite the City. I should imagine it was a few hours before noon when the flying machines appeared. They came out of the east, from the direction of the City, flying very low. They flew together, several hundred of them I should imagine, until they reached a point on the shore probably ten miles below me. Then they seemed to disperse, some into the country, a few at intervals along the beach. It was not long before one of them came shooting up toward me at a speed enormous beyond my imagination. I began to wave my arms wildly, and apparently I was seen, for the plane immediately decreased its speed.

A few minutes later, after passing perhaps a mile beyond me, the plane turned and glided along the beach until it stopped a hundred yards or so away. It was a small machine of a most curious and delicate design, but it did not differ very radically from those I had seen on the earth.

A man leaped out and came toward me. He, too, was very like myself, but about a foot taller, and with an extremely high forehead. His features were delicate, his build very slight but quite graceful. He was unclothed, except for a belt of metal and several metal ornaments upon his arms and legs. He carried a small, straight instrument of metal in his hand, apparently a weapon, which was turned upon me. I raised my arms, and cried "Wait!" or something equally absurd, which, naturally, he could not understand. He did not trouble to reply, realizing, I suppose, that our languages were different. Instead, he motioned me to approach, and, backing away from me, he allowed me to come up to the plane. I was signalled to enter it. There was no cock-pit, no enclosure. It consisted only of a platform, some five feet wide and ten feet long, with a rail of thin metal about it. A small metal chair of severe design was affixed to the forward end, behind the controls.

I mounted the platform and sat down, at his command, in one corner. Still holding the tiny instrument toward my chest, he then secured one of my wrists and one ankle to a couple of metal cuffs, evidently for that purpose, upon the rail. He flung the suit, after a contemptuous examination, into the corner beside him. I grinned at him several times during these operations, in order to show that my intentions were of the best. But he only stared at me with an expressionless face and turned away to the controls. If any shadow of expression was in his eyes, I fancied it was disgust.

A moment later he rose swiftly from the beach and turned toward the City, leaving me to my own despondent reveries as we flew over the water with amazing swiftness. He must have given some signal to the other planes by wireless, for a short while later I saw them all falling in behind, far back. It was then that I suspected, for the first time, that they might all have been searching for me. I had forgotten how conspicuous my giant body would have looked to them, even from a distance, if anyone chanced to observe it.

At the risk of omitting details which the reader would find very interesting, I am going to say nothing of the City as yet. I saw too little of it to draw any accurate conclusions, and I have very little more than a vague impression of tall buildings, flashing in the sunlight, mile after mile, extending far out over the horizon; buildings of immense height, standing each many hundreds of yards apart, with parks between. It was all roofed over and kept apparently at a uniform heat, while I suspect that in some way the clouds above were artificially dispelled to permit the huge sun to be seen. We entered through great gates in the glass dome, and joined a throng of other planes, mostly very small ones, and in a few minutes we had landed on the roof of a building near the limits of the City.

A number of the tall men then gathered about us. They were all clean shaven and they were practically without hair. They had an air of age and wisdom, although their faces, like that of the flyer, were smooth, delicate, and impassive. I was released, still under the scrutiny of the little weapon, and conveyed down, through elevators and moving passages, to a cell of white metal containing a low bed, some small chairs, a table, and other mere necessities. Food was put before me, and then I was left alone. I never left that cell thereafter until the moment of my final departure from the planet.

The days I spent in there were a long and monotonous succession of lonely hours and tedious examinations. On the day that I arrived, after I had eaten my meal, two of the men to whose care I was committed came with a guard to inspect me. They said nothing during the whole time they were there. I was motioned to explain myself. Half incredulously, I began to talk, and they nodded as though they understood—I cannot say how; I never

learned in what fashion they interpreted my speech. I told of my journey and of its consequences. I told about my world. At intervals they nodded, I suppose to assure me that they were listening. After awhile I was given writing materials. I wrote an appeal to them to explain their world to me, so that I might take up the frayed ends of my life upon it. But always they only nodded at me, and at last they departed, taking with them the words I had written. A little while later, several guards were sent to my cell. They handled me as though I were an animal, washing me with a peculiar sort of water, cutting my hair, shaving my beard. When I was apparently clean enough for their sensibilities, I was left alone again.

This went on for days and days. Sometimes the same two men who had first interviewed me came again. Sometimes there were other visitors. Every day I was forced to submit to the attendance of the guards, like any caged beast. I was never spoken to. All day long, when I was alone, I would wander restlessly about, thinking over and over again the old, terrible thoughts of what I had seen and lost and would not know. I should have gone mad, I think, had they not acceded finally to my request for writing materials—the only sign they ever gave me that I was understood. I might have given way to some murderous fit of rage against them, had those guards not always been there, with their tiny, threatening weapons.

But I was at least a little consoled with the writing materials. Thereafter I was able to spend hours and hours setting down the details of my adventure, recording all my thoughts and desires. I have given here only a small portion of all that I wrote. I think it must have been this relief in writing that kept me sane. I had never before realized so fully the vast wonder of the alphabet, of this thing we call writing. By pouring out all my heart into words, by expressing the things that hung so oppressively over my heart, I was able to make them a little lighter, and, perhaps, a little heroic, a little flattering and epic.

But this, thank God, did not go on forever. For one day Vinda came. She said afterward that it had been only curiosity which led her to my cell. Everybody in the City, everybody in that world, seems to have been wildly curious to see the strange creature from the distant star. But Vinda was the daughter of the King of the planet, whose family, so far as I could gather, retained its supremacy only so long as it retained its great intellectual power. Vinda's father, the King, was a physicist.

Vinda came in state, with a guard of six men and an escort of six scientists. I will not say that I loved her at first sight. I was, indeed, amazed by her great beauty and the mobility of her features, so fine a contrast with the impassivity of the men. She was not very tall either, just about my own height, and the most graceful woman I have ever known. She smiled at me with a somewhat aloof interest, and then—then she spoke! The first sounds of human speech I had heard on the planet. And she spoke English! Only a few broken words, it is true. But I found afterward that she had learned them, just for the amusement of it, from the reports of the scientists who examined me. She said:

"You—are—Kirby?" Her accent—how could I reproduce the sweetness of that clear accent, so exotic, so perfectly in keeping with the delicacy of her own appearance? For a long time I could say nothing, just stare at her open-mouthed, amazed, delighted. Then I managed to stutter some foolish reply:

"Kirby? Yes. . . . yes, I am Kirby. Yes. . ." And she smiled again, and I smiled, unaware of the scornful gleam in the eyes of the men. She smiled even more brightly when she saw my own grin. Indeed, I fancy she was about to laugh, laugh at me, but perhaps my very simplicity made her calm again. For—do you see?—I did not learn for a long time that only women laughed and played, and amused themselves with artistic pursuits on that planet. They did, indeed, scorn me, those men, when they saw me laughing, as we would scorn a man who talked with a piping voice and giggled and stepped mincingly about. But I like to think that there was something in me more appealing to Vinda than the impassive manhood of those scientists. Perhaps, after all, it is only that I was unique. But she did like me—I am certain of it now.

We said very little that time. She was reserved, formal, I was too confused to speak coherently. After a while she retired, and it seemed to me that my cell was ten thousand times as bare and cold and hard as it had been before.

The next time she came alone, except for a single guard. She had appealed to her father, the King, telling him how harmless I was and how different from the men of that planet, and that I should not be judged by their standards. She had persuaded him, so she came alone, with writing materials and a small machine which recorded sound and vision, and which took the place of books. She had decided to learn my language, knowing that hers was incomprehensible to me, since it depended on a sense which is dormant or inexistent in us, something related, perhaps, to the vague thing we call mental telepathy.

Oh, but I spent endless days of wonder and enchantment there with Vinda! Never once was I permitted to leave my cell, but I was content now, for it seemed that she brought all the beauty of the universe in with her, the sunshine, the gold and the green of the fields, the blue of the sea—everything. God knows how I ever failed to realize why those days were so beautiful, but I did not. Not until I was gone, and it was too late.

It was not long before we could converse together, for she had what seemed to me a marvellous mind, although, apparently, the minds of women were not very highly esteemed in that world. She told me, quite simply, that women had never evolved there beyond a certain state of civilization, while men had gone on thousands of years ahead. Women, it seemed, were kept for the sort of intellectual labour which corresponds to the manual labour of the savage women. The men were creators and teachers. They discovered, invented, reproduced, perfected endless marvellous things. Women, on the other hand, understood them only in the detailed way of those who tend them, watch over them, care for them.

But I had to confess to her that my own intellect probably was not so advanced as hers. And it is this, it seems, that made our companionship so de-

lightful. Women to those scientists were merely a biological fact. Except in rare cases, there was no companionship. With us it was different, for mentally we were nearly equal, and that seemed to revive in her an instinct long dead on that planet—the instinct that I now dare to say was love. Not biology, but love.

So we were daily together for a long time. Each moment of our conversation was wonderful to us both, for it revealed to each of us the exotic life of a planet unknown to us. I remember very little of what she told me about that planet—it seems that I can remember nothing but Vinda herself, her low voice with its delicious accent, her eyes, her hair—everything that a lover always remembers.

But I had not forgotten my longing for the earth. At first I was able to lose myself in the wonderful things she told me of her planet. But later, when I talked of my own world, I became homesick and hopeless. She seemed to grow more thoughtful as I spoke, but at the time I did not think it was more than an endeavour to form mental pictures of the things I related. One day, however, when we had talked for a long time of the earth, a silence followed which lasted for many minutes. At last she said:

"If you were able, you would return to your earth?" I raised my arms despairingly.

"God, yes!" I cried, "but the desire is all I have. No man can conquer time." She was very thoughtful for a moment.

"It has been done," she replied after a while.

"But Vinda, one cannot re-capture what is gone and past!"

"No," she agreed, "but one can do almost that. I do not know—but my uncle has a secret—"

"A secret! What, Vinda! Tell me what!"

"I must tell you first of a theory. . . ." She pondered while I waited breathlessly, even forgetting her beauty as I watched her face for some sign of the thing she was about to tell me.

"You have spoken," she said, "of a man called Einstein on your earth, and of other men who believe that time is a fourth dimension and that it is curved. Some of them, you say, believe that space is so curved that, if one goes sufficiently far, he will return to the point from which he started. Years ago we made discoveries on this planet about the curvature of time. And our evidence has taught us that time goes in circles, in cycles. They say that, if one were to live forever, he would find eventually the whole of history repeating itself."

"You mean—?"

"That a time comes when your world or this world, after having lived and died, will live again and again die."

"With the same history, the same civilizations?"

"Yes. For they teach us that there is a destiny in the life of all things, that the growth of the universe follows definite courses in which every fact, every incident, is inseparably woven into a texture which embraces the whole, and that every action of man or nature (and man is part of nature) is inevitable because it grows out of natural forces. The secret of all this we women have never learned: it is the study of the scientists. But the whole history of the universe is rigidly fore-ordained, and so, when time returns to its starting point, the course of history remains the same. That is the best I can do for an explanation."

"Vinda! You mean that some day there will be an earth like mine again?"

"Yes, Kirby." She always called me Kirby.

"And the same people! Martyn, and the rest?"

"That is what they say." I leaped up, and began to walk wildly about. To return! To see Martyn again, and the rest! And then a thought came to me. I grinned bitterly.

"But that will be millions of years away," I said, "and I shall be dead." She looked at me for a long while, and then she answered:

"No, Kirby. You passed millions of years in a few instants during your great journey. Do you not see that you can grow large again and that the millions of years will flash by as swiftly?"

"By Jove—yes!" I shouted.

"But you would be leaving us very soon?" she said.

"If that is true!" I cried. "Why, I would leave tomorrow!"

She turned away, and in a moment answered, "Not to-morrow, perhaps, but in a few weeks." And, suddenly, she went away.

I did not sleep that night with the wonder of this truly unbelievable thing. All night, all the next morning, I paced excitedly about my room, waiting for her return. When she did arrive, I begged her for more details.

"What can I tell you," she said, "who know so little myself? I have spoken with my uncle. He could not tell me much that I understood. There is some great secret underlying it, some great explanation, which is always just a few steps beyond my grasp. I seem to see for an instant what it is—then suddenly it is gone. He said, for instance, that over and above the cycles of time, is a great general progression which makes the civilizations of the universe always just a little further advanced in each successive cycle before they decline again. He described that as a sort of fifth dimension in time, comparable he said, to the path of the sun which carries the planets always just a little farther in space, although each year they return to their starting point in reference to the sun. It is immensely confusing."

"In other words, if I returned to the earth, I should find it a little further advanced than when I left it?"

"Somewhat like that. Except that, if you returned to your year 1937, you would find yourself in an era comparable to the year 1967, let us say, on the earth of the cycle you had left. In order to find your friend, Martyn, it would be necessary to go back to an earlier year which we cannot know, which you would, therefore, have to estimate yourself."

"But," I said, "there are things it is difficult to understand. Is it true, for instance, that there will be another incarnation of my body which will leave the earth at the same time I am returning?"

"It would seem so. And that incarnation would return in the cycle following your return."

"How complicated it all is!"

"That is only because we are not able to understand it as the scientists do. They speak, for instance, of the dimension of *size*. It seems that there is a direction, which we cannot quite grasp men-

tally any more than we can grasp time as a direction, which extends from the small to the great. That is to say, when you grow you are really moving in a new dimension which is linked, how I do not comprehend, with the dimension of time. The difference between this universe and the universe of which it is a part, an atom, is a difference in space through another dimension—similar to the difference in miles or light-years between our sun and another sun of our universe."

"But really, that is too obscure for me."

"For me, too," she acknowledged. "But our scientists understand." We were silent for a long while, she dreaming some private dream of her own, I pondering these vast conceptions that were beyond my grasp. I broke the silence first:

"In all theories of time as a dimension, this point has always raised itself in my mind. If I were to return during some crisis in history and foretell the mistake that would be made, could that mistake be rectified, changing the whole course of history?"

"That," she answered, "would come under the head of the progress which civilization makes from cycle to cycle, I think. You must remember that all these things are inevitable. If it were your destiny to return at some earlier point in your world's history, it would be the result of natural laws, and any changes you might effect in history would also be inevitable." Again we were silent.

At last I roused myself from my reveries.

"All this," I said, "seems very dim and unreal to me yet. I suppose that is natural. But we must begin to act. Could your scientists help me in the problem of finding the point in history where my world will be again as I left it?" She looked at me very steadily for a moment.

"You are sure you wish to go?" she said. I smiled.

"I cannot imagine wishing not to," I said. . . . Oh, fool that I was! If I had only known how much I should some day wish to return to her. . . .

"Then," she answered, averting her eyes, "I think I can help you. You kept records of the time you spent in your journey?"

"As well as I could," I replied.

"Can you draw a diagram of the stars as they looked from your earth when you left?"

"I am sure of it," I assured her.

"Then I think it can be done."

And, for the rest of that day I sat with her, drawing my maps of the sky from memory, setting down extracts from my tale of the journey. When she left, she had all the information which she thought would be required.

Again I shall pass over the next few weeks with a few words. During that time she came each day with news of the progress of her efforts. Once or twice she required new information of me. She had persuaded her uncle to make the calculations for me in his moments of relaxation (what an awful thought that conjured in my mind of the intellectual *labour* of these men!) Apparently the man, by figuring the length of time I had been away and the position of my sun in space, could identify it among the amazing records he possessed of all the stars in our universe, past, present, or future—things inconceivable to me. Having identified my world, he could then figure just the size I should have to become and the time I should have to spend in my various sizes, before I could return again to the world in its next cycle, unimaginable millions of eons in the future.

When the day came on which all these calculations were finished, Vinda brought me my suit, which had been preserved, and the machine. She brought also a chronometer which, she said, would record, upon its numerous dials, the passage of time in the universe I was leaving, regardless of the various sizes I might assume. It had been connected by those marvellous men in some fashion to the machine itself, so that the growth of the machine acted upon the chronometer in such fashion that it would record a corresponding swiftness in the passage of time. One dial recorded years. When the needle reached a certain swiftness of revolution on the dial, it ceased, and the next highest dial, in thousands of years, continued the record alone, having followed the dial of the years so long as it revolved. In turn this dial ceased to record, while the millions of years were registered, and so on—the whole process being reversed as my size decreased, each dial taking upon the record at the correct point.

The precise point when I must stop was recorded on the various dials, and the precise point when I must stop my growth and shrink again was indicated on the highest dial. It was impossible that I could fail, if I followed my directions explicitly.

When all was ready, an escort of two guards was given me, and Vinda came with me, very impassive, very silent. We went from my cell up through the building to the roof, and entered the plane which awaited us. This time I would not be chained to the rail, but I would stand beside it with Vinda.

We passed out through the City precisely as we had come in, reached the sea, and headed across it toward the isolated spot where I had first appeared. Vinda and I stood alone in the stern of the platform, looking out over the retreating water and the City.

"Do you not think," she said, "that you will be disappointed when you return? Will you not find it very ironic to take up a hum-drum life after all these exotic adventures?"

"No doubt I shall," I answered, for, now that I was on my way back, I could admit many things "but there will be the compensations of friendship and other things. And, anyhow, it is my destiny." She sighed.

"Yes. . . it is your destiny. Is there, perhaps, someone whom you love and who calls you back to her?" I laughed lightly.

"By no means!" I said. "I am immune. I have never fallen in love." For one lies, many times, without knowing it.

"You are very unfortunate," she said, "or perhaps very fortunate; it is hard to say."

"Are you, then, in love?" I asked her. She looked out over the sea, her face turned away.

"Yes," she replied simply.

"Then I wish you the greatest success," I said formally. And—do you know?—I was suddenly a little piqued, without at all knowing why. It may be that men are more intellectual than women, but it is certain that they are sometimes more terrible fools.

So we went rushing on through the air, cool, fragrant, quiet. How can I ever have wished to

leave that world? Perhaps, if I had spent all those weeks in the open air and with Vinda, perhaps—but there is no perhaps. I can only know facts. And it is a fact that I left her, and that I loved her—love her yet.

We came to the fields upon which I had landed. There I put on my suit with feverish haste, as though afraid lest it melt away under my hands. I adjusted the machine and the chronometer upon it with Vinda's aid, and then, isolated in a profound silence within my glass globe, I stood waiting for the hour at which I must begin my journey. It seemed to me that endless hours passed while I stood there in keen impatience, with the two curious guards watching me. At the last quarter-hour, Vinda suddenly turned and went behind the machine, where I could not see her. But I was too busily watching the face of my wrist-watch to see her in any case.

At last the moment came. I smiled a Homeric smile, and waved my hand at the two guards as I pressed the top button, while they gave me one last stolid glance and hurried to the machine. I began, with the usual dizziness, to grow, with closed eyes as the tingling electric flash shot through my veins. When, a moment later, these sensations had passed away, and I opened my eyes, I had already grown to thirty feet or so. As I looked down, I saw Vinda struggling between the two guards who evidently held her back from a dangerous proximity to my swiftly enlarging feet. I wondered what she wanted, and I felt a sudden regret that I had not been able to tell her good-bye. I was half inclined to stop my growth for a few minutes, but, instead, I knelt down far enough away from her for safety, and I smiled, waving my arm like some huge, clumsy, ridiculous giant. She stiffened and ceased her struggles. For a moment she stared at me with an expression nearer anger, I thought, than anything else. Then, suddenly, she turned and walked swiftly to the machine, followed by her guards, while I climbed unsteadily back upon my feet again—already nearly eighty feet high. A moment later the plane rose from the ground and darted away toward the sea. For a long time I followed its flight, until I had pushed up through the clouds, and lost it.

It certainly is not necessary to detail my return, for, in every respect, it was like the first journey. For a long, impatient, monotonous time, I grew larger and larger. Fortunately, it was not necessary to go beyond the limits of the nuclei, as by now I was determined to call them. There, at a certain time, I pressed the middle button and stopped, then I pushed the bottom button, and the last stage of my return was under way.

I came back to the earth without accident. It was the twenty-third day of May, in the year 1847, that I arrived. As Vinda had foretold, that year was quite correspondent with the year 1943 of the cycle during which I had left. I came down, unfortunately enough, in the Sahara desert, but not far from a settlement. I need not describe the difficulties I encountered in securing my passage back to New York. I arrived, of course, without a cent, and without even a stitch of clothing besides the suit, which I discarded at the earliest opportunity in favor of a wretched tatter of rags which left me almost as naked as I would have been without it. Had it not been for the generosity of a certain Consul, who fed and clothed me and bought me my passage, I should no doubt be wandering around the Sahara yet, carrying on my back a machine with which one can overcome time and size and space!

On the day that I arrived in New York, I went at once to Martyn's laboratory. I was amazed to find it deserted. I was absolutely at a loss, for his name was not in the telephone directory. In desperation, I called at the office of a newspaper. You will all recall what happened to Martyn, of course, but to me it was a most horrible and disgusting mistake—imprisoned for manslaughter. They had accused him of murdering me. The poor man had realized, when I failed to return, the hideous mistake he made in forgetting that size would affect the relative length of time. He had explained this, explained the whole story, and it caused a terrible sensation. It seems that laws were enacted all over the country for the "restraint" of scientists, who were said to constitute "the greatest menace to our country since the civil war."

Needless to say, my re-appearance has created a far more terrible sensation. This time, however, it is hoped that it will take the form of a re-action in favour of the scientists. My dramatic clearing of Martyn's name from any suggestion of blame has fired the imagination—such as it is—of the people.

Of course I must remember, difficult as it is sometimes, that the Kirby who left the world of this cycle is not the Kirby who has returned. I have to think of another person, my double in appearance, life, and name, who is now wandering about the universe, watching with amazement the strange formations of the stars, crashing about that huge beach far up there in the illimitable void, or seeing with a sudden rush of despair all the terribly distinct details of his fate. Yes, I can sympathize with that brother of mine.

The world has changed in many details since I knew it in the last cycle. For instance, the America I knew was a Republic still, whereas now, you know that it is the Monarchy which was declared by Theodore Roosevelt during the Great War of 1812, and which is now ruled by the Emporer Theodore II. In spite of this and many other things, however, the world is not materially different from the world I left. Those who are interested in the changes will do well to read the book which I am preparing, in collaboration with Martyn, who at last has come into his own, on the journey which I have recounted only generally here.

To-morrow morning I leave this earth, perhaps for the last time. You, who have read this attentively, must realize by now the love which, all unsuspectingly, I felt for Vinda. After a few months here, I soon realized the terrible mistake I had made—for I am sure that she loved me as well. During the last few years my longing for her has grown more unbearably great with every hour, and I cannot remain here any longer.

To-morrow, Martyn will accompany me for the last time to that laboratory in the country which was the beginning of all my fantastic adventures. He will say good-bye again, a final good-bye this time, and he will adjust about me the suit, the globe, and the machines. I will press the top button—the top button! And then—only a few hours until I see Vinda again.

Martyn has made the calculations. I shall appear to her no more than a few hours after the departure of that person who is following all my adventures. It will, of course, be in the next cycle of time, and there will be changes. But surely my Vinda will be there, and I shall be able to take her in my arms and tell her of all the love I have for her. I cannot believe that it will be another woman. No—just as this Martyn is the same Martyn I left, so will that Vinda be my Vinda. Surely it is the soul that counts, and the soul is the same.

There is one thing that sometimes worried my leaping mind. There is this other Kirby—this double of mine, this other *me*. Perhaps he will have more perception than I have had (for does not each cycle bring a finer civilization, and is not the man the basis of civilization?). Perhaps he will have the intelligence to remain with Vinda, and I shall meet him there—meet myself! How impossibly it savours of Poe and *William Wilson!* For if we meet, and we both love Vinda, there will be only one way to settle it—we must fight, fight to the death perhaps, for this love is very great. And, if we are the same man, will the death of one mean the death of the other too? It does not matter. At least I shall be able to say at least once to Vinda that I love her. . . .

(THE END.)

The Infinite Vision

By CHARLES C. WINN

(Concluded)

Then the storm outside broke into its full fury. Lightning played in rapid streams, and thunder echoed and re-echoed with mighty din.

Suddenly a bolt of blinding light reached down from the sky to the tower upon the dome. The partially fused metal gave to the weight, and the great ray slowly fell in a wide arc to the earth. There was a series of frightful reports, as it tore the mountain asunder with its mighty force.

In the room below the image no longer showed sharp and clear upon the screen, but was entirely obscured by a mass of whirling grayish green. Then as the awful crashes rent the air, Faxworthy gave a terrible cry. "THE RAY!" he shrieked and leaped toward the far end of the switchboard! But it was too late!

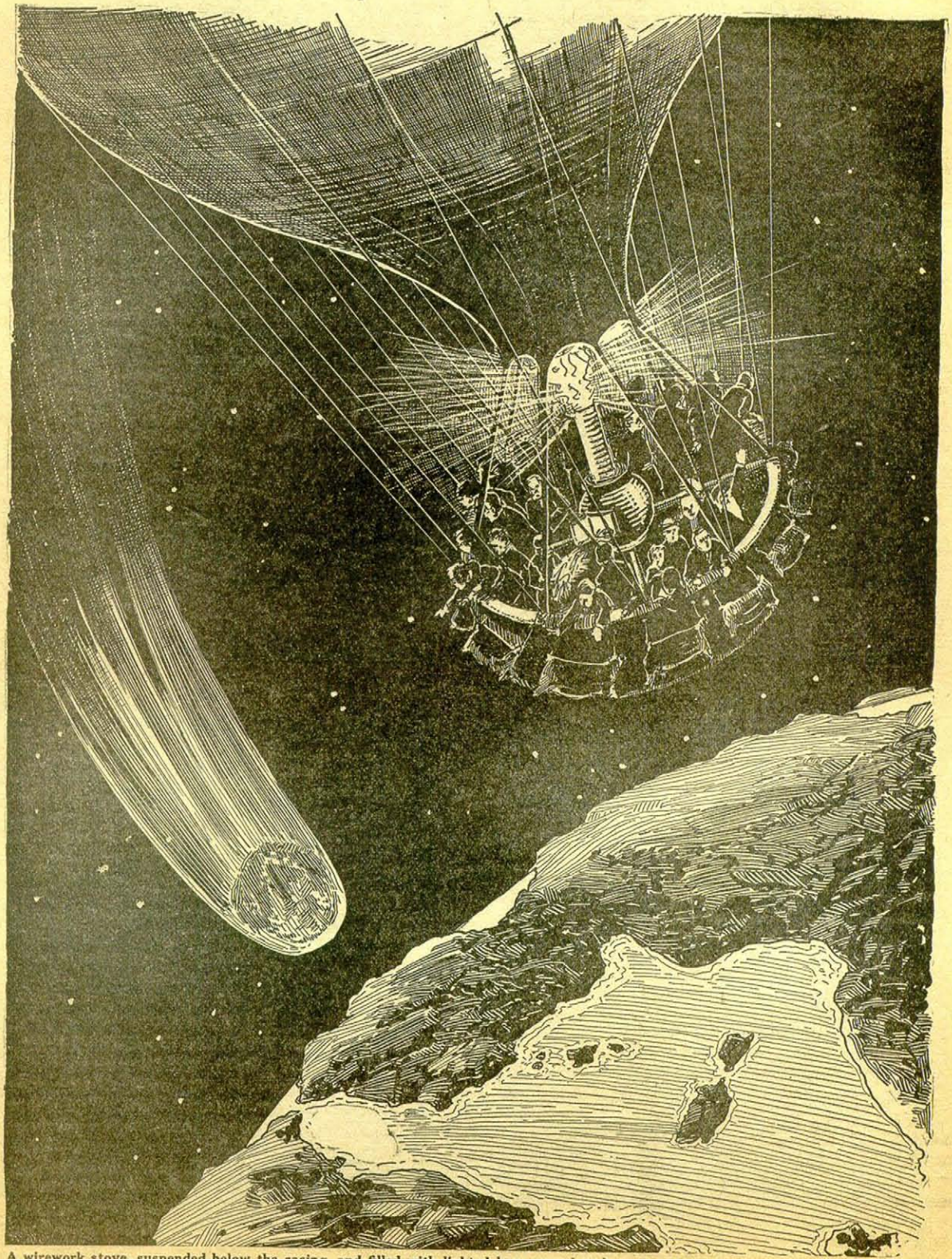
With a sudden lurch, the thing on the roof had fallen completely to the perpendicular. There was a second frightful din as it rent asunder all within its path, ripping out the very vitals of the delicate apparatus that gave it life! Then it grew dark.

And above in wild cadence the thunder drums of Nature rolled out a pean of victory, over the shattered fragments of the rash mortals who fain would know her innermost secrets.

THE END

OFF ON A COMET

By Jules Verne



A wirework stove, suspended below the casing, and filled with lighted hay, served to keep the air in the interior of the balloon at a proper temperature.

What Has Gone Before

THE story opens in Africa—in Algeria—near the capital. An officer in the French army—Captain Servadac—and a Russian nobleman—Count Timascheff—are preparing to fight a duel about a lady. Servadac occupies part of the time before the encounter in an attempt to write a poem to the lady. Just when he was getting to an end of his attempt, a sudden convulsion occurred and a great change in the universe was noted. The sun rose in the West, the day was one-half its former duration, gravity was reduced so that they could jump to a height of 30 or 40 feet with hardly any effort. There was a change in the contour of the country and an atmosphere of utter mystery prevailed. The line of the shore was changed. Everything was altered. The hero, Servadac, is alone in his explorations with his servant, Ben Zoof. An unknown satellite is seen in the sky. The heat is extreme.

The Russian nobleman owned a yacht, the "Dobryna." And now Captain Servadac and his servant see this on the distant ocean. She reaches the shore and finds a safe harbor. Her owner leaves her and meets Captain Servadac. The duel under these strange circumstances is forgotten. The "Dobryna" is put to work to explore the surroundings and to try to find France. A light is seen and on a little island is discovered the tomb of Louis IX. On taking soundings, a strange mineral is always brought up by the grease-cup on the bottom of the lead. Nothing else can be found as forming the ocean bed. Some English officers are found on an isolated spot, which was supposed to be all that was left of the Rock of Gibraltar. Presently a sealed tube is found floating on the water—an old leather telescope case—with a message from some student of astronomy. Now apprehensions rise that the temperature, which has been very high, may fall to that of inter-stellar space. Later, in the midst of these fears, some more inhabitants are found—one a charming little girl. Then another message from the supposed astronomer is found floating on the ocean—this time in a meat-can. The next arrival is a trading Jew in his "Tartan"—as this Mediterranean craft is called. As the weather gets colder and colder, they betake themselves to a cave in the side of a volcano, where the temperature is kept warm by a lava flow. Next, a carrier pigeon brings them a third message from the astronomer. The ocean now is frozen over. They put metal sleigh-runners under the boat and go off with almost ice-boat speed and find an island on which there is a monument—a surveyor's pylon—and there they also find a man, apparently dead, but who proves to have some vestage of life in him still. Thirty-six hours later, the ice-boat brings them all back to their volcano-home.

Off On a Comet

Or Hector Servadac

By JULES VERNE

Book II

CHAPTER I

THE ASTRONOMER

BY THE return of the expedition, conveying its contribution from Formentera, the known population of Gallia was raised to a total of thirty-six.

On learning the details of his friends' discoveries, Count Timascheff did not hesitate in believing that the exhausted individual who was lying before him was the author alike of the two unsigned documents picked up at sea, and of the third statement so recently brought to hand by the carrier-pigeon. Manifestly, he had arrived at some knowledge of Gallia's movements: he had estimated her distance from the sun; he had calculated the diminution of her tangential speed; but there was nothing to show that he had arrived at the conclusions which were of the most paramount interest to them all. Had he ascertained the true character of her orbit? had he established any data from which it would be possible to reckon what time must elapse before she would again approach the earth?

IN the first book, Jules Verne told us what happened to one specific part of the Earth, and gave hypothetical reasons for these astounding conclusions and their natural consequences. But into this book, the author brings the astronomer—a scientific genius in his particular field. It is he who explains scientifically (though temperamentally, to be sure) just what happened, how it happened and why it happened. By exact calculation, he predicts with correctness, the very minute in which their return to Earth could be effected. Though this story is the product of a fantastic imagination, it is not without the realms of possibility that similar calculations may sometime be made for actual, practical purposes.

The only intelligible words which the astronomer had uttered had been, "My comet!"

To what could the exclamation refer? Was it to be conjectured that a fragment of the earth had been chipped off by the collision of a comet? and if so, was it implied that the name of the comet itself was Gallia, and were they mistaken in supposing that such was the name given by the *savant* to the little world that had been so suddenly launched into space? Again and again they discussed these questions; but no satisfactory answer could be found. The only man who was able to throw any light upon the subject was lying amongst them in an unconscious and half-dying condition.

Apart from motives of humanity, motives of self-interest made it a matter of the deepest concern to restore animation to that senseless form. Ben Zoof, after making the encouraging remark that *savants* have as many lives as a cat, proceeded, with Negrete's assistance, to give the body such a vigorous rubbing as would have threatened serious injury to any ordinary mortal, whilst they administered cordials and restoratives from

the *Dobryna's* medical stores powerful enough, one might think, to rouse the very dead.

Meanwhile the captain was racking his brain in his exertions to recall what were the circumstances of his previous acquaintance with the Frenchman upon whose features he was gazing; he only grew more and more convinced that he had once been familiar with them. Perhaps it was not altogether surprising that he had almost forgotten him; he had never seen him since the days of his youth, that time of life which, with a certain show of justice, has been termed the age of ingratitude; for, in point of fact, the astronomer was none other than Professor Palmyrin Rosette, Servadac's old science-master at the Lycée Charlemagne.

After completing his year of elementary studies, Hector Servadac had entered the school at Saint Cyr, and from that time he and his former tutor had never met, so that naturally they would well-nigh pass from each other's recollection. One thing, on the other hand, might conduce to a mutual and permanent impression on their memories; during the year at the Lycée, young Servadac, never of a very studious turn of mind, had contrived, as the ringleader of a set of like caliber as himself, to lead the poor professor a life of perpetual torment. On the discovery of each delinquency he would fume and rage in a manner that was a source of unbounded delight to his audience.

Two years after Servadac left the Lycée, Professor Rosette had thrown up all educational employment in order that he might devote himself entirely to the study of astronomy. He endeavored to obtain a post at the Observatory, but his ungenial character was so well known in scientific circles that he failed in his application; however, having some small private means, he determined on his own account to carry on his researches without any official salary. He had really considerable genius for the science that he had adopted; besides discovering three of the latest of the telescopic planets, he had worked out the elements of the three hundred and twenty-fifth comet in the catalogue; but his chief delight was to criticize the publications of other astronomers, and he was never better pleased than when he detected a flaw in their reckonings.

When Ben Zoof and Negrete had extricated their patient from the envelope of furs in which he had been wrapped by Servadac and the lieutenant, they found themselves face to face with a shriveled little man, about five feet two inches high, with a round bald head smooth and shiny as an ostrich's egg, no beard—unless the unshorn growth of a week could be so described—and a long hooked nose that supported a pair of spectacles such as to many near-sighted people seems to have become a part of their individuality. His nervous system was remarkably developed, and his body might not inaptly be compared to one of the Rhumkorff coils of which the wire, hundreds of yards in length, is permeated throughout by electric current. But whatever he was, his life, if possible, must be preserved. When he had been partially divested of his clothing, his heart was found to be still beating, though faintly. Asserting that while there was life there was hope, Ben Zoof recommenced his friction with more vigor than ever.

When the rubbing had been continued without a moment's intermission for the best part of half an hour, the astronomer heaved a faint sigh, which ere long was followed by another and another. He half opened his eyes, closed them again, then opened them completely, but without exhibiting any consciousness whatever of his situation. A few words seemed to escape his lips, but they were quite unintelligible. Presently he raised his right hand to his forehead as though instinctively feeling for something that was missing; then, all of a sudden, his features became contracted, his face flushed with apparent irritation, and he exclaimed fretfully, "My spectacles!—where are my spectacles?"

In order to facilitate his operations, Ben Zoof had removed the spectacles in spite of the tenacity with which they seemed to adhere to the temples of his patient; but he now rapidly brought them back and readjusted them as best he could to what seemed to be their natural position on the aquiline nose. The professor heaved a long sigh of relief, and once more closed his eyes.

Before long the astronomer roused himself a little more, and glanced inquiringly about him, but soon relapsed into his comatose condition. When next he opened his eyes, Captain Servadac happened to be bending down closely over him, examining his features with curious scrutiny. The old man darted an angry look at him through the spectacles, and said sharply, "Servadac, five hundred lines tomorrow!"

It was an echo of days of old. The words were few, but they were enough to recall the identity which Servadac was trying to make out.

"Is it possible?" he exclaimed. "Here is my old teacher, Professor Rosette, in very flesh and blood."

"Can't say much for the flesh," muttered Ben Zoof.

The old man had again fallen back into a torpid slumber. Ben Zoof continued, "His sleep is getting more composed. Let him alone; he will come round yet. Haven't I heard of men more dried up than he is, being brought all the way from Egypt in cases covered with pictures?"

"You idiot!—those were mummies; they had been dead for ages."

Ben Zoof did not answer a word. He went on preparing a warm bed, into which he managed to remove his patient, who soon fell into a calm and natural sleep.

Too impatient to await the awakening of the astronomer and to hear what representations he had to make, Servadac, the count, and the lieutenant, constituting themselves what might be designated the "Academy of Sciences" of the Colony, spent the whole of the remainder of the day in starting and discussing the wildest conjectures about their situation. The hypothesis, to which they had now accustomed themselves for so long, that a new asteroid had been formed by a fracture of the earth's surface, seemed to fall to the ground when they found that Professor Palmyrin Rosette had associated the name of Gallia, not with their present home, but with what he called "my comet"; and that theory being abandoned, they were driven to make the most improbable speculations to replace it.

Alluding to Rosette, Servadac took care to inform his companions that, although the professor was always eccentric, and at times very irascible, yet he was really exceedingly good-hearted; his

bark was worse than his bite; and if suffered to take their course without observation, his outbreaks of ill-temper seldom lasted long.

"We will certainly do our best to get on with him," said the count. "He is no doubt the author of the papers, and we must hope that he will be able to give us some valuable information."

"Beyond a question the documents have originated with him," assented the lieutenant. "Gallia was the word written at the top of every one of them, and Gallia was the first word uttered by him in our hearing."

The astronomer slept on. Meanwhile, the three together had no hesitation in examining his papers, and scrutinizing the figures on his extemporized blackboard. The handwriting corresponded with that of the papers already received; the blackboard was covered with algebraical symbols traced in chalk, which they were careful not to obliterate; and the papers, which consisted for the most part of detached scraps, presented a perfect wilderness of geometrical figures, conic sections of every variety being repeated in countless profusion.

Lieutenant Procope pointed out that these curves evidently had reference to the orbits of comets, which are variously parabolic, hyperbolic, or elliptic. If it were either of the first two, the comet, after once appearing within the range of terrestrial vision, would vanish forever in the outlying regions of space; if the last, it would be sure, sooner or later, after some periodic interval, to return.

From the *primâ facie* appearance of his papers, then, it seemed probable that the astronomer, during his sojourn at Formentera, had been devoting himself to the study of cometary orbits; and as calculations of this kind are ordinarily based upon the assumption that the orbit is a parabola, it was not unlikely that he had been endeavoring to trace the path of some particular comet.

"I wonder whether these calculations were made before or after the 1st of January; it makes all the difference," said Lieutenant Procope.

"We must bide our time and hear," replied the count.

Servadac paced restlessly up and down. "I would give a month of my life," he cried, impetuously, "for every hour that the old fellow goes sleeping on."

"You might be making a bad bargain," said Procope, smiling. "Perhaps after all the comet has had nothing to do with the convulsion that we have experienced."

"Nonsense!" exclaimed the captain; "I know better than that, and so do you. Is it not as clear as daylight that the earth and this comet have been in collision, and the result has been that our little world has been split off and sent flying far into space?"

Count Timascheff and the lieutenant looked at each other in silence. "I do not deny your theory," said Procope after a while. "If it be correct, I suppose we must conclude that the enormous disc we observed on the night of the catastrophe was the comet itself; and the velocity with which it was traveling must have been so great that it was hardly arrested at all by the attraction of the earth."

"Plausible enough," answered Count Timascheff; "and it is to this comet that our scientific friend here has given the name Gallia."

It still remained a puzzle to them all why the astronomer should apparently be interested in the comet so much more than in the new little world in which their strange lot was cast.

"Can you explain this?" asked the count.

"There is no accounting for the freaks of philosophers, you know," said Servadac; "and have I not told you that this philosopher in particular is one of the most eccentric beings in creation?"

"Besides," added the lieutenant, "it is exceedingly likely that his observation had been going on for some considerable period before the convulsion happened."

Thus the general conclusion arrived at by the Gallian Academy of Science was this: That on the night of the 31st of December, a comet, crossing the ecliptic, had come into collision with the earth, and that the violence of the shock had separated a huge fragment from the globe, which fragment from that date had been traversing the remote inter-planetary regions. Palmyrin Rosette would doubtless confirm their solution of the phenomenon.

CHAPTER II

A REVELATION

TO THE general population of the colony the arrival of the stranger was a matter of small interest. The Spaniards were naturally too indolent to be affected in any way by an incident that concerned themselves so remotely, while the Russians felt themselves simply reliant on their master, and as long as they were with him were careless as to where or how they spent their days. Everything went on with them in an accustomed routine; and they lay down night after night, and awoke to their avocations morning after morning, just as if nothing extraordinary had occurred.

All night long Ben Zoof would not leave the professor's bedside. He had constituted himself sick nurse, and considered his reputation at stake if he failed to set his patient on his feet again. He watched every movement, listened to every breath, and never failed to administer the strongest cordials upon the slightest pretext. Even in his sleep Rosette's irritable nature revealed itself. Ever and again, sometimes in a tone of uneasiness, and sometimes with the expression of positive anger, the name of Gallia escaped his lips, as though he were dreaming that his claim to the discovery of the comet was being contested or denied; but although his attendant was on the alert to gather all he could, he was able to catch nothing in the incoherent sentences that served to throw any real light upon the problem that they were all eager to solve.

When the sun reappeared on the western horizon the professor was still sound asleep; and Ben Zoof, who was especially anxious that the repose which promised to be so beneficial should not be disturbed, felt considerable annoyance at hearing a loud knocking, evidently of some blunt heavy instrument against a door that had been placed at the entrance of the gallery, more for the purpose of retaining internal warmth than for guarding against intrusion from without.

"Confound it!" said Ben Zoof. "I must put a stop to this;" and he made his way towards the door.

"Who's there?" he cried, in no very amiable tone.

"I," replied the quavering voice.

"Who are you?"

"Isaac Hakkabut. Let me in; do, please, let me in."

"Oh, it is you, old Ashtaroth, is it? What do you want? Can't you get anybody to buy your stuffs?"

"Nobody will pay me a proper price."

"Well, old Shimei, you won't find a customer here. You had better be off."

"No; but do, please—do, please, let me in," supplicated the Jew. "I want to speak to his Excellency, the governor."

"The governor is in bed, and asleep."

"I can wait until he awakes."

"Then wait where you are."

And with this inhospitable rejoinder the orderly was about to return to his place at the side of his patient, when Servadac, who had been roused by the sound of voices, called out, "What's the matter, Ben Zoof?"

"Oh, nothing, sir; only that hound of a Hakkabut says he wants to speak to you."

"Let him in, then."

Ben Zoof hesitated.

"Let him in, I say," repeated the captain, peremptorily.

However reluctantly, Ben Zoof obeyed. The door was unfastened, and Isaac Hakkabut, enveloped in an old overcoat, shuffled into the gallery. In a few moments Servadac approached, and the Jew began to overwhelm him with the most obsequious epithets. Without vouchsafing any reply, the captain beckoned to the old man to follow him, and leading the way to the central hall, stopped, and turning so as to look him steadily in the face, said, "Now is your opportunity. Tell me what you want."

"Oh, my lord, my lord," whined Isaac, "you must have some news to tell me."

"News? What do you mean?"

"From my little tartan yonder, I saw the yawl go out from the rock here on a journey, and I saw it come back, and it brought a stranger; and I thought—I thought—I thought——"

"Well, you thought—what did you think?"

"Why, that perhaps the stranger had come from the northern shores of the Mediterranean, and that I might ask him——"

He paused again, and gave a glance at the captain.

"Ask him what? Speak out, man."

"Ask him if he brings any tidings of Europe," Hakkabut blurted out at last.

Servadac shrugged his shoulders in contempt and turned away. Here was a man who had been resident three months in Gallia, a living witness to all the abnormal phenomena that had occurred, and yet refused to believe that his hope of making good bargains with European traders was at an end. Surely nothing, thought the captain, will convince the old rascal now; and he moved off in disgust. The orderly, however, who had listened with much amusement, was by no means disinclined for the conversation to be continued. "Are you satisfied, old Ezekiel?" he asked.

"Isn't it so? Am I not right? Didn't a stranger arrive here last night?" inquired the Jew.

"Yes, quite true."

"Where from?"

"From the Balearic Isles."

"The Balearic Isles?" echoed Isaac.

"Yes."

"Fine quarters for trade! Hardly twenty leagues from Spain! He must have brought news from Europe!"

"Well, old Manasseh, what if he has?"

"I should like to see him."

"Can't be."

The Jew sidled close up to Ben Zoof, and laying his hand on his arm, said in a low and insinuating tone, "I am poor, you know; but I would give you a few reals if you would let me talk to this stranger."

But as if he thought he was making too liberal an offer, he added, "Only it must be at once."

"He is too tired; he is worn out; he is fast asleep," answered Ben Zoof.

"But I would pay you to wake him."

The captain had overheard the tenor of the conversation, and interposed sternly, "Hakkabut! if you make the least attempt to disturb our visitor, I shall have you turned outside that door immediately."

"No offense, my lord, I hope," stammered out the Jew. "I only meant——"

"Silence!" shouted Servadac.

The old man hung his head, abashed.

"I will tell you what," said Servadac after a brief interval; "I will give you leave to hear what this stranger has to tell as soon as he is able to tell us anything; at present we have not heard a word from his lips."

The Jew looked perplexed.

"Yes," said Servadac; "when we hear his story, you shall hear it too."

"And I hope it will be to your liking, old Ezekiel!" added Ben Zoof in a voice of irony.

They had none of them long to wait, for within a few minutes Rosette's peevish voice was heard calling, "Joseph! Joseph!"

The professor did not open his eyes, and appeared to be slumbering on, but very shortly afterwards called out again, "Joseph! Confound the fellow! where is he?" It was evident that he was half dreaming about a former servant now far away on the ancient globe. "Where's my blackboard, Joseph?"

"Quite safe, sir," answered Ben Zoof, quickly.

Rosette unclosed his eyes and fixed them full upon the orderly's face. "Are you Joseph?" he asked.

"At your service, sir," replied Ben Zoof with imperturbable gravity.

"Then get me my coffee, and be quick about it."

Ben Zoof left to go into the kitchen, and Servadac approached the professor in order to assist him in rising to a sitting posture.

"Do you recognize your quondam pupil, professor?" he asked.

"Ah, yes, yes; you are Servadac," replied Rosette. "It is twelve years or more since I saw you; I hope you have improved."

"Quite a reformed character, sir, I assure you," said Servadac, smiling.

"Well, that's as it should be; that's right," said the astronomer with fussy importance. "But let me have my coffee," he added impatiently; "I cannot collect my thoughts without my coffee."

Fortunately, Ben Zoof appeared with a great cup,

hot and strong. After draining it with much apparent relish, the professor got out of bed, walked into the common hall, round which he glanced with a pre-occupied air, and proceeded to seat himself in an armchair, the most comfortable which the cabin of the *Dobryna* had supplied. Then, in a voice full of satisfaction, which involuntarily recalled the exclamations of delight that had wound up the two first of the mysterious documents that had been received, he burst out, "Well, gentlemen, what do you think of Gallia?"

There was no time for anyone to make a reply before Isaac Hakkabut had darted forward.

"By the God——"

"Who is that?" asked the startled professor; and he frowned, and made a gesture of repugnance.

Regardless of the efforts that were made to silence him, the Jew continued, "By the God of Abraham, I beseech you, give me some tidings of Europe!"

"Europe?" shouted the professor, springing from his seat as if he were electrified; "what does the man want with Europe?"

"I want to get there!" screeched the Jew; and in spite of every exertion to get him away, he clung most tenaciously to the professor's chair, and again implored for news of Europe.

Rosette made no immediate reply. After a moment or two of reflection, he turned to Servadac and asked him whether it was not the middle of April.

"It is the twentieth," answered the captain.

"Then to-day," said the astronomer, speaking with the greatest deliberation—"to-day we are just three millions of leagues away from Europe."

The Jew was utterly crestfallen.

"You seem here," continued the professor, "to be very ignorant of the state of things."

"How far we are ignorant," rejoined Servadac, "I cannot tell. But I will tell you all that we do know, and all that we have surmised." And as briefly as he could, he related all that had happened since the memorable night of the thirty-first of December; how they had experienced the shock; how the *Dobryna* had made her voyage; how they had discovered nothing except the fragments of the old continent at Tunis, Sardinia, Gibraltar, and now at Formentera; how at intervals the three anonymous documents had been received; and, finally, how the settlement at Gourbi Island had been abandoned for their present quarters at Nina's Hive.

The astronomer had hardly patience to hear him to the end. "And what do you say is your surmise as to your present position?" he asked.

"Our supposition," the captain replied, "is this. We imagine that we are on a considerable fragment of the terrestrial globe that has been detached by collision with a planet to which you appear to have given the name of Gallia."

"Better than that!" cried Rosette, starting to his feet with excitement.

"How? Why? What do you mean?" cried the voices of the listeners.

"You are correct to a certain degree," continued the professor. "It is quite true that at 47 minutes, 35.6 seconds after two o'clock on the morning of the first of January there was a collision; my comet grazed the earth; and the bits of the earth which you have named were carried clean away."

They were all fairly bewildered.

"Where, then," cried Servadac eagerly, "where are we?"

"You are on my comet, on Gallia itself!"

And the professor gazed around him with a perfect air of triumph.

CHAPTER III

THE PROFESSOR'S EXPERIENCES

"YES, my comet!" repeated the professor, and from time to time he knitted his brows, and looked around him with a defiant air, as though he could not get rid of the impression that someone was laying an unwarranted claim to its proprietorship, or that the individuals before him were intruders upon his own proper domain.

But for a considerable while, Servadac, the count, and the lieutenant remained silent and sunk in thought. Here then, at last, was the unriddling of the enigma they had been so long endeavoring to solve; both the hypotheses they had formed in succession had now to give way before the announcement of the real truth. The first supposition, that the rotatory axis of the earth had been subject to some accidental modification, and the conjecture that replaced it, namely that a certain portion of the terrestrial sphere had been splintered off and carried into space, had both now to yield to the representation that the earth had been grazed by an unknown comet, which had caught up some scattered fragments from its surface, and was bearing them far away into sidereal regions. Unfolded lay the past and the present before them; but this only served to awaken a keener interest about the future. Could the professor throw any light upon that? they longed to inquire, but did not yet venture to ask him.

Meanwhile Rosette assumed a pompous professional air, and appeared to be waiting for the entire party to be ceremoniously introduced to him. Quite willing to humor the vanity of the eccentric little man, Servadac proceeded to go through the expected formalities.

"Allow me to present to you my excellent friend, the Count Timascheff," he said.

"You are very welcome," said Rosette, bowing to the count with a smile of condescension.

"Although I am not precisely a voluntary resident on your comet, Mr. Professor, I beg to acknowledge your courteous reception," gravely responded Timascheff.

Servadac could not quite conceal his amusement at the count's irony, but continued, "This is Lieutenant Procope, the officer in command of the *Dobryna*."

The professor bowed again in frigid dignity.

"His yacht has conveyed us right around Gallia," added the captain.

"Around Gallia?" eagerly exclaimed the professor.

"Yes, entirely around it," answered Servadac, and without allowing time for reply, proceeded, "And this is my orderly, Ben Zoof."

"Aide-de-camp to his Excellency the Governor of Gallia," interposed Ben Zoof himself, anxious to maintain his master's honor as well as his own.

Rosette scarcely bent his head.

The rest of the population of the Hive were

all presented in succession; the Russian sailors, the Spaniards, young Pablo, and little Nina, on whom the professor, evidently no lover of children, glared fiercely through his formidable spectacles. Isaac Hakkabut, after his introduction, begged to be allowed to ask one question.

"How soon may we hope to get back?" he inquired.

"Get back!" rejoined Rosette, sharply; "who talks of getting back? We have hardly started yet."

Seeing that the professor was inclined to get angry, Captain Servadac adroitly gave a new turn to the conversation by asking him whether he would gratify them by relating his own recent experiences. The astronomer seemed pleased with the proposal, and at once commenced a verbose and somewhat circumlocutory address, of which the following summary presents the main features.

The French Government, being desirous of verifying the measurements already made of the arc of the meridian of Paris, appointed a scientific commission for that purpose. From that commission the name of Palmyrin Rosette was omitted, apparently for no other reason than his personal unpopularity. Furious at the slight, the professor resolved to set to work independently on his own account, and declaring that there were inaccuracies in the previous geodesic operations, he determined to re-examine the results of the last triangulation which had united Formentera to the Spanish coast by a triangle, one of the sides of which measured over a hundred miles, the very operation which had already been so successfully accomplished by Arago and Biot.

Accordingly, leaving Paris for the Balearic Isles, he placed his observatory on the highest point of Formentera, and accompanied as he was only by his servant, Joseph, led the life of a recluse. He secured the services of a former assistant and dispatched him to a high peak on the coast of Spain, where he had to superintend a helioscope, which, with the aid of a glass, could be read from Formentera. A few books and instruments, and two months' victuals, was all the baggage he took with him, except an excellent astronomical telescope, which was, indeed, almost part and parcel of himself, and with which he assiduously scanned the heavens, in the sanguine anticipation of making some discovery which would immortalize his name.

The task he had undertaken demanded the utmost patience. Night after night, in order to fix the apex of his triangle, he had to linger on the watch for the assistant's signal-light, but he did not forget that his predecessors, Arago and Biot, had had to wait sixty-one days for a similar purpose. What retarded the work was the dense fog which, as mentioned before, at that time enveloped not only that part of Europe, but almost the entire world.

Never failing to turn to the best advantage the few intervals when the mist lifted a little, the astronomer would at the same time cast an inquiring glance at the firmament, as he was greatly interested in the revision of the chart of the heavens, in the region contiguous to the constellation Gemini.

To the naked eye this constellation consists of only six stars, but through a telescope ten inches in diameter, as many as six thousand are visible. Rosette, however, did not possess a telescope of this magnitude, and was obliged to content himself with the good, but comparatively small, instrument he had.

On one of these occasions, whilst carefully gauging the recesses of Gemini, he espied a bright speck which was unregistered in the chart, and which at first he took for a small star that had escaped being entered in the catalogue. But the observation of a few separate nights soon made it manifest that the star was rapidly changing its position with regard to the adjacent stars, and the astronomer's heart began to leap at the thought that the renown of the discovery of a new planet would be associated with his name.

Redoubling his attention, he soon satisfied himself that what he saw was not a planet; the rapidity of its displacement rather forced him to the conjecture that it must be a comet, and this opinion was soon strengthened by the appearance of a coma, and subsequently confirmed, as the body approached the sun, by the development of a tail.

A comet! The discovery was fatal to all further progress in triangulation. However conscientiously the assistant on the Spanish coast might look to the kindling of the beacon, Rosette had not a glance to spare for that direction; he had no eyes except for the one object of his notice, no thought apart from that of one quarter of the firmament.

A comet! No time must be lost in calculating its elements.

Now, in order to calculate the elements of a comet, it is always deemed the safest mode of procedure to assume the orbit to be a parabola. Ordinarily, comets are conspicuous at their perihelia, as being their shortest distances from the sun, which is the focus of their orbit, and inasmuch as a parabola is nearly an ellipse, but with its axis indefinitely produced, for some short portion of its pathway the orbit may be indifferently considered either one or the other; and in this particular case the professor was right in adopting the supposition of its being parabolic.

Just as in a circle it is necessary to know three points to determine the circumference, so, in ascertaining the elements of a comet, three different positions must be observed before what astronomers call its "ephemeris" can be established.

But Professor Rosette did not content himself with three positions; taking advantage of every rift in the fog he made ten, twenty, thirty observations both in right ascension and in declination, and succeeded in working out with the most minute accuracy the five elements of the comet which was evidently advancing with astounding rapidity towards the earth.

These elements were:

1. The inclination of the plane of the cometary orbit to the plane of the ecliptic, an angle which is generally considerable; but in this case the planes were proved to coincide.

2. The position of the ascending node, or the point where the comet crossed the terrestrial orbit.

These two elements being obtained, the position in space of the comet's orbit was determined.

3. The direction of the axis major of the orbit, which was found by calculating the longitude of the comet's perihelion.

4. The perihelion distance from the sun, which settled the precise form of the parabola.

5. The motion of the comet, as being retrograde, or unlike the planets, from east to west.

Rosette thus found himself able to calculate the date at which the comet would reach its perihelion, and overjoyed at his discovery, without thinking of calling it Palmyra or Rosette, after his own name, he resolved that it should be known as Gallia.

His next business was to draw up a formal report. Not only did he at once recognize that a collision with the earth was possible, but he soon foresaw that it was inevitable, and that it must happen on the night of the 31st of December; moreover, as the bodies were moving in opposite directions, the shock could hardly fail to be violent.

To say that he was elated at the prospect was far below the truth; his delight amounted almost to delirium. Anyone else would have hurried from the solitude of Formentera in sheer fright; but, without communicating a word of his startling discovery, he remained resolutely at his post. From occasional newspapers which he had received, he had learnt that fogs, dense as ever, continued to envelop both hemispheres, so that he was assured that the existence of the comet was utterly unknown elsewhere; and the ignorance of the world as to the peril that threatened it averted the panic that would have followed the publication of the facts, and left the philosopher of Formentera in sole possession of the great secret. He clung to his post with the greater persistency, because his calculations had led him to the conclusion that the comet would strike the earth somewhere to the south of Algeria, and as it had a solid nucleus, he felt sure that, as he expressed it, the effect would be "unique," and he was anxious to be in the vicinity.

The shock came, and with it the results already recorded. Palmyrin Rosette was suddenly separated from his servant Joseph, and when, after a long period of unconsciousness, he came to himself, he found that he was the solitary occupant of the only fragment that survived of the Balearic Archipelago.

Such was the substance of the narrative which the professor gave with sundry repetitions and digressions; while he was giving it, he frequently paused and frowned as if irritated in a way that seemed by no means justified by the patient and good-humored demeanor of his audience.

"But now, gentlemen," added the professor, "I must tell you something more. Important changes have resulted from the collision; the cardinal points have been displaced; gravity has been diminished; not that I ever supposed for a minute, as you did, that I was still upon the earth. No! the earth, attended by her moon, continued to rotate along her proper orbit. But we, gentlemen, have nothing to complain of; our destiny might have been far worse; we might all have been crushed to death, or the comet might have remained in adhesion to the earth; and in neither of these cases should we have had the satisfaction of making this marvelous excursion through untraversed solar regions. No, gentlemen, I repeat it, we have nothing to regret."

And as the professor spoke, he seemed to kindle with the emotion of such supreme contentment that no one had the heart to gainsay his assertion. Ben Zoof alone ventured an unlucky remark to the effect that if the comet had happened to strike against Montmartre, instead of a bit of Africa, it would have met with some resistance.

"Pshaw!" said Rosette, disdainfully. "A mole-hill like Montmartre would have been ground to powder in a moment."

"Mole-hill!" exclaimed Ben Zoof, stung to the quick. "I can tell you it would have caught up your bit of a comet and worn it like a feather in a cap."

The professor looked angry, and Servadac having imposed silence upon his orderly, explained the worthy soldier's sensitiveness on all that concerned Montmartre. Always obedient to his master, Ben Zoof held his tongue; but he felt that he could never forgive the slight that had been cast upon his beloved home.

It was now all-important to learn whether the astronomer had been able to continue his observations, and whether he had learned sufficient of Gallia's path through space to make him competent to determine, at least approximately, the period of its revolution round the sun. With as much tact and caution as he could, Lieutenant Procope endeavored to intimate the general desire for some information on this point.

"Before the shock, sir," answered the professor, "I had conclusively demonstrated the path of the comet; but, in consequence of the modification which that shock has entailed upon my comet's orbit, I have been compelled to recommence my calculations entirely."

The lieutenant looked disappointed.

"Although the orbit of the earth was unaltered," continued the professor, "the result of the collision was the projection of the comet into a new orbit altogether."

"And may I ask," said Procope, deferentially, "whether you have got the elements of the fresh orbit?"

"Yes."

"Then perhaps you know——"

"I know this, sir, that at 47 minutes, 35.6 seconds after two oclock on the morning of the 1st of January last, Gallia, in passing its ascending node, came in contact with the earth; that on the 10th of January it crossed the orbit of Venus; that it reached its perihelion on the 15th; that it recrossed the orbit of Venus; that on the 1st of February it passed its descending node; on the 13th crossed the orbit of Mars; entered the zone of the telescopic planets on the 10th of March, and, attracting Nerina, carried it off as a satellite."

Servadac interposed:

"We are already acquainted with well nigh all these extraordinary facts; many of them, moreover, we learned from documents which we picked up, and which, although unsigned, we cannot entertain a doubt have originated with you."

Professor Rosette drew himself up proudly and said: "Of course they originated with me. I sent them off by hundreds. From whom else could they come?"

"From no one but yourself, certainly," rejoined the count, with grave politeness.

Hitherto the conversation had thrown no light upon the future movements of Gallia, and Rosette was disposed apparently to evade, or at least to postpone, the subject. When Lieutenant Procope was about to press his inquiries in a more categorical form, therefore, Servadac, thinking it inadvisable to press the little *savant* too far, interrupted him by asking the professor how he accounted for the earth

having suffered so little from such a formidable concussion.

"I account for it in this way," answered Rosette: "the earth was traveling at the rate of 28,000 leagues an hour, and Gallia at the rate of 57,000 leagues an hour. Therefore the result was the same as though a train, rushing along at a speed of about 85,000 leagues an hour had suddenly encountered some obstacle. The nucleus of the comet, being excessively hard, has done exactly what a ball would do fired with that velocity close to a pane of glass. It has crossed the earth without cracking it."

"It is possible you may be right," said Servadac, thoughtfully.

"Right! of course I am right!" replied the snappish professor. Soon, recovering his equanimity, however, he continued: "It is fortunate that the earth was only touched obliquely; if the comet had impinged perpendicularly, it must have plowed its way deep below the surface, and the disasters it might have caused are beyond reckoning. Perhaps," he added, with a smile, "even Montmartre might not have survived the calamity."

"Sir!" shouted Ben Zoof, quite unable to bear the unprovoked attack.

"Quiet, Ben Zoof!" said Servadac sternly.

Fortunately for the sake of peace, Isaac Hakkabut, who at length was beginning to realize something of the true condition of things, came forward at this moment, and in a voice trembling with eagerness, implored the professor to tell him when they would all be back again upon the earth.

"Are you in a great hurry?" asked the professor coolly.

The Jew was about to speak again, when Captain Servadac interposed: "Allow me to say that, in somewhat more scientific terms, I was about to ask you the same question. Did I not understand you to say that, as the consequence of the collision, the character of the comet's orbit has been changed?"

"You did, sir."

"Did you imply that the orbit has ceased to be a parabola?"

"Just so."

"Is it then an hyperbola? and are we to be carried on far and away into remote distance, and never, never return?"

"I did not say an hyperbola."

"And is it not?"

"It is not."

"Then it must be an ellipse?"

"Yes."

"And does its plane coincide with the plane of the earth?"

"Yes."

"Then it must be a periodic comet?"

"It is."

Servadac involuntarily raised a ringing shout of joy that echoed again along the gallery.

"Yes," continued the professor, "Gallia is a periodic comet, and allowing for the perturbations to which it is liable from the attraction of Mars and Jupiter and Saturn, it will return to the earth again in two years precisely."

"You mean that in two years after the first shock, Gallio will meet the earth at the same point at which they met before?" said Lieutenant Procope.

"I am afraid so," said Rosette.

"Afraid so? Why afraid of such a meeting?"

"Because we are doing exceedingly well as we are." The professor stamped his foot upon the ground, by way of emphasis, and added, "If I had my will, Gallia should never return to the earth again!"

CHAPTER IV

A REVISED CALENDAR

ALL previous hypotheses were now forgotten in the presence of the one great fact that Gallia was a comet and gravitating through remote solar regions. Captain Servadac became aware that the huge disc that had been looming through the clouds after the shock was the retreating earth, to the proximity of which the one high tide they had experienced was also to be attributed.

As to the fulfillment of the professor's prediction of an ultimate return to the terrestrial sphere, that was a point on which it must be owned that the captain, after the first flush of his excitement was over, was not without many misgivings.

The next day or two were spent in providing for the accommodation of the newcomer. Fortunately his desires were very moderate; he seemed to live among the stars, and as long as he was well provided with coffee, he cared little for luxuries, and paid little or no regard to the ingenuity with which all the internal arrangements of Nina's Hive had been devised. Anxious to show all proper respect to his former tutor, Servadac proposed to put the most comfortable apartment of the place at his disposal; but the professor resolutely declined to occupy it, saying that what he required was a small chamber, no matter how small, provided that it was elevated and secluded, so that he could use it as an observatory where he might continue his studies without disturbance. A general search was instituted, and before long they were lucky enough to find, about a hundred feet above the central grotto, a small recess or cave hollowed, as it were, in the mountain side, which would exactly answer their purpose. It contained room enough for a bed, a table, an armchair, a chest of drawers, and, what was of still more consequence, for the indispensable telescope. One small stream of lava, an off-shoot of the great torrent, sufficed to keep the apartment warm.

In these retired quarters the astronomer took up his abode. It was on all hands acknowledged to be advisable to let him go on entirely in his own way. His meals were taken to him at stated intervals; he slept but little, carried on his calculations by day, his observations by night, and very rarely made his appearance amongst the rest of the little community.

The cold now became very intense, the thermometer registering 30° C. below zero. The mercury, however, never exhibited any of those fluctuations that are ever and again to be observed in variable climates, but continued slowly and steadily to fall, and in all probability would continue to do so until it reached the normal temperature of the regions of outlying space.

This steady sinking of the mercury was accompanied by a complete stillness of the atmosphere; the very air seemed to be congealed; no particle of it stirred; from zenith to horizon there was never a cloud; neither were there any of the damp mists or

dry fogs which so often extend over the polar regions of the earth; the sky was always clear; the sun shone by day and the stars by night without causing any perceptible difference in the temperature.

These peculiar conditions rendered the cold endurable even in the open air. The cause of so many of the diseases that prove fatal to Arctic explorers resides in the cutting winds, unwholesome fogs, or terrible snow drifts, which, by drying up, relaxing, or otherwise affecting the lungs, hinder them from fulfilling their proper functions. But during periods of calm weather, when the air was absolutely still, many polar navigators, well-clothed and properly fed, were known to withstand a temperature when the thermometer fell to 60° below zero. It was the experience of Perry upon Melville Island. of Kane beyond latitude 81° north, and of Hall and the crew of the *Polaris*, that, however intense the cold, in the absence of the wind they could always brave its rigor.

Notwithstanding, then, the extreme lowness of the temperature, the little population found that they were able to move about in the open air with perfect immunity. The Governor General made it his special care to see that his people were all well fed and warmly clad. Food was both wholesome and abundant, and besides the furs brought from the *Dobryna's* stores, fresh skins could very easily be procured and made up into wearing apparel. A daily course of out-door exercise was enforced upon everyone; not even Pablo and Nina were exempted from the general rule; the two children, muffled up in furs, like little Esquimaux, skated along together, Pablo ever at his companion's side, ready to give her a helping hand whenever she was weary from her exertions.

After his interview with the newly arrived astronomer, Isaac Hakkabut slunk back again to his tartan. A change had come over his ideas; he could no longer resist the conviction that he was indeed millions and millions of miles away from the earth, where he had carried on so varied and remunerative a traffic. It might be imagined that this realization of his true position would have led him to a better mind, and that, in some degree at least he would have been induced to regard the few fellow-creatures with whom his lot had been so strangely cast, otherwise than as mere instruments to be turned to his own personal and pecuniary advantage; but no—the desire of gain was too thoroughly ingrained into his hard nature ever to be eradicated, and secure in his knowledge that he was under the protection of a French officer, who, except under the most urgent necessity, would not permit him to be molested in retaining his property, he determined to wait for some emergency to arise which should enable him to use his present situation for his own profit.

On the one hand, the Jew took it into account that although the chances of returning to the earth might be remote, yet from what he had heard from the professor he could not believe that they were improbable; on the other, he knew that a considerable sum of money, in English and Russian coinage, was in the possession of various members of the little colony, and this, although valueless now, would be worth as much as ever if the proper condition of things should be restored; accordingly, he set his heart on getting all the monetary wealth of Gallia into his possession, and to do this he must sell his goods. But he would not sell them yet; there might come a time when for many articles the supply would not be equal to the demand; that would be the time for him; by waiting he reckoned he should be able to transact some lucrative business.

Such in his solitude were old Isaac's cogitations, whilst the universal population of Nina's Hive were congratulating themselves upon being rid of his odious presence.

As already stated in the message brought by the carrier pigeon, the distance traveled by Gallia in April was 39,000,000 leagues, and at the end of the month she was 110,000,000 leagues from the sun. A diagram representing the elliptical orbit of the planet, accompanied by an ephemeris made out in minute detail, had been drawn out by the professor. The curve was divided into twenty-four sections of unequal length, representing respectively the distance described in the twenty-four months of the Gallian year, the twelve former divisions, according to Kepler's law, gradually diminishing in length as they approached the point denoting the aphelion and increasing as they neared the perihelion.

It was on the 12th of May that Rosette exhibited this result of his labors to Servadac, the count, and the lieutenant, who visited his apartment and naturally examined the drawing with the keenest interest. Gallia's path, extending beyond the orbit of Jupiter, lay clearly defined before their eyes, the progress along the orbit and the solar distances being inserted for each month separately. Nothing could look plainer, and if the professor's calculations were correct (a point upon which they dared not, if they would, express the semblance of a doubt), Gallia would accomplish her revolution in precisely two years, and would meet the earth, which would in the same period of time have completed two annual revolutions, in the very same spot as before. What would be the consequences of a second collision they scarcely ventured to think.

Without lifting his eye from the diagram, which he was still carefully scrutinizing, Servadac said, "I see that during the month of May, Gallia will only travel 30,400,000 leagues, and that this will leave her about 140,000,000 leagues distant from the sun."

"Just so," replied the professor.

"Then we have already passed the zone of the telescopic planets, have we not?" asked the count.

"Can you not use your eyes?" said the professor, testily. "If you will look you will see the zone marked clearly enough upon the map."

Without noticing the interruption, Servadac continued his own remarks, "The comet then, I see, is to reach its aphelion on the 15th of January, exactly a twelvemonth after passing its perihelion."

"A twelvemonth! Not a Gallian twelvemonth?" exclaimed Rosette.

Servadac looked bewildered. Lieutenant Procope could not suppress a smile.

"What are you laughing at?" demanded the professor, turning round upon him angrily.

"Nothing, sir; only it amuses me to see how you want to revise the terrestrial calendar."

"I want to be logical, that's all."

"By all manner of means, my dear professor, let us be logical."

"Well, then, listen to me," resumed the professor, stiffly. "I presume you are taking it for granted that the Gallian year—by which I mean the time in which Gallia makes one revolution round the sun—is equal in length to two terrestrial years."

They signified their assent.

"And that year, like every other year, ought to be divided into twelve months."

"Yes, certainly, if you wish it," said the captain, acquiescing.

"If I wish it!" exclaimed Rosette. "Nothing of the sort! Of course a year must have twelve months!"

"Of course," said the captain.

"And how many days will make a month?" asked the professor.

"I suppose sixty or sixty-two, as the case may be. The days now are only half as long as they used to be," answered the captain.

"Servadac, don't be thoughtless!" cried Rosette, with all the petulant impatience of the old pedagogue. "If the days are only half as long as they were, sixty of them cannot make up a twelfth part of Gallia's year—cannot be a month."

"I suppose not," replied the confused captain.

"Do you not see, then," continued the astronomer, "that if a Gallian month is twice as long as a terrestrial month, and a Gallian day is only half as long as a terrestrial day, there must be a hundred and twenty days in every month?"

"No doubt you are right, professor," said Count Timascheff; "but do you not think that the use of a new calendar such as this would practically be very troublesome?"

"Not at all! not at all! I do not intend to use any other," was the professor's bluff reply.

After pondering for a few moments, the captain spoke again. "According to this new calendar, it isn't the middle of May at all; it must now be some time in March."

"Yes," said the professor, "to-day is the 26th of March. It is the 266th day of the Gallian year. It corresponds with the 133d day of the terrestrial year. You are quite correct, it is the 26th of March."

"Strange!" muttered Servadac.

"And a month, a terrestrial month, thirty old days, sixty new days hence, it will be the 86th of March."

"Ha, ha!" roared the captain; "this is logic with a vengeance!"

The old professor had an undefined consciousness that his former pupil was laughing at him and as it was growing late, he made an excuse that he had no more leisure. The visitors accordingly quitted the observatory.

It must be owned that the revised calendar was left to the professor's sole use, and the colony was fairly puzzled whenever he referred to such unheard of dates as the 47th of April or the 118th of May.

According to the old calendar, June had now arrived; and by the professor's tables Gallia during the month would have advanced 27,500,000 leagues farther along its orbit, and would have attained a distance of 155,000,000 leagues from the sun. The thermometer continued to fall; the atmosphere remained clear as heretofore. The population performed their daily avocations with systematic routine; and almost the only thing that broke the monotony of existence was an occasional visit from the blustering, nervous, little professor, when some sudden fancy induced him to throw aside his astronomical studies for a time, and pay a visit to the common hall. His arrival there was generally hailed as the precursor of a little season of excitement. Somehow or other the conversation would eventually work its way round to the topic of a future collision between the comet and the earth; and in the same degree as this was a matter of sanguine anticipation to Captain Servadac and his friends, it was a matter of aversion to the astronomical enthusiast, who had no desire to quit his present quarters in a sphere which, being of his own discovery, he could hardly have cared for more if it had been of his own creation. The interview would often terminate in a scene of considerable animation.

On the 27th of June (old calendar) the professor burst like a cannon-ball into the central hall, where they were all assembled, and without a word of salutation or of preface, accosted the lieutenant in the way in which in earlier days he had been accustomed to speak to an idle school-boy, "Now, lieutenant! no evasions! no shuffling! Tell me, have you or have you not circumnavigated Gallia?"

The lieutenant drew himself up stiffly. "Evasions! shufflings! I am not accustomed, sir—" he began in a tone evidencing no little resentment; but catching a hint from the count he subdued his voice, and simply said, "We have."

"And may I ask," continued the professor, quite unaware of his previous discourtesy, "whether, when you made your voyage, you took any account of distances?"

"As approximately as I could," replied the lieutenant; "I did what I could by log and compass. I was unable to take the altitude of sun or star."

"At what result did you arrive? What is the measurement of our equator?"

"I estimate the total circumference of the equator to be about 1,400 miles."

"Ah!" said the professor, more than half speaking to himself, "a circumference of 1,400 miles would give a diameter of about 450 miles. That would be approximately about one-sixteenth of the diameter of the earth."

Raising his voice, he continued, "Gentlemen, in order to complete my account of my comet Gallia, I require to know its area, its mass, its volume, its density, its specific gravity."

"Since we know the diameter," remarked the lieutenant, "there can be no difficulty in finding its surface and its volume."

"And did I say there was any difficulty?" asked the professor, fiercely. "I have been able to reckon that ever since I was born."

"Cock-a-doodle-doo!" cried Ben Zoof, delighted at any opportunity to pay off his old grudge.

The professor looked at him, but did not vouchsafe a word. Addressing the captain, he said, "Now, Servadac, take your paper and a pen, and find me the surface of Gallia."

With more submission than when he was a school-boy, the captain sat down and endeavored to recall the proper formula.

"The surface of a sphere? Multiply circumference by diameter."

"Right!" cried Rosette; "but it ought to be done by this time."

"Circumference, 1,400; diameter, 450; area of surface, 630,000," read the captain.

"True," replied Rosette, "630,000 square miles; just 292 times less than that of the earth."

"Pretty little comet! nice little comet!" muttered Ben Zoof.

The astronomer bit his lip, snorted, and cast at him a withering look, but did not take any further notice.

"Now, Captain Servadac," said the professor, "take your pen again, and find me the volume of Gallia."

The captain hesitated.

"Quick, quick!" cried the professor, impatiently; "surely you have not forgotten how to find the volume of a sphere!"

"A moment's breathing time, please."

"Breathing time, indeed! A mathematician should not want breathing time! Come, multiply the surface by the third of the radius. Don't you recollect?"

Captain Servadac applied himself to his task while the by-standers waited, with some difficulty suppressing their inclination to laugh. There was a short silence, at the end of which Servadac announced that the volume of the comet was 47,880,000 cubic miles.

"Just about one five-thousandth that of the earth," observed the lieutenant.

"Nice little comet! pretty little comet!" said Ben Zoof.

The professor scowled at him, and was manifestly annoyed at having the insignificant dimensions of his comet pointed out in so disparaging a manner. Lieutenant Procope further remarked that from the earth he supposed it to be about as conspicuous as a star of the seventh magnitude, and would require a good telescope to see it.

"Ha, ha!" laughed the orderly, aloud; "charming little comet! so pretty; and so modest!"

"You rascal!" roared the professor, and clenched his hand in passion, as if about to strike him. Ben Zoof laughed the more, and was on the point of repeating his satirical comments, when a stern order from the captain made him hold his tongue. The truth was that the professor was just as sensitive about his comet as the orderly was about Montmartre, and if the contention between the two had been allowed to go on unchecked, it is impossible to say what serious quarrel might not have arisen.

When Professor Rosette's equanimity had been restored, he said, "Thus gentlemen, the diameter, the surface, the volume of my comet are settled; but there is more to be done. I shall not be satisfied until, by actual measurement, I have determined its mass, its density, and the force of gravity at its surface."

"A laborious problem," remarked Count Timascheff.

"Laborious or not, it has to be accomplished. I am resolved to find out what my comet weighs."

"Would it not be of some assistance, if we knew of what substance it is composed?" asked the lieutenant.

"That is of no moment at all," replied the professor; "the problem is independent of it."

"Then we await your orders," was the captain's reply.

"You must understand, however," said Rosette, "that there are various preliminary calculations to be made; you will have to wait till they are finished."

"As long as you please," said the count.

"No hurry at all," observed the captain, who was not in the least impatient to continue his mathematical exercises.

"Then, gentlemen," said the astronomer, "with your leave we will for this purpose make an appointment a few weeks hence. What do you say to the 62d of April?"

Without noticing the general smile which the novel date provoked, the astronomer left the hall, and retired to his observatory.

CHAPTER V

WANTED: A STEELYARD

UNDER the still diminishing influence of the sun's attraction, but without let or hindrance, Gallia continued its inter-planetary course, accompanied by Nerina, its captured satellite, which performed its fortnightly revolutions with unvarying regularity.

Meanwhile, the question beyond all others important was ever recurring to the minds of Servadac and his two companions: were the astronomer's calculations correct, and was there a sound foundation for his prediction that the comet would again touch the earth? But whatever might be their doubts or anxieties, they were fain to keep all their misgivings to themselves; the professor was of a temper far too cross-grained for them to venture to ask him to revise or re-examine the results of his observations.

The rest of the community by no means shared in their uneasiness. Negrete and his fellow-countrymen yielded to their destiny with philosophical indifference. Happier and better provided for than they had ever been in their lives, it did not give them a passing thought, far less cause any serious concern, whether they were still circling round the sun, or whether they were being carried right away within the limits of another system. Utterly careless of the future, the majos, light-hearted as ever, carolled out their favorite songs, just as if they had never quitted the shores of their native land.

Happiest of all were Pablo and Nina. Racing through the galleries of the Hive, clambering over the rocks upon the shore, one day skating far away across the frozen ocean, the next fishing in the lake that was kept liquid by the heat of the lava-torrent, the two children led a life of perpetual enjoyment. Nor was their recreation allowed to interfere with their studies. Captain Servadac, who in common with the count really liked them both, conceived that the responsibilities of a parent in some degree had developed upon him, and took great care in superintending their daily lessons, which he succeeded in making hardly less pleasant than their sports.

Indulged and loved by all, it was little wonder that young Pablo had no longing for the scorching plains of Andalusia, or that little Nina had lost all wish to return with her pet goat to the barren rocks

of Sardinia. They had now a home in which they had nothing to desire.

"Have you no father or mother?" asked Pablo, one day.

"No," she answered.

"No more have I," said the boy, "I used to run along by the side of the diligences when I was in Spain."

"I used to look after goats at Madalena," said Nina; "but it is much nicer here—I am so happy here. I have you for a brother, and everybody is so kind. I am afraid they will spoil us, Pablo," she added, smiling.

"Oh, no, Nina; you are too good to be spoiled, and when I am with you, you make me good too," said Pablo, gravely.

July had now arrived. During the month Gallia's advance along its orbit would be reduced to 22,000,000 leagues, the distance from the sun at the end being 172,000,000 leagues, about four and a half times as great as the average distance of the earth from the sun. It was traveling now at about the same speed as the earth, which traverses the ecliptic at a rate of 21,000,000 leagues a month, or 28,800 leagues an hour.

In due time the 62d of April, according to the revised Gallian calendar, dawned; and in punctual fulfillment of the professor's appointment, a note was delivered to Servadac to say that he was ready, and hoped that day to commence operations for calculating the mass and density of his comet, as well as the force of gravity at its surface.

A point of far greater interest to Captain Servadac and his friends would have been to ascertain the nature of the substance of which the comet was composed, but they felt pledged to render the professor any aid they could in the researches upon which he had set his heart. Without delay, therefore, they assembled in the central hall, where they were soon joined by Rosette, who seemed to be in fairly good temper.

"Gentlemen," he began, "I propose to-day to endeavor to complete our observations of the elements of my comet. Three matters of investigation are before us. First, the measure of gravity at its surface; this attractive force we know, by the increase of our own muscular force, must of course be considerably less than that at the surface of the earth; secondly, its mass, that is, the quality of its matter; and thirdly, its density or quantity of matter in a unit of its volume. We will proceed, gentlemen, if you please, to weigh Gallia."

Ben Zoof, who had just entered the hall, caught the professor's last sentence, and without saying a word, went out again and was absent for some minutes. When he returned, he said, "If you want to weigh this comet of yours, I suppose you want a pair of scales; but I have been to look, and I cannot find a pair anywhere. And what's more," he added mischievously, "you won't get them anywhere."

A frown came over the professor's countenance. Servadac saw it, and gave his orderly a sign that he should desist entirely from his bantering.

"I require, gentlemen," resumed Rosette, "first of all to know by how much the weight of a kilogram here differs from its weight upon the earth; the attraction, as we have said, being less, the weight will proportionately be less also."

"Then an ordinary pair of scales, being under the influence of attraction, I suppose, would not answer your purpose," submitted the lieutenant.

"And the very kilogram weight you used would have become lighter," put in the count, deferentially.

"Pray, gentlemen, do not interrupt me," said the professor, authoritatively, as if *ex cathedrâ*. "I need no instruction on these points."

Procope and Timascheff demurely bowed their heads.

The professor resumed. "Upon a spring-balance, dependent upon mere tension or flexibility, the attraction will have no influence. If I suspend a weight upon it equivalent to the weight of a kilogram, the index will register the proper weight on the surface of Gallia. Thus I shall arrive at the difference I want: the difference between the earth's attraction and the comet's. Will you, therefore, have the goodness to provide me at once with a spring-balance and a tested kilogram?"

The audience looked at one another, and then at Ben Zoof, who was thoroughly acquainted with all their resources. "We have neither one nor the other," said the orderly.

The professor stamped with vexation.

"I believe old Hakkabut has a spring-balance on board his tartan," said Ben Zoof, presently.

"Then why didn't you say so before, you idiot?" roared the excitable little man.

Anxious to pacify him, Servadac assured him that every exertion should be made to procure the instrument, and directed Ben Zoof to go to the Jew and borrow it.

"No, stop a moment," he said as Ben Zoof was moving away on his errand; "perhaps I had better go with you myself; the old Jew may make a difficulty about lending us any of his property."

"Why should we not all go?" asked the count; "we should see what kind of a life the misanthrope leads on board the *Hansa*."

The proposal met with general approbation. Before they started, Professor Rosette requested that one of the men might be ordered to cut him a cubic decimeter out of the solid substance of Gallia. "My engineer is the man for that," said the count; "he will do it well for you if you will give him the precise measurement."

"What! you don't mean," exclaimed the professor, again going off into a passion, "that you haven't a proper measure of length?"

Ben Zoof was sent off to ransack the stores for the article in question, but no measure was forthcoming. "Most likely we shall find one on the tartan," said the orderly.

"Then let us lose no time in trying," answered the professor, as he bustled with hasty strides into the gallery.

The rest of the party followed, and were soon in the open air upon the rocks that overhung the shore. They descended to the level of the frozen water and made their way towards the little creek where the *Dobryna* and the *Hansa* lay firmly imprisoned in their icy bonds.

The temperature was low beyond previous experience; but well muffled up in fur, they all endured it without much actual suffering. Their breath issued in vapor, which was at once congealed into little crystals upon their whiskers, beards, eyebrows, and eyelashes, until their faces, covered with

countless snow-white prickles, were truly ludicrous. The little professor, most comical of all, resembled nothing so much as the cub of an Arctic bear.

It was eight o'clock in the morning. The sun was rapidly approaching the zenith; but its disc, from the extreme remoteness, was proportionately dwarfed, its beams being all but destitute of their proper warmth and radiance. The volcano to its very summit, and the surrounding rocks, were still covered with the unsullied mantle of snow that had fallen while the atmosphere was still to some extent charged with vapor; but on the north side the snow had given place to the cascade of fiery lava, which, making its way down the sloping rocks as far as the vaulted opening of the central cavern, fell thence perpendicularly into the sea. Above the cavern, 150 feet up the mountain, was a dark hole, above which the stream of lava made a bifurcation in its course. From this hole projected the tube of an astronomer's telescope; it was the opening of Palmyrin Rosette's observatory.

Sea and land seemed blended into one dreary whiteness, to which the pale blue sky offered scarcely any contrast. The shore was indented with the marks of many footsteps left by the colonists either on their way to collect ice for drinking purposes, or as the result of their skating expeditions; the edges of the skates had cut out a labyrinth of curves complicated as the figures traced by aquatic insects upon the surface of a pool.

Across the quarter of a mile level ground that lay between the mountain and the creek, a series of footprints, frozen hard into the snow, marked the course taken by Isaac Hakkabut on his last return from Nina's Hive.

On approaching the creek, Lieutenant Procope drew his companions' attention to the elevation of the *Dobryna's* and *Hansa's* waterline, both vessels being now some fifteen feet above the level of the sea.

"What a strange phenomenon!" exclaimed the captain.

"It makes me very uneasy," rejoined the lieutenant; "in shallow places like this, as the crust of ice thickens, it forces everything upwards with irresistible force."

"But surely this process of congelation must have a limit!" said the count.

"But who can say what that limit will be? Remember that we have not yet reached our maximum of cold," replied Procope.

"Indeed, I hope not!" exclaimed the professor; "where would be the use of our traveling 200,000,000 leagues from the sun, if we are only to experience the same temperature as we should find at the poles of the earth?"

"Fortunately for us, however, professor," said the lieutenant, with a smile, "the temperature of the remotest space never descends beyond 70° C. below zero."

"And as long as there is no wind," added Servadac, "we may pass comfortably through the winter, without a single attack of catarrh."

Lieutenant Procope proceeded to impart to the count his anxiety about the situation of his yacht. He pointed out that by the constant superposition of new deposits of ice, the vessel would be elevated to a great height, and consequently in the event of a thaw, it must be exposed to a calamity similar to those which in polar seas cause destruction to so many whalers.

There was no time now for concerting measures off-hand to prevent the disaster, for the other members of the party had already reached the spot where the *Hansa* lay bound in her icy trammels. A flight of steps, recently hewn by Hakkabut himself, gave access for the present to the gangway, but it was evident that some different contrivance would have to be resorted to when the tartan should be elevated perhaps to a hundred feet.

A thin curl of blue smoke issued from the copper funnel that projected above the mass of snow which had accumulated upon the deck of the *Hansa*. The owner was sparing of his fuel, and it was only the non-conducting layer of ice enveloping the tartan that rendered the internal temperature endurable.

"Hi! old Nebuchadnezzar, where are you?" shouted Ben Zoof, at the full strength of his lungs.

At the sound of his voice, the cabin door opened, and the Jew's head and shoulders protruded onto the deck.

CHAPTER VI

MONEY AT A PREMIUM

"WHO'S there? I have nothing here for anyone. Go away;" Such was the inhospitable greeting with which Isaac Hakkabut received his visitors.

"Hakkabut! do you take us for thieves?" asked Servadac, in tones of stern displeasure.

"Oh, your Excellency, my lord, I did not know that it was you," whined the Jew, but without emerging any farther from his cabin.

"Now, old Hakkabut, come out of your shell! Come and show the governor proper respect, when he gives you the honor of his company," cried Ben Zoof, who by this time had clambered up on the deck.

After considerable hesitation, but still keeping his hold upon the cabin-door, the Jew made up his mind to step outside. "What do you want?" he inquired, timorously.

"I want a word with you," said Servadac, "but I do not want to stand talking out here in the cold."

Followed by the rest of the party, he proceeded to mount the steps. The Jew trembled from head to foot. "But I cannot let you into my cabin. I am a poor man; I have nothing to give you," he moaned piteously.

"Here he is!" laughed Ben Zoof contemptuously; "he is beginning his chapter of lamentations over again. But standing out here will never do. Out of the way, old Hakkabut, I say! out of the way!" and, without more ado, he thrust the astonished Jew to one side and opened the door of the cabin.

Servadac, however, declined to enter until he had taken the pains to explain to the owner of the tartan that he had no intention of laying violent hands upon his property, and that if the time should ever come that his cargo was in requisition for the common use, he should receive a proper price for his goods, the same as he would in Europe.

"Europe, indeed!" muttered the Jew maliciously between his teeth. "European prices will not do for me. I must have Gallian prices—and of my own fixing too!"

So large a portion of the vessel had been appropriated to the cargo that the space reserved for the cabin was of most meager dimensions. In one corner of the compartment stood a small iron stove, in which smoldered a bare handful of coals; in another was a trestle-board which served as a bed; two or three stools and a rickety deal table, together with a few cooking utensils, completed a stock of furniture which was worthy of its proprietor.

On entering the cabin, Ben Zoof's first proceeding was to throw on the fire a liberal supply of coals, utterly regardless of the groans of poor Isaac, who would almost as soon have parted with his own bones as submit to such reckless expenditure of his fuel. The perishing temperature of the cabin, however, was sufficient justification for the orderly's conduct, and by a little skillful manipulation he soon succeeded in getting up a tolerable fire.

The visitors having taken what seats they could, Hakkabut closed the door, and, like a prisoner awaiting his sentence, stood with folded hands, expecting the captain to speak.

"Listen," said Servadac; "we have come to ask a favor."

Imagining that at least half his property was to be confiscated, the Jew began to break out into his usual formula about being a poor man and having nothing to spare; but Servadac, without heeding his complainings, went on: "We are not going to ruin you, you know."

Hakkabut looked keenly into the captain's face.

"We have only come to know whether you can lend us a spring-balance."

So far from showing any symptom of relief, the old miser exclaimed, with a stare of astonishment, as if he had been asked for some thousand francs: "A spring-balance?"

"Yes!" echoed the professor, impatiently; "a spring-balance."

"Haven't you one?" asked Servadac.

"To be sure he has!" said Ben Zoof.

Old Isaac stammered and stuttered, but at last confessed that perhaps there might be one amongst the stores.

"Then, surely, you will not object to lend it to us?" said the captain.

"Only for one day," added the professor.

The Jew stammered again, and began to object. "It is a very delicate instrument, your Excellency. The cold, you know, the cold may do injury to the spring; and perhaps you are going to use it to weigh something very heavy."

"Why, old Ephraim, do you suppose we are going to weigh a mountain with it?" said Ben Zoof.

"Better than that!" cried out the professor, triumphantly; "we are going to weigh Gallia with it—my comet."

"Merciful Heaven!" shrieked Isaac, feigning consternation at the bare suggestion.

Servadac knew well enough that the Jew was holding out only for a good bargain, and assured him that the scale was required for no other purpose than to weigh a kilogram, which (considering how much lighter everything had become) could not possibly put the slightest strain upon the instrument.

The Jew still spluttered, and moaned, and hesitated.

"Well, then," said Servadac, "if you do not like to lend us your scale, do you object to selling it to us?"

Isaac fairly shrieked aloud. "God of Israel!" he ejaculated, "sell my spring-balance? Would you deprive me of one of the most indispensable of my means of livelihood? How should I weigh my merchandise without my spring-balance—my solitary spring-balance, so delicate and so correct?"

The orderly wondered how his master could refrain from strangling the old miser upon the spot; but Servadac, rather amused than otherwise, determined to try another form of persuasion. "Come, Hakkabut, I see that you are not disposed either to lend or to sell your balance. What do you say to letting us hire it?"

The Jew's eyes twinkled with a satisfaction that he was unable to conceal. "But what security would you give? The instrument is very valuable;" and he looked more cunning than ever.

"What is it worth? If it is worth twenty francs, I will leave a deposit of a hundred. Will that satisfy you?"

He shook his head doubtfully. "It is very little; indeed, it is too little, your Excellency. Consider, it is the only spring-balance in all this new world of ours; it is worth more, much more. If I take your deposit it must be in gold—all gold. But how much do you agree to give me for the hire—the hire, one day?"

"You shall have twenty francs," said Servadac.

"Oh, it is dirt cheap; but never mind, for one day, you shall have it. Deposit in gold money a hundred francs, and twenty francs for the hire." The old man folded his hands in meek resignation.

"The fellow knows how to make a good bargain," said Servadac, as Isaac, after casting a distrustful look around, went out of the cabin.

"Detestable old wretch!" replied the count, full of disgust.

Hardly a minute elapsed before the Jew was back again, carrying his precious instrument with ostentatious care. It was of an ordinary kind. A spring balance, fitted with a hook, held the article to be weighed; a pointer, revolving on a disc, indicated the weight of the article. Professor Rosette was manifestly right in asserting that such a machine would register results quite independently of any change in the force of attraction. On the earth it would have registered a kilogram as a kilogram; here it recorded a different value altogether, as the result of the altered force of gravity.

Gold coinage to the worth of one hundred and twenty francs was handed over to the Jew, who clutched at the money with unmistakable eagerness. The balance was committed to the keeping of Ben Zoof, and the visitors prepared to quit the *Hansa*.

All at once it occurred to the professor that the balance would be absolutely useless to him, unless he had the means for ascertaining the precise measurement of the unit of the soil of Gallia which he proposed to weigh. "Something more you must lend me," he said, addressing the Jew.

"I must have a measure, and I must have a kilogram."

"I have neither of them," answered Isaac. "I have neither. I am sorry; I am very sorry." And this time the old Jew spoke the truth. He would have been really glad to do another stroke or two of business upon terms as advantageous as the transaction he had just concluded.

Palmyrin Rosette scratched his head in perplexity, glaring round upon his companions as if they were personally responsible for his annoyance. He muttered something about finding a way out of his difficulty, and hastily mounted the cabin-ladder. The rest followed, but they had hardly reached the deck when the chink of money was heard in the room below. Hakkabut was locking away the gold in one of the drawers.

Back again, down the ladder, scrambled the little professor, and before the Jew was aware of his presence he had seized him by the tail of his slouchy overcoat. "Some of your money! I must have money!" he said.

"Money!" gasped Hakkabut; "I have no money." He was pale with fright, and hardly knew what he was saying.

"Falsehood!" roared Rosette. "Do you think I cannot see?" And peering down into the drawer which the Jew was vainly trying to close, he cried, "Heaps of money! French money! Five-franc pieces! the very thing I want! I must have them!"

The captain and his friends, who had returned to the cabin looked on with mingled amusement and bewilderment.

"They are mine!" shrieked Hakkabut.

"I will have them!" shouted the professor.

"You shall kill me first!" bellowed the Jew.

"No, but I must!" persisted the professor again.

It was manifestly time for Servadac to interefere. "My dear professor," he said, smiling, "allow me to settle this little matter for you."

"Ah, your Excellency," moaned the agitated Jew, "protect me! I am but a poor man——"

"None of that Hakkabut. Hold your tongue." And turning to Rosette, the captain said, "If, sir, I understand right, you require some silver five-franc pieces for your operation?"

"Forty," said Rosette, surily.

"Two hundred francs!" whined Hakkabut.

"Silence!" cried the captain.

"I must have more than that," the professor continued. "I want ten two-franc pieces, and twenty half-francs."

"Let me see," said Servadac, "how much is that in all? Two hundred and thirty francs, is it not?"

"I dare say it is," answered the professor.

"Count, may I ask you," continued Servadac, "to be security to the Jew for this loan to the professor?"

"Loan!" cried the Jew, "do you mean only a loan?"

"Silence!" again shouted the captain.

Count Timascheff, expressing his regret that his purse contained only paper money, begged to place it at Captain Servadac's disposal.

"No paper, no paper!" exclaimed Isaac. "Paper has no currency in Gallia."

"About as much as silver," coolly retorted the count.

"I am a poor man," began the Jew.

"Now, Hakkabut, stop these miserable lamentations of yours, once for all. Hand us over two hundred and thirty francs in silver money, or we will proceed to help ourselves."

Isaac began to yell with all his might: "Thieves! thieves!"

In a moment Ben Zoof's hand was clasped tightly over his mouth. "Stop that howling, Belshazzar!"

"Let him alone, Ben Zoof. He will soon come to his senses," said Servadac, quietly.

When the old Jew had again recovered himself, the captain addressed him. "Now, tell us, what interest do you expect?"

Nothing could overcome the Jew's anxiety to make another good bargain. He began: "Money is scarce, very scarce, you know——"

"No more of this!" shouted Servadac. "What interest, I say, what interest do you ask?"

Faltering and undecided still, the Jew went on. "Very scarce, you know. Ten francs a day, I think, would not be unreasonable, considering——"

The count had no patience to allow him to finish what he was about to say. He flung down notes to the value of several rubles. With a greediness that could not be concealed, Hakkabut grasped them all. Paper, indeed, they were; but the cunning Israelite knew that they would in any case be security far beyond the value of his cash. He was making some eighteen hundred per cent. interest, and accordingly chuckled within himself at his unexpected stroke of business.

The professor pocketed his French coins with a satisfaction far more demonstrative. "Gentlemen," he said, "with these franc pieces I obtain the means of determining accurately both a meter and a kilogram."

CHAPTER VII

GALLIA WEIGHED

A QUARTER of an hour later, the visitors to the *Hansa* had reassembled in the common hall of Nina's Hive.

"Now, gentlemen, we can proceed," said the professor. "May I request that this table may be cleared?"

Ben Zoof removed the various articles that were lying on the table, and the coins which had just been borrowed from the Jew were placed upon it in three piles, according to their value.

The professor commenced. "Since none of you gentlemen, at the time of the shock, took the precaution to save either a meter measure or a kilogram weight from the earth, and since both these articles are necessary for the calculation on which we are engaged, I have been obliged to devise means of my own to replace them."

This exordium delivered, he paused and seemed to watch its effect upon his audience. But they were too well acquainted with the professor's temper to make any attempt to exonerate themselves from the rebuke of carelessness, and submitted silently to the implied reproach.

"I have taken pains," he continued, "to satisfy myself that these coins are in proper condition for my purpose. I find them unworn and unchipped; indeed, they are almost new. They have been hoarded instead of circulated; accordingly, they are fit to be utilized for my purpose of obtaining the precise length of a terrestrial meter."

Ben Zoof looked on in perplexity, regarding the lecturer with much the same curiosity as he would have watched the performances of a traveling mountebank at a fair in Montmartre; but Servadac and his two friends had already divined the professor's meaning. They knew that French coinage

is all decimal, the franc being the standard of which the other coins, whether gold, silver, or copper, are multiples or measures; they knew, too, that the caliber or diameter of each piece of money is rigorously determined by law, and that the diameters of the silver coins representing five francs, two francs, and fifty centimes measure thirty-seven, twenty-seven, and eighteen millimeters respectively; and they accordingly guessed that Professor Rosette had conceived the plan of placing such a number of these coins in juxtaposition that the length of their united diameters should measure exactly the thousand millimeters that make up the terrestrial meter.

The measurement thus obtained was made by means of a pair of compasses divided accurately into ten equal portions, or decimeters, each of course 3.93 inches long. A rod was then cut of this exact length and given to the engineer of the *Dobryna*, who was directed to cut out of the solid rock the cubic decimeter required by the professor.

The next business was to obtain the precise weight of a kilogram. This was by no means a difficult matter. Not only the diameters, but also the weights, of the French coins are rigidly determined by law, and as the silver five-franc pieces always weigh exactly twenty-five grams, the united weight of forty of these coins is known to amount to one kilogram.

"Oh!" cried Ben Zoof: "to be able to do all this, I see you must be rich as well as learned."

With a good-natured laugh at the orderly's remark, the meeting adjourned for a few hours. By the appointed time the engineer had finished his task, and with all due care had prepared a cubic decimeter of the material of the comet.

"Now, gentlemen," said Professor Rosette, "we are in a position to complete our calculation; we can now arrive at Gallia's attraction, density, and mass."

Everyone gave him complete attention.

"Before I proceed," he resumed, "I must recall to your minds Newton's general law, 'that the attraction of two bodies is directly proportional to the product of their masses, and inversely proportional to the square of their distances."

"Yes," said Servadac; "we remember that."

"Well, then," continued the professor, "keep it in mind for a few minutes now. Look here! In this bag are forty five-franc pieces—altogether they weigh exactly a kilogram; by which I mean if we were on the earth, and if I were to hang the bag on the hook of the steelyard, the indicator on the dial would register one kilogram. This is clear enough, I suppose?"

As he spoke the professor designedly kept his eyes fixed upon Ben Zoof. He was avowedly following the example of Arago, who was accustomed always in lecturing to watch the countenance of the least intelligent of his audience, and when he felt that he had made his meaning clear to him, he concluded that he must have succeeded with all the rest. In this case, however, it was technical ignorance, rather than any lack of intelligence, that justified the selection of the orderly for this special attention.

Satisfied with his scrutiny of Ben Zoof's face, the professor went on. "And now, gentlemen, we have to see what these coins weigh here upon Gallia."

He suspended the money bag to the hook; the needle oscillated, and stopped. "Read it off!" he said.

The weight registered was one hundred and thirty-three grams.

"There, gentlemen, one hundred and thirty-three grams! Less than one-seventh of a kilogram! You see, consequently, that the force of gravity here on Gallia is not one-seventh of what it is upon the earth!"

"Interesting!" cried Servadac, "most interesting! But let us go and compute the mass."

"No, captain, the density first," said Rosette.

"Certainly," said the lieutenant; "for as we already know the volume, we can determine the mass as soon as we have ascertained the density."

The professor took up the cube of rock. "You know what this is," he went on to say. "You know, gentlemen, that this block is a cube hewn from the substance of which everywhere, all throughout your voyage of circumnavigation, you found Gallia to be composed—a substance to which your geological attainments did not suffice to assign a name."

"Our curiosity will be gratified," said Servadac, "if you will enlighten our ignorance."

But Rosette did not take the slightest notice of the interruption.

"A substance it is which no doubt constitutes the sole material of the comet, extending from its surface to its innermost depths. The probability is that it would be so; your experience confirms that probability: you have found no trace of any other substance. Of this rock here is a solid decimeter; let us get at its weight, and we shall have the key which will unlock the problem of the whole weight of Gallia. We have demonstrated that the force of attraction here is only one-seventh of what it is upon the earth, and shall consequently have to multiply the apparent weight of our cube by seven, in order to ascertain its proper weight. Do you understand me, goggle-eyes?"

This was addressed to Ben Zoof, who was staring hard at him. "No!" said Ben Zoof.

"I thought not; it is of no use waiting for your puzzle-brains to make it out. I must talk to those who *can* understand."

The professor took the cube, and, on attaching it to the hook of the steelyard, found that its apparent weight was one kilogram and four hundred and thirty grams.

"Here it is, gentlemen; one kilogram, four hundred and thirty grams. Multiply that by seven; the product is, as nearly as possible, ten kilograms. What, therefore, is our conclusion? Why, that the density of Gallia is just about double the density of the earth, which we know is only five kilograms to a cubic decimeter. Had it not been for this greater density, the attraction of Gallia would only have been one-fifteenth instead of one-seventh of the terrestrial attraction."

The professor could not refrain from exhibiting his gratification that, however inferior in volume, in density, at least, his comet had the advantage over the earth.

Nothing further now remained than to apply the investigations thus finished to the determining of the mass or weight. This was a matter of little labor.

"Let me see," said the captain; "what is the force of gravity upon the various planets?"

"You can't mean, Servadac, that you have forgotten that? But you always were a disappointing pupil."

The captain could not help himself: he was forced to confess that his memory had failed him.

"Well, then," said the professor, "I must remind you. Taking the attraction of the earth as 1, that on Mercury is 1.15, on Venus it is .92, on Mars .5, and on Jupiter 2.45; on the moon the attraction is .16, whilst on the surface of the sun a terrestrial kilogram would weigh 28 kilograms."

"Therefore, if a man upon the surface of the sun were to fall down, he would have considerable difficulty in getting up again. A cannon ball, too, would only fly a few yards," said Lieutenant Procope.

"A jolly battle-field for cowards!" exclaimed Ben Zoof.

"Not so jolly, Ben Zoof, as you fancy," said his master; "the cowards would be too heavy to run away."

Ben Zoof ventured the remark that, as the smallness of Gallia secured to its inhabitants such an increase of strength and agility, he was almost sorry that it was not a little smaller still.

"Though it could not have been very much smaller anyhow," he added, looking slyly at the professor.

"Idiot!" exclaimed Rosette. "Your head is too light already; a puff of wind would blow it away."

"I must take care of my head, then, and hold it on," replied the irrepressible orderly.

Unable to get the last word, the professor was about to retire, when Servadac detained him.

"Permit me to ask you one more question," he said. "Can you tell me what is the nature of the soil of Gallia?"

"Yes, I can answer that. And in this matter I do not think your impertinent orderly will venture to put Montmartre in the comparison. This soil is of a substance not unknown upon the earth." And speaking very slowly, the professor said: "It contains 70 per cent. of tellurium, and 30 per cent. of gold."

Servadac uttered an exclamation of surprise.

"And the average of the specific gravities of these two substances is 10, precisely the number that represents Gallia's density."

"A comet of gold!" ejaculated the captain.

"Yes; a realization of what the illustrious Maupertuis has already deemed probable," replied the astronomer.

"If Gallia, then, should ever become attached to the earth, might it not bring about an important revolution in all monetary affairs?" inquired the count.

"No doubt about it!" said Rosette, with manifest satisfaction. "It would supply the world with about 246,000 trillions of francs."

"It would make gold about as cheap as dirt, I suppose," said Servadac.

The last observation, however, was entirely lost upon the professor, who had left the hall with an air almost majestic, and was already on his way to the observatory.

"And what, I wonder, is the use of all these big figures?" said Ben Zoof to his master, when next day they were alone together.

"That's just the charm of them, my good fellow," was the captain's cool reply, "that they are of no use whatever."

CHAPTER VIII

JUPITER SOMEWHAT CLOSE

EXCEPT as to the time the comet would take to revolve round the sun, it must be confessed that all the professor's calculations had comparatively little interest for anyone but himself, and he was consequently left very much to pursue his studies in solitude.

The following day was the 1st of August, or according to Rosette, the 63rd of April. In the course of this month Gallia would travel 16,500,000 leagues, attaining at the end a distance of 197,000,000 leagues from the sun. This would leave 81,000,000 leagues more to be traversed before reaching the aphelion of the 15th of January, after which it would begin once more to approach the sun.

But meanwhile, a marvelous world, never before so close within the range of human vision, was revealing itself. No wonder that Palmyrin Rosette cared so little to quit his observatory; for throughout those calm, clear Gallian nights, when the book of the firmament lay open before him, he could revel in a spectacle which no previous astronomer had ever been permitted to enjoy.

The glorious orb that was becoming so conspicuous an object was none other than the planet Jupiter, the largest of all the bodies existing within the influence of solar attraction. During the seven months that had elapsed since its collision with the earth, the comet had been continuously approaching the planet, until the distance between them was scarcely more than 61,000,000 leagues, and this would go on diminishing until the 15th of October.

Under these circumstances, was it perfectly certain that no danger could accrue? Was not Gallia, when its pathway led it into such close proximity to this enormous planet, running a risk of being attracted within its influence? Might not that influence be altogether disastrous? The professor, it is true, in his estimate of the duration of his comet's revolution, had represented that he had made all proper allowances for any perturbations that would be caused either by Jupiter, by Saturn, or by Mars; but what if there were any errors in his calculations? what if there should be any elements of disturbance on which he had not reckoned?

Speculations of this kind became more and more frequent, and Lieutenant Procope pointed out that the danger incurred might be of a fourfold character: first, that the comet, being irresistibly attracted, might be drawn on to the very surface of the planet, and there annihilated; secondly, that as the result of being brought under that attraction, it might be transformed into a satellite, or even a sub-satellite, of that mighty world; thirdly, that it might be diverted into a new orbit, which would never be coincident with the ecliptic; or lastly, its course might be so retarded that it would only reach the ecliptic too late to permit any junction with the earth. The occurrence of any one of these contingencies would be fatal to their hopes of reunion with the globe, from which they had been so strangely severed.

To Rosette, who, without family ties which he had never found leisure or inclination to contract,

had no shadow of desire to return to the earth, it would be only the first of these probabilities that could give him any concern. Total annihilation might not accord with his views, but he would be quite content for Gallia to miss its mark with regard to the earth, indifferent whether it revolved as a new satellite around Jupiter, or whether it wended its course through the untraversed regions of the milky way. The rest of the community, however, by no means sympathized with the professor's sentiments, and the following month was a period of considerable doubt and anxiety.

On the 1st of September the distance between Gallia and Jupiter was precisely the same as the mean distance between the earth and the sun; on the 16th, the distance was further reduced to 26,000,000 leagues. The planet began to assume enormous dimensions, and it almost seemed as if the comet had already been deflected from its elliptical orbit, and was rushing on in a straight line towards the overwhelming luminary.

The more they contemplated the character of this gigantic planet, the more they became impressed with the likelihood of a serious perturbation in their own course. The diameter of Jupiter is 85,390 miles, nearly eleven times as great as that of the earth; its volume is 1,387 times, and its mass 300 times greater; and although the mean density is only about a third of that of water (whence it has been supposed that the superficies of Jupiter is liquid), yet its other proportions were large enough to warrant the apprehension that important disturbances might result from its proximity.

"I forget my astronomy, lieutenant," said Servadac. "Tell me all you can about this formidable neighbor."

The lieutenant having refreshed his memory by reference to Flammarion's *Récits de l'Infini*, of which he had a Russian translation, and some other books, proceeded to recapitulate that Jupiter accomplishes its revolution round the sun in 4,332 days, 14 hours, and 2 minutes; that it travels at the rate of 467 miles a minute along an orbit measuring 2,976 millions of miles; and that its rotation on its axis occupies only 9 hours and 55 minutes.

"His days, then, are shorter than the earth's days?" interrupted the captain.

"Considerably," answered the lieutenant, who went on to describe how the displacement of a point at the equator of Jupiter was twenty-seven times as rapid as on the earth, causing the polar compression to be about 2,378 miles; how the axis, being nearly perpendicular to the plane of its orbit, caused the days and nights to be nearly of the same length, and the seasons to be invariable; and how the amount of light and heat received by the planet is only a twenty-fifth part of that received by the earth, the average distance from the sun being 475,693,000 miles.

"And how about these satellites? Sometimes, I suppose, Jupiter has the benefit of four moons all shining at once?" asked Servadac.

Of the satellites, Lieutenant Procope went on to say that one is rather smaller than our own moon; that another moves round its primary at an interval about equal to the moon's distance from ourselves; but that they all revolve in considerably less time: the first takes only 1 day, 18 hours, 27 minutes; the second takes 3 days, 13 hours, 14 minutes; the third, 7 days, 3 hours, 42 minutes; whilst the largest of all takes but 16 days, 16 hours, 32 minutes. The most remote revolves round the planet at a distance of 1,192,820 miles.

"They have been enlisted into the service of science," said Procope. "It is by their movements that the velocity of light has been calculated; and they have been made available for the determination of terrestrial longitudes."

"It must be a wonderful sight," said the captain.

"Yes," answered Procope. "I often think Jupiter is like a prodigious clock with four hands."

"I only hope that we are not destined to make a fifth hand," answered Servadac.

Such was the style of the conversation that was day by day reiterated during the whole month of suspense. Whatever topic might be started, it seemed soon to settle down upon the huge orb that was looming upon them with such threatening aspect.

"The more remote that these planets are from the sun," said Procope, "the more venerable and advanced in formation are they found to be. Neptune, situated 2,746,271,000 miles from the sun, issued from the solar nebulosity, thousands of millions of centuries back. Uranus, revolving 1,753,851,000 miles from the center of the planetary system, is of an age amounting to many hundred millions of centuries. Jupiter, the colossal planet, gravitating at a distance of 475,693,000 miles, may be reckoned as 70,000,000 centuries old. Mars has existed for 1,000,000,000 years at a distance of 139,212,000 miles. The earth, 91,430,000 miles from the sun, quitted his burning bosom 100,000,000 years ago. Venus, revolving now 66,131,000 miles away, may be assigned the age of 50,000,000 years at least; and Mercury, nearest of all, and youngest of all, has been revolving at a distance of 35,393,000 miles for the space of 10,000,000 years—the same time as the moon has been evolved from the earth."

Servadac listened attentively. He was at a loss what to say; and the only reply he made to the recital of this novel theory was to the effect that, if it were true, he would prefer being captured by Mercury than by Jupiter, for Mercury, being so much the younger, would probably prove the less imperative and self-willed master.

It was on the 1st of September that the comet had crossed the orbit of Jupiter, and on the 1st of October the two bodies were calculated to be at their minimum separation. No direct shock, however, could be apprehended; the demonstration was sufficiently complete that the orbit of Gallia did not coincide with that of the planet, the orbit of Jupiter being inclined at any angle of 1° 19′ to the orbit of the earth, with which that of Gallia was, no doubt, coincident.

As the month of September verged towards its close, Jupiter began to wear an aspect that must have excited the admiration of the most ignorant or the most indifferent observer. Its salient points were illumined with novel and radiant tints, and the solar rays, reflected from its disc, glowed with a mingled softness and intensity upon Gallia, so that Nerina had to pale her beauty.

Who could wonder that Rosette, enthusiast as he was, should be irremovable from his observatory?

Who could expect otherwise than that, with the prospect before him of viewing the giant among planets, ten times nearer than any mortal eye had ever done, he should have begrudged every moment that distracted his attention?

Meanwhile, as Jupiter grew large, the sun grew small.

From its increased remoteness the diameter of the sun's disc was diminished to 5′ 46″.

And what increased interest began to be associated with the satellites! They were visible to the naked eye! Was it not a new record in the annals of science?

Although it is acknowledged that they are not ordinarily visible on earth without the aid of a somewhat powerful telescope, it has been asserted that a favored few, endued with extraordinary powers of vision, have been able to identify them with an unassisted eye; but here, at least, in Nina's Hive were many rivals, for everyone could so far distinguish them one from the other as to describe them by their colors. The first was of a dull white shade; the second was blue; the third was white and brilliant; the fourth was orange, at times approaching to a red. It was further observed that Jupiter itself was almost void of scintillation.

Rosette, in his absorbing interest for the glowing glories of the planet, seemed to be beguiled into comparative forgetfulness of the charms of his comet; but no astronomical enthusiasm of the professor could quite allay the general apprehension that some serious collision might be impending.

Time passed on. There was nothing to justify apprehension. The question was continually being asked, "What does the professor really think?"

"Our friend the professor," said Servadac, "is not likely to tell us very much; but we may feel pretty certain of one thing: he would not keep us long in the dark, if he thought we were not going back to the earth again. The greatest satisfaction he could have would be to inform us that we had parted from the earth for ever."

"I trust from my very soul," said the count, "that his prognostications are correct."

"The more I see of him, and the more I listen to him," replied Servadac, "the more I become convinced that his calculations are based on a solid foundation, and will prove correct to the minutest particular."

Ben Zoof here interrupted the conversation. "I have something on my mind," he said.

"Something on your mind? Out with it!" said the captain.

"That telescope!" said the orderly; "it strikes me that that telescope which the old professor keeps pointed up at yonder big sun is bringing it down straight upon us."

The captain laughed heartily.

"Laugh, captain, if you like; but I feel disposed to break the old telescope into atoms."

"Ben Zoof," said Servadac, his laughter exchanged for a look of stern displeasure, "touch that telescope, and you shall swing for it!"

The orderly looked astonished.

"I am governor here," said Servadac.

Ben Zoof knew what his master meant, and to him his master's wish was law.

The interval between the comet and Jupiter was, by the 1st of October, reduced to 43,000,000 miles. The belts all parallel to Jupiter's equator were very distinct in their markings. Those immediately north and south of the equator were a dusky hue; those toward the poles were alternately dark and light; the intervening spaces of the planet's superficies, between edge and edge, being intensely bright. The belts themselves were occasionally broken by spots, which the records of astronomy describe as varying both in form and in extent.

The physiology of belts and spots alike was beyond the astronomer's power to ascertain; and even if he should be destined once again to take his place in an astronomical congress on the earth, he would be just as incapable as ever of determining whether or no they owed their existence to the external accumulation of vapor, or to some internal agency. It would not be Professor Rosette's lot to enlighten his brother *savants* to any great degree as to the mysteries that are associated with this, which must ever rank as one of the most magnificent amongst the heavenly orbs.

As the comet approached the critical point of its career it cannot be denied that there was an unacknowledged consciousness of alarm. Mutually reserved, though ever courteous, the count and the captain were secretly drawn together by the prospect of a common danger; and as their return to the earth appeared to them to become more and more dubious, they abandoned their views of narrow isolation, and tried to embrace the wider philosophy that acknowledges the credibility of a habitable universe.

But no philosophy could be proof against the common instincts of their humanity; their hearts, their hopes, were set upon their natural home; no speculation, no science, no experience, could induce them to give up their fond and sanguine anticipation that once again they were to come in contact with the earth.

"Only let us escape Jupiter," said Lieutenant Procope, repeatedly, "and we are free from anxiety."

"But would not Saturn lie ahead?" asked Servadac and the count in one breath.

"No!" said Procope; "the orbit of Saturn is remote, and does not come athwart our path. Jupiter is our sole hindrance. Of Jupiter we must say, as William Tell said, 'Once through the ominous pass and all is well.'"

The 15th of October came, the date of the nearest approximation of the comet to the planet. They were only 31,000,000 miles apart. What would now transpire? Would Gallia be diverted from its proper way? or would it hold the course that the astronomer had predicted?

Early next morning the captain ventured to take the count and the lieutenant up to the observatory. The professor was in the worst of tempers.

That was enough. It was enough, without a word, to indicate the course which events had taken. The comet was pursuing an unaltered way.

The astronomer, correct in his prognostications, ought to have been the most proud and contented of philosophers; his pride and contentment were both overshadowed by the certainty that the career of his comet was destined to be so transient, and that it must inevitably once again come into collision with the earth.

CHAPTER IX

MARKET PRICES IN GALLIA

"ALL right!" said Servadac, convinced by the professor's ill humor that the danger was past; "no doubt we are in for a two years' excursion, but fifteen months more will take us back to the earth!"

"And we shall see Montmartre again!" exclaimed Ben Zoof, in excited tones that betrayed his delight in the anticipation.

To use a nautical expression, they had safely "rounded the point," and they had to be congratulated on their successful navigation; for if, under the influence of Jupiter's attraction, the comet had been retarded for a single hour, in that hour the earth would have already traveled 2,500,000 miles from the point where contact would ensue, and many centuries would elapse before such a coincidence would possibly again occur.

On the 1st of November Gallia and Jupiter were 40,000,000 miles apart. It was little more than ten weeks to the 15th of January, when the comet would begin to reapproach the sun. Though light and heat were now reduced to a twenty-fifth part of their terrestrial intensity, so that a perpetual twilight seemed to have settled over Gallia, yet the population felt cheered even by the little that was left, and buoyed up by the hope that they should ultimately regain their proper position with regard to the great luminary, of which the temperature has been estimated as not less than 5,000,000 degrees.

Of the anxiety endured during the last two months Isaac Hakkabut had known nothing. Since the day he had done his lucky stroke of business he had never left the tartan; and after Ben Zoof, on the following day, had returned the steelyard and borrowed cash, receiving back the paper roubles deposited, all communication between the Jew and Nina's Hive had ceased. In the course of the few minute's conversation which Ben Zoof had held with him, he had mentioned that he knew the whole soil of Gallia was made of gold; but the old man, guessing that the orderly was only laughing at him as usual, paid no attention to the remark, and only meditated upon the means he could devise to get every bit of the money in the new world into his own possession. No one grieved over the life of solitude which Hakkabut persisted in leading. Ben Zoof giggled heartily, as he repeatedly observed "it was astonishing how they reconciled themselves to his absence."

The time came, however, when various circumstances prompted him to think he must renew his intercourse with the inhabitants of the Hive. Some of his goods were beginning to spoil, and he felt the necessity of turning them into money, if he would not be a loser; he hoped, moreover, that the scarcity of his commodities would secure very high prices.

It happened, just about this same time, that Ben Zoof had been calling his master's attention to the fact that some of their most necessary provisions would soon be running short, and that their stock of coffee, sugar, and tobacco would want replenishing. Servadac's mind, of course, turned to the cargo on board the *Hansa*, and he resolved, according to his promise, to apply to the Jew and become a purchaser. Mutual interest and necessity thus conspired to draw Hakkabut and the captain together.

Often and often had Isaac gloated in his solitude over the prospect of first selling a portion of his merchandise for all the gold and silver in the colony. His recent usurious transaction had whetted his appetite. He would next part with some more of his cargo for all the paper money they coud give him; but still he should have goods left, and they would want these. Yes, they should have these, too, for promissory notes. Notes would hold good when they got back again to the earth; bills from his Excellency the governor would be good bills; anyhow there would be the sheriff. By the God of Israel! he would get good prices, and he would get fine interest!

Although he did not know it, he was proposing to follow the practice of the Gauls of old, who advanced money on bills for payment in a future life. Hakkabut's "future life," however, was not many months in advance of the present.

Still Hakkabut hesitated to make the first advance, and it was accordingly with much satisfaction that he hailed Captain Servadac's appearance on board the *Hansa*.

"Hakkabut," said the captain, plunging without further preface into business, "we want some coffee, some tobacco, and other things. I have come to-day to order them, to settle the price, and to-morrow Ben Zoof shall fetch the goods away."

"Merciful heavens!" the Jew began to whine; but Servadac cut him short.

"None of that miserable howling! Business! I am come to buy your goods. I shall pay for them."

"Ah yes, your Excellency," whispered the Jew, his voice trembling like a street beggar. "Don't impose on me. I am poor; I am nearly ruined already."

"Cease your wretched whining!" cried Servadac. "I have told you once, I shall pay for all I buy."

"Ready money?" asked Hakkabut.

"Yes, ready money. What makes you ask?" said the captain, curious to hear what the Jew would say.

"Well, you see—you see, your Excellency," stammered out the Jew, "to give credit to one wouldn't do, unless I gave credit to another. You are solvent—I mean honorable, and his lordship the count is honorable; but maybe—maybe——"

"Well?" said Servadac, waiting, but inclined to kick the old rascal out of his sight.

"I shouldn't like to give credit," he repeated.

"I have not asked for credit. I have told you, you shall have ready money."

"Very good, your Excellency. But how will you pay me?"

"Pay you? Why, we shall pay you in gold and silver and copper, while our money lasts, and when that is gone we shall pay you in bank notes."

"Oh, no paper, no paper!" groaned out the Jew, relapsing into his accustomed whine.

"Nonsense, man!" cried Servadac.

"No paper!" reiterated Hakkabut.

"Why not? Surely you can trust the banks of England, France, and Russia."

"Ah no! I must have gold. Nothing so safe as gold."

"Well then," said the captain, not wanting to lose his temper, "you shall have it your own way; we

have plenty of gold for the present. We will leave the bank notes for by and by." The Jew's countenance brightened, and Servadac, repeating that he should come again the next day, was about to quit the vessel.

"One moment, your Excellency," said Hakkabut, sidling up with a hypocritical smile; "I suppose I am to fix my own prices."

"You will, of course, charge ordinary prices—proper market prices; European prices, I mean."

"Merciful heavens!" shrieked the old man, "you rob me of my rights; you defraud me of my privilege. The monopoly of the market belongs to me. It is the custom; it is my right; it is my privilege to fix my own prices."

Servadac made him understand that he had no intention of swerving from his decision.

"Merciful heavens!" again howled the Jew, "it is sheer ruin. The time of monopoly is the time for profit; it is the time for speculation."

"The very thing, Hakkabut, that I am anxious to prevent. Just stop now, and think a minute. You seem to forget *my* rights; you are forgetting that, if I please, I can confiscate all your cargo for the common use. You ought to think yourself lucky in getting any price at all. Be contented with European prices; you will get no more. I am not going to waste my breath on you. I will come again to-morrow;" and, without allowing Hakkabut time to renew his lamentations, Servadac went away.

All the rest of the day the Jew was muttering bitter curses against the thieves of Gentiles in general, and the governor of Gallia in particular, who were robbing him of his just profits, by binding him down to a maximum price for his goods, just as if it were a time of revolution in the state. But he would be even with them yet; he would have it all out of them: he would make European prices pay, after all. He had a plan—he knew how; and he chuckled to himself and grinned maliciously.

True to his word, the captain next morning arrived at the tartan. He was accompanied by Ben Zoof and two Russian sailors. "Good-morning, old Eleazar; we have come to do our little bit of friendly business with you, you know," was Ben Zoof's greeting.

"What do you want to-day?" asked the Jew.

"To-day we want coffee, and we want sugar, and we want tobacco. We must have ten kilograms of each. Take care they are all good; all first rate. I am commissariat officer, and I am responsible."

"I thought you were the governor's aide-de-camp," said Hakkabut.

"So I am, on state occasions; but to-day, I tell you. I am superintendent of the commissariat department. Now, look sharp!"

Hakkabut hereupon descended into the hold of the tartan, and soon returned, carrying ten packets of tobacco, each weighing one kilogram, and securely fastened by strips of paper, labeled with the French government stamp.

"Ten kilograms of tobacco at twelve francs a kilogram: a hundred and twenty francs," said the Jew.

Ben Zoof was on the point of laying down the money, when Servadac stopped him.

"Let us just see whether the weight is correct."

Hakkabut pointed out that the weight was duly registered on every packet, and that the packets had never been unfastened. The captain, however, had his own special object in view, and would not be diverted. The Jew fetched his spring balance, and a packet of the tobacco was suspended to it.

"Merciful heavens!" screamed Isaac.

The index registered only 133 grams!

"You see, Hakkabut, I was right. I was perfectly justified in having your goods put to the test," said Servadac, quite seriously.

"But—but, your Excellency——" stammered out the bewildered man.

"You will, of course, make up the deficiency," the captain continued, not noticing the interruption.

"Oh, my lord, let me say——" began Isaac again.

"Come, come, old Caiaphas, do you hear? You are to make up the deficiency," exclaimed Ben Zoof.

"Ah, yes, yes; but——"

The unfortunate Israelite tried hard to speak, but his agitation prevented him. He understood well enough the cause of the phenomenon, but he was overpowered by the conviction that the "cursed Gentiles" wanted to cheat him. He deeply regretted that he had not a pair of common scales on board.

"Come, I say, old Jedediah, you are a long while making up what's short," said Ben Zoof, while the Jew was still stammering on.

As soon as he recovered his power of articulation, Isaac began to pour out a medley of lamentations and petitions for mercy. The captain was inexorable. "Very sorry, you know, Hakkabut. It is not my fault that the packet is short weight; but I cannot pay for a kilogram unless I have a kilogram."

Hakkabut pleaded for some consideration.

"A bargain is a bargain," said Servadac. "You must complete your contract."

And, moaning and groaning, the miserable man was driven to make up the full weight as registered by his own scale. He had to repeat the process with the sugar and coffee: for every kilogram he had to weigh seven. Ben Zoof and the Russians jeered him most unmercifully.

"I say, old Mordecai, wouldn't you rather give your goods away, than sell them at this rate? I would."

"I say, old Pilate, a monopoly isn't always a good thing, is it?"

"I say, old Sepharvaim, what a flourishing trade you're driving!"

Meanwhile seventy kilograms of each of the articles required were weighed, and the Jew for each seventy had to take the price of ten.

All along Captain Servadac had been acting only in jest. Aware that old Isaac was an utter hypocrite, he had no compunction in turning a business transaction with him into an occasion for a bit of fun. But the joke at an end he took care that the Jew was properly paid all his legitimate due.

CHAPTER X

FAR INTO SPACE

A MONTH passed away. Gallia continued its course, bearing its little population onwards, so far removed from the ordinary influence of human passions that it might almost be said that its sole ostensible vice was represented by the greed and avarice of the miserable Jew.

After all, they were but making a voyage—a

strange, yet a transient, excursion through solar regions hitherto untraversed; but if the professor's calculations were correct—and why should they be doubted?—their little vessel was destined, after a two years' absence, once more to return "to port." The landing, indeed, might be a matter of difficulty; but with the good prospect before them of once again standing on terrestrial shores, they had nothing to do at present except to make themselves as comfortable as they could in their present quarters.

Thus confident in their anticipations, neither the captain, the count, nor the lieutenant felt under any serious obligation to make any extensive provisions for the future; they saw no necessity for expending the strength of the people, during the short summer that would intervene upon the long severity of winter, in the cultivation or the preservation of their agricultural resources. Nevertheless they often found themselves talking over the measures they would have been driven to adopt, if they had found themselves permanently attached to their present home.

Even after the turning-point in their career, they knew that at least nine months would have to elapse before the sea would be open to navigation; but at the very first arrival of summer they would be bound to arrange for the *Dobryna* and the *Hansa* to retransport themselves and all their animals to the shores of Gourbi Island, where they would have to commence their agricultural labors to secure the crops that must form their winter store. During four months or thereabouts, they would lead the lives of farmers and of sportsmen; but no sooner would their haymaking and their corn harvest have been accomplished, than they would be compelled again, like a swarm of bees, to retire to their semi-troglodyte existence in the cells of Nina's Hive.

Now and then the captain and his friends found themselves speculating whether, in the event of their having to spend another winter upon Gallia, some means could not be devised by which the dreariness of a second residence in the recesses of the volcano might be escaped. Would not another exploring expedition possibly result in the discovery of a vein of coal or other combustible matter, which could be turned to account in warming some erection which they might hope to put up? A prolonged existence in their underground quarters was felt to be monotonous and depressing, and although it might be all very well for a man like Professor Rosette, absorbed in astronomical studies, it was ill suited to the temperaments of any of themselves for any longer period than was absolutely indispensable.

One contingency there was, almost too terrible to be taken into account. Was it not to be expected that the time might come when the internal fires of Gallia would lose their activity, and the stream of lava would consequently cease to flow? Why should Gallia be exempt from the destiny that seemed to await every other heavenly body? Why should it not roll onwards, like the moon, a dark cold mass in space?

In the event of such a cessation of the volcanic eruption, whilst the comet was still at so great a distance from the sun, they would indeed be at a loss to find a substitute for what alone had served to render life endurable at a temperature of 60° below zero. Happily, however, there was at present no symptom of the subsidence of the lava's stream; the volcano continued its regular and unchanging discharge, and Servadac, ever sanguine, declared that it was useless to give themselves any anxiety upon the matter.

On the 15th of December, Gallia was 276,000,000 leagues from the sun, and, as it was approximately to the extremity of its axis major, would travel only some 11,000,000 or 12,000,000 leagues during the month. Another world was now becoming a conspicuous object in the heavens, and Palmyrin Rosette, after rejoicing in an approach nearer to Jupiter than any other mortal man had ever attained, was now to be privileged to enjoy a similar opportunity of contemplating the planet Saturn. Not that the circumstances were altogether so favorable. Scarcely 31,000,000 miles had separated Gallia from Jupiter, the minimum distance of Saturn would not be less than 415,000,000 miles; but even this distance, although too great to affect the comet's progress more than had been duly reckoned on, was considerably shorter than what had ever separated Saturn from the earth.

To get any information about the planet from Rosette appeared quite impossible. Although equally by night and by day he never seemed to quit his telescope, he did not evince the slightest inclination to impart the results of his observations. It was only from the few astronomical works that happened to be included in the *Dobryna's* library that any details could be gathered, but these were sufficient to give a large amount of interesting information.

Ben Zoof, when he was made aware that the earth would be invisible to the naked eye from the surface of Saturn, declared that he then, for his part, did not care to learn any more about such a planet; to him it was indispensable that the earth should remain in sight, and it was his great consolation that hitherto his native sphere had never vanished from his gaze.

At this date Saturn was revolving at a distance of 420,000,000 miles from Gallia, and consequently 874,440,000 miles from the sun, receiving only a hundredth part of the light and heat which that luminary bestows upon the earth. On consulting their books of reference, the colonists found that Saturn completes its revolution round the sun in a period of 29 years and 167 days, traveling at the rate of more than 21,000 miles an hour along an orbit measuring 5,490 millions of miles in length. Its circumference is about 220,000 miles; its superficies, 144,000 millions of square miles; its volume, 143,846 millions of cubic miles. Saturn is 735 times larger than the earth, consequently it is smaller than Jupiter; in mass it is only 90 times greater than the earth, which gives it a density less than that of water. It revolves on its axis in 10 hours 29 minutes, and its own year consists of 86,630 days; and its seasons, on account of the great inclination of its axis to the plane of its orbit, are each of the length of seven terrestrial years.

Although the light received from the sun is comparatively feeble, the nights upon Saturn must be splendid. Eight satellites — Mimas, Enceladus, Tethys, Dione, Rhea, Titan, Hyperion, and Japetus —accompany the planet; Mimas, the nearest to its primary, rotating on its axis in 22½ hours, and revolving at a distance of only 120,800 miles, whilst Japetus, the most remote, occupies 79 days in its

rotation, and revolves at a distance of 2,314,000 miles.

Another most important contribution to the magnificence of the nights upon Saturn is the triple ring with which, as a brilliant setting, the planet is encompassed. To an observer at the equator, this ring, which has been estimated by Sir William Herschel as scarcely 100 miles in thickness, must have the appearance of a narrow band of light passing through the zenith 12,000 miles above his head. As the observer, however, increases his latitude either north or south, the band will gradually widen out into three detached and concentric rings, of which the innermost, dark though transparent, is 9,625 miles in breadth; the intermediate one, which is brighter than the planet itself, being 17,605 miles broad; and the outer, of a dusky hue, being 8,660 miles broad.

Such, they read, is the general outline of this strange appendage, which revolves in its own plane in 10 hours 32 minutes. Of what matter it is composed, and how it resists disintegration, is still an unsettled question; but it might almost seem that the Designer of the universe, in permitting its existence, had been willing to impart to His intelligent creatures the manner in which celestial bodies are evolved, and that this remarkable ring-system is a remnant of the nebula from which Saturn was himself developed, and which, from some unknown cause, has become solidified. If at any time it should disperse, it would either fall into fragments upon the surface of Saturn, or the fragments, mutually coalescing, would form additional satellites to circle round the planet in its path.

To an observer stationed on the planet, between the extremes of lat. 45° on either side of the equator, these wonderful rings would present various strange phenomena. Sometimes they would appear as an illuminated arch, with the shadow of Saturn passing over it like the hour-hand over a dial; at other times they would be like a semi-aureole of light. Very often, too, for periods of several years, daily eclipses of the sun must occur through the interposition of this triple ring.

Truly, with the constant rising and setting of the satellites, some with bright discs at their full, others like silver crescents, in quadrature, as well as by the encircling rings, the aspect of the heavens from the surface of Saturn must be as impressive as it is gorgeous.

The Gallians indeed, were unable to realize all the marvels of this strange world. After all, they were practically a thousand times further off than the great astronomers were able to approach by means of their giant telescopes. But they did not complain; their little comet, they knew, was far safer where it was; far better out of the reach of an attraction which, by affecting their path, might have annihilated their best hopes.

The distances of several of the brightest of the fixed stars have been estimated. Amongst others, Vega in the constellation Lyra is 100 millions of millions of miles away; Sirius in Canis Major, 123 millions of millions; the Pole star, 282 millions of millions; and Capella, 340 millions of millions of miles, a figure represented by no less than fifteen digits.

The hard numerical statement of these enormous figures, however, fails altogether in any adequate way to convey a due impression of the magnitude of these distances. Astronomers, in their ingenuity, have endeavored to use some other basis, and have found "the velocity of light" to be convenient for their purpose. They have made their representations something in this way:

"Suppose," they say, "an observer endowed with and infinite length of vision: suppose him stationed on the surface of Cappella; looking thence towards the earth, he would be a spectator of events that had happened seventy years previously; transport him to a star ten times distant, and he will be reviewing the terrestrial sphere of 720 years back; carry him away further still, to a star so remote that it requires something less than nineteen centuries for light to reach it,* and he would be a witness of the birth and death of Christ; convey him further again, and he shall be looking upon the dread desolation of the Deluge; take him away further yet (for space is infinite), and he shall be a spectator of the Creation of the spheres. History is thus stereotyped in space; nothing once accomplished can ever be effaced."

Who can altogether be astonished that Palmyrin Rosette, with his burning thirst for astronomical research, should have been conscious of a longing for yet wider travel through the sidereal universe? With his comet now under the influence of one star, now of another, what various systems might he not have explored! what undreamed-of marvels might not have revealed themselves before his gaze! The stars, fixed and immovable in name, are all of them in motion, and Gallia might have followed them in their untracked way.

But Gallia had a narrow destiny. She was not to be allowed to wander away into the range of attraction of another center; nor to mingle with the star clusters, some of which have been entirely, others partially resolved; nor was she to lose herself amongst the 5,000 nebulæ which have resisted hitherto the grasp of the most powerful reflectors. No; Gallia was neither to pass beyond the limits of the solar system, nor to travel out of sight of the terrestrial sphere. Her orbit was circumscribed to little over 1,500 millions of miles; and in comparison with the infinite space beyond, this was a mere nothing.

CHAPTER XI

A FETE DAY

THE temperature continued to decrease; the mercurial thermometer, which freezes at 42° below zero, was no longer of service, and the spirit thermometer of the *Dobryna* had been brought into use. This now registered 53° below freezing-point.

In the creek, where the two vessels had been moored for the winter, the elevation of the ice, in anticipation of which Lieutenant Procope had taken the precautionary measure of beveling, was going on slowly but irresistibly, and the tartan was upheaved fifty feet above the level of the Gallian Sea, while the schooner, as being lighter, had been raised to a still greater altitude.

So irresistible was this gradual process of elevation, so utterly defying all human power to arrest, that the lieutenant began to feel very anxious as to the safety of his yacht. With the exception of

**This book appeared in the Nineteenth Century.*

the engine and the masts, everything had been cleared out and conveyed to shore, but in the event of a thaw it appeared that nothing short of a miracle could prevent the hull from being dashed to pieces, and then all means of leaving the promontory would be gone. The *Hansa*, of course, would share a similar fate; in fact, it had already heeled over to such an extent as to render it quite dangerous for its obstinate owner, who, at the peril of his life, resolved that he would stay where he could watch over his all-precious cargo, though continually invoking curses on the ill-fate of which he deemed himself the victim.

There was, however, a stronger will than Isaac Hakkabut's. Although no one of all the community cared at all for the safety of the Jew, they cared very much for the security of his cargo, and when Servadac found that nothing would induce the old man to abandon his present quarters voluntarily, he very soon adopted measures of coercion that were far more effectual than any representations of personal danger.

"Stop where you like, Hakkabut," said the captain to him; "but understand that I consider it my duty to make sure that your cargo is taken care of. I am going to have it carried across to land, at once."

Neither groans, nor tears, nor protestations on the part of the Jew, were of the slightest avail. Forthwith, on the 20th of December, the removal of the goods commenced.

Both Spaniards and Russians were all occupied for several days in the work of unloading the tartan. Well muffled up as they were in furs, they were able to endure the cold with impunity, making it their special care to avoid actual contact with any article of metal, which, in the low state of the temperature, would inevitably have taken all the skin off their hands, as much as if it had been red-hot. The task, however, was brought to an end without accident of any kind; and when the stores of the *Hansa* were safely deposited in the galleries of the Hive, Lieutenant Procope avowed that he really felt that his mind had been unburdened from a great anxiety.

Captain Servadac gave old Isaac full permission to take up his residence amongst the rest of the community, promised him the entire control over his own property, and altogether showed him so much consideration that, but for his unbounded respect for his master, Ben Zoof would have liked to reprimand him for his courtesy to a man whom he so cordially despised.

Although Hakkabut clamored most vehemently about his goods being carried off "against his will," in his heart he was more than satisfied to see his property transferred to a place of safety, and delighted, moreover, to know that the transport had been effected without a farthing of expense to himself. As soon, then, as he found the tartan empty, he was only too glad to accept the offer that had been made him, and very soon made his way over to the quarters in the gallery where his merchandise had been stored. Here he lived day and night. He supplied himself with what little food he required from his own stock of provisions, a small spirit-lamp sufficing to perform all the operations of his meager cookery. Consequently all intercourse between himself and the rest of the inhabitants was entirely confined to business transactions, when occasion required that some purchase should be made from his stock of commodities. Meanwhile, all the silver and gold of the colony was gradually finding its way to a double-locked drawer, of which the Jew most carefully guarded the key.

The 1st of January was drawing near, the anniversary of the shock which had resulted in the severance of thirty-six human beings from the society of their fellow-men. Hitherto, not one of them was missing. The unvarying calmness of the climate, notwithstanding the cold, had tended to maintain them in good health, and there seemed no reason to doubt that, when Gallia returned to the earth, the total of its little population would still be complete.

The 1st of January, it is true, was not properly "New Year's Day" in Gallia, but Captain Servadac, nevertheless, was very anxious to have it observed as a holiday.

"I do not think," he said to Count Timascheff and Lieutenant Procope, "that we ought to allow our people to lose their interest in the world to which we are all hoping to return; and how can we cement the bond that ought to unite us, better than by celebrating, in common with our fellow-creatures upon earth, a day that awakens afresh the kindliest sentiments of all? Besides," he added, smiling, "I expect that Gallia, although invisible just at present to the naked eye, is being closely watched by the telescopes of our terrestrial friends, and I have no doubt that the newspapers and scientific journals of both hemispheres are full of accounts detailing the movements of the new comet."

"True," asserted the count. "I can quite imagine that we are occasioning no small excitement in all the chief observatories."

"Ay, more than that," said the lieutenant; "our Gallia is certain to be far more than a mere object of scientific interest or curiosity. Why should we doubt that the elements of a comet which has once come into collision with the earth have by this time been accurately calculated? What our friend the professor has done here, has been done likewise on the earth, where, beyond a question, all manner of expedients are being discussed as to the best way of mitigating the violence of a concussion that must occur."

The lieutenant's conjectures were so reasonable that they commanded assent. Gallia could scarcely be otherwise than an object of terror to the inhabitants of the earth, who could by no means be certain that a second collision would be comparatively so harmless as the first. Even to the Gallians themselves, much as they looked forward to the event, the prospect was not unmixed with alarm, and they would rejoice in the invention of any device by which it was likely the impetus of the shock might be deadened.

Christmas arrived, and was marked by apropriate religious observance by everyone in the community, with the exception of the Jew, who made a point of secluding himself more obstinately than ever in the gloomy recesses of his retreat.

To Ben Zoof the last week of the year was full of bustle. The arrangements for the New Year *fête* were entrusted to him, and he was anxious, in spite of the resources of Gallia being so limited, to make the program for the great day as attractive as possible.

It was a matter of debate that night whether the professor should be invited to join the party; it was scarcely likely that he would care to come, but, on the whole, it was felt to be advisable to ask him. At first Captain Servadac thought of going in person with the invitation; but, remembering Rosette's dislike to visitors, he altered his mind, and sent young Pablo up to the observatory with a formal note, requesting the pleasure of Professor Rosette's company at the New Year's *fête*.

Pablo was soon back, bringing no answer except that the professor had told him that "to-day was the 125th of June, and that to-morrow would be the 1st of July."

Consequently, Servadac and the count took it for granted that Palmyrin Rosette declined their invitation.

An hour after sunrise on New Year's Day, Frenchmen, Russians, Spaniards, and little Nina, as the representative of Italy, sat down to a feast such as never before had been seen in Gallia. Ben Zoof and the Russian cook had quite surpassed themselves. The wines, part of the *Dobryna's* stores, were of excellent quality. Those of the vintages of France and Spain were drunk in toasting their respective countries, and even Russia was honored in a similar way by means of a few bottles of kuemmel. The company was more than contented—it was as jovial as Ben Zoof could desire; and the ringing cheers that followed the great toast of the day—"A happy return to our Mother Earth," must fairly have startled the professor in the silence of his observatory.

The *déjeuner* over, there still remained three hours of daylight. The sun was approaching the zenith, but so dim and enfeebled were his days that they were very unlike what had produced the wines of Bordeaux and Burgundy which they had just been enjoying, and it was necessary for all, before starting upon an excursion that would last over nightfall, to envelop themselves in the thickest of clothing.

Full of spirits, the party left the Hive, and chattering and singing as they went, made their way down to the frozen shore, where they fastened on their skates. Once upon the ice, everyone followed his own fancy, and some singly, some in groups, scattered themselves in all directions. Captain Servadac, the count, and the lieutenant were generally seen together. Negrete and the Spaniards, now masters of their novel exercise, wandered fleetly and gracefully hither and thither, occasionally being out of sight completely. The Russian sailors, following a northern custom, skated in file, maintaining their rank by means of a long pole passed under their right arms, and in this way they described a trackway of singular regularity. The two children, blithe as birds, flitted about, now singly, now arm-in-arm, now joining the captain's party, now making a short peregrination by themselves, but always full of life and spirit. As for Ben Zoof, he was here, there, and everywhere, his imperturbable good temper ensuring him a smile of welcome whenever he appeared.

Thus coursing rapidly over the icy plain, the whole party had soon exceeded the line that made the horizon from the shore. First, the rocks of the coast were lost to view; then the white crests of the cliffs were no longer to be seen; and at last, the summit of the volcano, with its corona of vapor, was entirely out of sight. Occasionally the skaters were obliged to stop to recover their breath, but, fearful of frost-bite, they almost instantly resumed their exercise, and proceeded nearly as far as Gourbi Island before they thought about retracing their course.

But night was coming on, and the sun was already sinking in the east with the rapidity to which the residents on Gallia were by this time well accustomed. The sunset upon this contracted horizon was very remarkable. There was not a cloud nor a vapor to catch the tints of the declining beams; the surface of the ice did not, as a liquid sea would, reflect the last green ray of light; but the radiant orb, enlarged by the effect of refraction, its circumference sharply defined against the sky, sank abruptly, as though a trap had been opened in the ice for its reception.

Before the daylight ended, Captain Servadac had cautioned the party to collect themselves betimes into one group. "Unless you are sure of your whereabouts before dark," he said, "you will not find it after. We have come out like a party of skirmishers; let us go back in full force."

The night would be dark; their moon was in conjunction, and would not be seen; the stars would only give something of that "pale radiance" which the poet Corneille has described.

Immediately after sunset the torches were lighted, and the long series of flames, fanned by the rapid motion of their bearers, had much the appearance of an enormous fiery banner. An hour later, the volcano appeared like a dim shadow on the horizon, the light from the crater shedding a lurid glare upon the surrounding gloom. In time the glow of the burning lava, reflected in the icy mirror, fell upon the troop of skaters, and cast their lengthened shadows grotesquely on the surface of the frozen sea.

Later still, half an hour or more afterwards, the torches were all but dying out. The shore was close at hand. All at once, Ben Zoof uttered a startled cry, and pointed with bewildered excitement towards the mountain. Involuntarily, one and all, they plowed their heels into the ice and came to a halt. Exclamations of surprise and horror burst from every lip. The volcano was extinguished! The stream of burning lava had suddenly ceased to flow!

Speechless with amazement, they stood still for some moments. There was not one of them that did not realize, more or less, how critical was their position. The sole source of the heat that had enabled them to brave the rigor of the cold had failed them! death, in the cruellest of all shapes, seemed staring them in the face—death from cold!

Meanwhile, the last torch had flickered out.

It was quite dark.

"Forward!" cried Servadac, firmly.

At the word of command they advanced to the shore; clambered with no little difficulty up the slippery rocks; gained the mouth of the gallery; groped their way into the common hall.

How dreary! how chill it seemed!

Th fiery cataract no longer spread its glowing covering over the mouth of the grotto. Lieutenant Procope leaned through the aperture. The pool, hitherto kept fluid by its proximity to the lava, was already encrusted with a layer of ice.

Such was the end of the New Year's Day so happily begun.

CHAPTER XII

THE BOWELS OF THE COMET

THE whole night was spent in speculating, with gloomy forebodings, upon the chances of the future. The temperature of the hall, now entirely exposed to the outer air, was rapidly falling, and would quickly become unendurable. Far too intense was the cold to allow anyone to remain at the opening, and the moisture on the walls soon resolved itself into icicles. But the mountain was like the body of a dying man, that retains awhile a certain amount of heat at the heart after the extremities have become cold and dead. In the more interior galleries there was still a certain degree of warmth, and thither Servadac and his companions were glad enough to retreat.

Here they found the professor, who, startled by the sudden cold, had been fain to make a precipitate retreat from his observatory. Now would have been the opportunity to demand of the enthusiast whether he would like to prolong his residence indefinitely upon his little comet. It is very likely that he would have declared himself ready to put up with any amount of discomfort to be able to gratify his love of investigation; but all were far too disheartened and distressed to care to banter him upon the subject on which he was so sensitive.

Next morning, Servadac thus addressed his people. "My friends, except from cold, we have nothing to fear. Our provisions are ample—more than enough for the remaining period of our sojourn in this lone world of ours; our preserved meat is already cooked; we shall be able to dispense with all fuel for cooking purposes. All that we require is warmth—warmth for ourselves: let us secure that, and all may be well. Now, I do not entertain a doubt but that the warmth we require is resident in the bowels of this mountain on which we are living; to the depth of those bowels we must penetrate; there we shall obtain the warmth which is indispensable to our very existence."

His tone, quite as much as his words, restored confidence to many of his people, who were already yielding to a feeling of despair. The count and the lieutenant fervently, but silently, grasped his hand.

"Nina," said the captain, "you will not be afraid to go down to the lower depths of the mountain, will you?"

"Not if Pablo goes," replied the child.

"Oh yes, of course, Pablo will go. You are not afraid to go, are you Pablo?" he said, addressing the boy.

"Anywhere with you, your Excellency," was the boy's prompt reply.

And certain it was that no time must be lost in penetrating below the heart of the volcano; already the most protected of the many ramifications of Nina's Hive were being pervaded by a cold that was insufferable. It was an acknowledged impossibility to get access to the crater by the exterior declivities of the mountain-side; they were far too steep and too slippery to afford a foothold. It must of necessity be entered from the interior.

Lieutenant Procope accordingly undertook the task of exploring all the galleries, and was soon able to report that he had discovered one which he had every reason to believe abutted upon the central funnel. His reason for coming to this conclusion was that the caloric emitted by the rising vapors of the hot lava seemed to be oozing, as it were, out of the tellurium, which had been demonstrated already to be a conductor of heat. Only succeed in piercing through this rock for seven or eight yards, and the lieutenant did not doubt that his way would be opened into the old lava-course, by following which he hoped descent would be easy.

Under the lieutenant's direction the Russian sailors were immediately set to work. Their former experience had convinced them that spades and pick-axes were of no avail, and their sole resource was to proceed by blasting with gun-powder. However skillfully the operation might be carried on, it must necessarily occupy several days, and during that time the sufferings from cold must be very severe.

"If we fail in our object, and cannot get to the depths of the mountain, our little colony is doomed," said Count Timascheff.

"That speech is not like yourself," answered Servadac, smiling. "What has become of the faith which has hitherto carried you so bravely through all our difficulties?"

The count shook his head, as if in despair, and said, sadly, "The Hand that has hitherto been outstretched to help seems now to be withdrawn."

"But only to test our powers of endurance," rejoined the captain, earnestly. "Courage, my friend, courage! Something tells me that this cessation of the eruption is only partial; the internal fire is not all extinct. All is not over yet. It is too soon to give up; never despair!"

Lieutenant Procope quite concurred with the captain. Many causes, he knew, besides the interruption of the influence of the oxygen upon the mineral substances in Gallia's interior, might account for the stoppage of the lava-flow in this one particular spot, and he considered it more than probable that a fresh outlet had been opened in some other part of the surface, and that the eruptive matter had been diverted into the new channel. But at present his business was to prosecute his labors so that a retreat might be immediately effected from their now untenable position.

Restless and agitated, Professor Rosette, if he took any interest in these discussions, certainly took no share in them. He had brought his telescope down from the observatory into the common hall, and there at frequent intervals, by night and by day, he would endeavor to continue his observations; but the intense cold perpetually compelled him to desist, or he would literally have been frozen to death. No sooner, however, did he find himself obliged to retreat from his study of the heavens, than he would begin overwhelming everybody about him with bitter complaints, pouring out his regrets that he had ever quitted his quarters at Formentera.

On the 4th of January, by persevering industry, the process of boring was completed, and the lieutenant could hear that fragments of the blasted rock, as the sailors cleared them away with their spades, were rolling into the funnel of the crater. He noticed, too, that they did not fall perpendicularly, but seemed to slide along, from which he inferred that the sides of the crater were sloping; he

had therefore reason to hope that a descent would be found practicable.

Larger and larger grew the orifice; at length it would admit a man's body, and Ben Zoof, carrying a torch, pushed himself through it, followed by the lieutenant and Servadac. Procope's conjecture proved correct. On entering the crater, they found that the sides slanted at the angle of about four degrees; moreover, the eruption had evidently been of recent origin, dating probably only from the shock which had invested Gallia with a proportion of the atmosphere of the earth, and beneath the coating of ashes with which they were covered, there were various irregularities in the rock, not yet worn away by the action of the lava, and these afforded a tolerably safe footing.

"Rather a bad stair-case!" said Ben Zoof, as they began to make their way down.

In about half an hour, proceeding in a southerly direction, they had descended nearly five hundred feet. From time to time they came upon large excavations that at first sight had all the appearance of galleries, but by waving his torch, Ben Zoof could always see their extreme limits, and it was evident that the lower strata of the mountain did not present the same system of ramification that rendered the Hive above so commodious a residence.

It was not a time to be fastidious; they must be satisfied with such accommodation as they could get, provided it was warm. Captain Servadac was only too glad to find that his hopes about the temperature were to a certain extent realized. The lower they went, the greater was the diminution in the cold, a diminution that was far more rapid than that which is experienced in making the descent of terrestrial mines. In this case it was a volcano, not a colliery, that was the object of exploration, and thankful enough they were to find that it had not become extinct. Although the lava, from some unknown cause, had ceased to rise in the crater, yet plainly it existed somewhere in an incandescent state, and was still transmitting considerable heat to inferior strata.

Lieutenant Procope had brought in his hand a mercurial thermometer, and Servadac carried an aneroid barometer, by means of which he could estimate the depth of their descent below the level of the Gallian Sea. When they were six hundred feet below the orifice the mercury registered a temperature of 6° C. below zero.

"Six degrees!" said Servadac; "that will not suit us. At this low temperature we could not survive the winter. We must try deeper down. I only hope the ventilation will hold out."

There was, however, nothing to fear on the score of ventilation. The great current of air that rushed into the aperture penetrated everywhere, and made respiration perfectly easy.

The descent was continued for about another three hundred feet, which brought the explorers to a total depth of nine hundred feet from their old quarters. Here the thermometer registered 12° C. above zero—a temperature which, if only it were permanent, was all they wanted. There was no advantage in proceeding any further along the lava-course; they could already hear the dull rumblings that indicated that they were at no great distance from the central focus.

"Quite near enough for me!" exclaimed Ben Zoof. "Those who are chilly are welcome to go as much lower as they like. For my part, I shall be quite warm enough here."

After throwing the gleams of torch-light in all directions, the explorers seated themselves on a jutting rock, and began to debate whether it was practicable for the colony to make an abode in these lower depths of the mountain. The prospect, it must be owned, was not inviting. The crater, it is true, widened out into a cavern sufficiently large, but here its accommodation ended. Above and below were a few ledges in the rock that would serve as receptacles for provisions; but, with the exception of a small recess that must be reserved for Nina, it was clear that henceforth they must all renounce the idea of having separate apartments. The single cave must be their dining-room, drawing-room, and dormitory, all in one. From living the life of rabbits in a warren, they were reduced to the existence of moles, with the difference that they could not, like them, forget their troubles in a long winter's sleep.

The cavern, however, was quite capable of being lighted by means of lamps and lanterns. Among the stores were several barrels of oil and a considerable quantity of spirits of wine, which might be burned when required for cooking purposes. Moreover, it would be unnecessary for them to confine themselves entirely to the seclusion of their gloomy residence; well wrapped up, there would be nothing to prevent them making occasional excursions both to the Hive and to the sea-shore. A supply of fresh water would be constantly required; ice for this purpose must be perpetually carried in from the coast, and it would be necessary to arrange that everyone in turn should perform this office, as it would be no sinecure to clamber up the sides of the crater for 900 feet, and descend the same distance with a heavy burden.

But the emergency was great, and it was accordingly soon decided that the little colony should forthwith take up its quarters in the cave. After all, they said, they should hardly be much worse off than thousands who annually winter in Arctic regions. On board the whaling-vessels, and in the establishments of the Hudson's Bay Company, such luxuries as separate cabins or sleeping-chambers are never thought of; one large apartment, well heated and ventilated, with as few corners as possible, is considered far more healthy; and on board ship the entire hold, and in forts a single floor, is appropriated to this purpose. The recollection of this fact served to reconcile them, in a great degree, to the change to which they felt it requisite to submit.

Having remounted the ascent, they made the result of their exploration known to the mass of the community, who received the tidings with a sense of relief, and cordially accepted the scheme of the migration.

The first step was to clear the cavern of its accumulation of ashes, and then the labor of removal commenced in earnest. Never was a task undertaken with greater zest. The fear of being to a certainty frozen to death if they remained where they were, was a stimulus that made everyone put forth all his energies. Beds, furniture, cooking utensils—first the stores of the *Dobryna*, then the cargo of the tartan—all were carried down with the greatest alacrity, and the diminished weight combined with

the downhill route to make the labor proceed with incredible briskness.

Although Professor Rosette yielded to the pressure of circumstances, and allowed himself to be conducted to the lower regions, nothing would induce him to allow his telescope to be carried underground; and as it was undeniable that it would certainly be of no service deep down in the bowels of the mountain, it was allowed to remain undisturbed upon its tripod in the great hall of Nina's Hive.

As for Isaac Hakkabut, his outcry was beyond description lamentable. Never, in the whole universe, had a merchant met with such reverses; never had such a pitiable series of losses befallen an unfortunate man. Regardless of the ridicule which his abject wretchedness excited, he howled on still, and kept up an unending wail; but meanwhile he kept a keen eye upon every article of his property, and amidst universal laughter insisted on having every item registered in an inventory as it was transferred to its appointed place of safety. Servadac considerately allowed the whole cargo to be deposited in a hollow apart by itself, over which the Jew was permitted to keep a watch as vigilant as he pleased.

By the 10th the removal was accomplished. Rescued, at all events, from the exposure to a perilous temperature of 60° below zero, the community was installed in its new home. The large cave was lighted by the *Dobryna's* lamps, while several lanterns, suspended at intervals along the acclivity that led to their deserted quarters above, gave a weird picturesqueness to the scene, that might vie with any of the graphic descriptions of the "Arabian Nights' Entertainments."

"How do you like this, Nina?" said Ben Zoof.

"*Va bene!*" replied the child. "We are only living in the cellars instead of upon the ground floor."

"We will try and make ourselves comfortable," said the orderly.

"Oh yes, we will be happy here," rejoined the child; "it is nice and warm."

Although they were as careful as they could to conceal their misgivings from the rest, Servadac and his two friends could not regard their present situation without distrust. When alone, they would frequently ask each other what would become of them all, if the volcanic heat should really be subsiding, or if some unexpected perturbation should retard the course of the comet and compel them to an indefinitely prolonged residence in their grim abode. It was scarcely likely that the comet could supply the fuel of which ere long they would be in urgent need. Who could expect to find coal in the bowels of Gallia,—coal, which is the residuum of ancient forests mineralized by the lapse of ages? Would not the lava-cinders exhumed from the extinct volcano be their last poor resource?

"Keep up your spirits, my friends," said Servadac; "we have plenty of time before us at present. Let us hope that as fresh difficulties arise, fresh ways of escape will open. Never despair!"

"True," said the count; "it is an old saying that 'Necessity is the mother of invention.' Besides, I should think it very unlikely that the internal heat will fail us now before the summer."

The lieutenant declared that he entertained the same hope. As the reason for his opinion he alleged that the combustion of the eruptive matter was most probably of quite recent origin, because the comet before its collision with the earth had possessed no atmosphere, and that consequently no oxygen could have penetrated to its interior.

"Most likely you are right," replied the count; "and so far from dreading a failure of the internal heat, I am not quite sure that we may not be exposed to a more terrible calamity still?"

"What?" asked Servadac.

"The calamity of the eruption breaking out suddenly again, and taking us by surprise."

"Heavens!" cried the captain, "we will not think of that."

"The outbreak may happen again," said the lieutenant, calmly; "but it will be our fault, our lack of vigilance, if we are taken by surprise." And so the conversation dropped.

The 15th of January dawned; and the comet was 220,000,000 leagues from the sun.

Gallia had reached its aphelion.

CHAPTER XIII

DREARY MONTHS

HENCEFORTH, then, with a velocity ever increasing, Gallia would re-approach the sun. Except the thirteen Englishmen who had been left at Gibraltar, every living creature had taken refuge in the dark abyss of the volcano's crater.

And with those Englishmen, how had it fared?

"Far better than with ourselves," was the sentiment that would have been universally accepted in Nina's Hive. And there was every reason to conjecture that so it was. The party at Gibraltar, they all agreed, would not, like themselves, have been compelled to have recourse to a stream of lava for their supply of heat; they, no doubt, had had abundance of fuel as well as food; and in their solid casemate, with its substantial walls, they would find ample shelter from the rigor of the cold. The time would have been passed at least in comfort, and perhaps in contentment; and Colonel Murphy and Major Oliphant would have had leisure more than sufficient for solving the most abstruse problems of the chess-board. All of them, too, would be happy in the confidence that when the time should come, England would have full meed of praise to award to the gallant soldiers who had adhered so well and so manfully to their post.

It did, indeed, more than once occur to the minds both of Servadac and his friends that, if their condition should become one of extreme emergency, they might, as a last resource, betake themselves to Gibraltar, and there seek a refuge; but their former reception had not been of the kindest, and they were little disposed to renew an acquaintanceship that was marked by so little cordiality—not that they expected to meet with any inhospitable rebuff. Far from that; they knew well enough that Englishmen, whatever their faults, would be the last to abandon their fellow-creatures in the hour of distress. Nevertheless, unless the necessity became far more urgent than it had hitherto proved, they resolved to endeavor to remain in their present quarters. Up till this time no casualties had diminished their original number, but to undertake so long a journey across that unsheltered expanse of ice could scarcely fail to result in the loss of some of their party.

However great was the desire to find a retreat for every living thing in the deep hollow of the crater, it was found necessary to slaughter almost all the domestic animals before the removal of the community from Nina's Hive. To have stabled them all in the cavern below would have been quite impossible, whilst to have left them in the upper galleries would only have been to abandon them to a cruel death; and since meat could be preserved for an indefinite time in the original store-places, now colder than ever, the expedient of killing the animals seemed to recommend itself as equally prudent and humane.

Naturally the captain and Ben Zoof were most anxious that their favorite horses should be saved, and accordingly by dint of the greatest care, all difficulties in the way were overcome, and Zephyr and Galette were conducted down the crater, where they were installed in a large hole and provided with forage, which was still abundant.

Birds, subsisting only on scraps thrown out to them did not cease to follow the population in its migration, and so numerous did they become that multitudes of them had repeatedly to be destroyed.

The general re-arrangement of the new residence was no easy business, and occupied so much time that the end of January arrived before they could be said to be fairly settled. And then began a life of dreary monotony. There seemed to creep over everyone a kind of moral torpor as well as physical lassitude, which Servadac, the count, and the lieutenant did their best not only to combat in themselves, but to counteract in the general community. They provided a variety of intellectual pursuits; they instituted debates in which everybody was encouraged to take part; they read aloud, and explained extracts from the elementary manuals of science, or from the books of adventurous travel which their library supplied; and Russians and Spaniards, day after day, might be seen gathered round the large table, giving their best attention to instruction which should send them back to Mother Earth less ignorant than they had left her.

Selfish and morose, Hakkabut could never be induced to be present at these social gatherings. He was far too much occupied in his own appropriated corner, either in conning his accounts, or in counting his money. Altogether, with what he had before, he now possessed the round sum of 150,000 francs, half of which was in sterling gold; but nothing could give him any satisfaction while he knew that the days were passing, and that he was denied the opportunity of putting out his capital in advantageous investments, or securing a proper interest.

Neither did Palmyrin Rosette find leisure to take any share in the mutual intercourse. His occupation was far too absorbing for him to suffer it to be interrupted, and to him, living as he did perpetually in a world of figures, the winter days seemed neither long nor wearisome. Having ascertained every possible particular about his comet, he was now devoting himself with equal ardor to the analysis of all the properties of the satellite Nerina, to which he appeared to assert the same claim of proprietorship.

In order to investigate Nerina it was indispensable that he should make several actual observations at various points of the orbit; and for this purpose he repeatedly made his way up to the grotto above, where, in spite of the extreme severity of the cold, he would persevere in the use of his telescope till he was all but paralyzed. But what he felt more than anything was the want of some retired apartment, where he could pursue his studies without hindrance or intrusion.

It was about the beginning of February, when the professor brought his complaint to Captain Servadac, and begged him to assign him a chamber, no matter how small, in which he should be free to carry on his task in silence and without molestation. So readily did Servadac promise to do everything in his power to provide him with the accommodation for which he asked, that the professor was put into such a manifest good temper that the captain ventured to speak upon the matter that was ever uppermost in his mind.

"I do not mean," he began timidly, "to cast the least imputation of inaccuracy upon any of your calculations, but would you allow me, my dear professor, to suggest that you should revise your estimate of the duration of Gallia's period of revolution. It is so important, you know, so all important; the difference of one half minute, you know, would so certainly mar the expectation of reunion with the earth——"

And seeing a cloud gathering on Rosette's face, added:

"I am sure Lieutenant Procope would be only too happy to render you any assistance in the revision."

"Sir," said the professor, bridling up, "I want no assistant; my calculations want no revision. I never make an error. I have made my reckoning as far as Gallia is concerned. I am now making a like estimate of the elements of Nerina."

Conscious how impolitic it would be to press this matter further, the captain casually remarked that he should have supposed that all the elements of Nerina had been calculated long since by astronomers on the earth. It was about as unlucky a speech as he could possibly have made. The professor glared at him fiercely.

"Astounding, sir!" he exclaimed. "Yes! Nerina was a planet then; everything that appertained to the planet was determined; but Nerina is a moon now. And do you not think, sir, that we have a right to know as much about our moon as those *terrestrials*"—and he curled his lip as he spoke with a contemptuous emphasis—"know of theirs?"

"I beg pardon," said the corrected captain.

"Well then, never mind," replied the professor, quickly appeased; "only will you have the goodness to get me a proper place for study?"

"I will, as I promised, do all I can," answered Servadac.

"Very good," said the professor. "No immediate hurry; an hour hence will do."

But in spite of this condescension on the part of the man of science, some hours had to elapse before any place of retreat could be discovered likely to suit his requirements; but at length a little nook was found in the side of the cavern just large enough to hold an armchair and a table, and in this the astronomer was soon ensconced to his entire satisfaction.

Buried thus, nearly 900 feet below ground, the Gallians ought to have had unbounded mental energy to furnish an adequate reaction to the depressing monotony of their existence; but many days would often elapse without any one of them ascending to

the surface of the soil, and had it not been for the necessity of obtaining fresh water, it seemed almost probable that no one would ever have made an effort to leave the cavern at all.

A few excursions were made in the downward direction. The three leaders, with Ben Zoof, made their way to the lower depths of the crater, not with the design of making any further examination as to the nature of the rock—for although it might be true enough that it contained thirty per cent. of gold, it was as valueless to them as granite—but with the intention of ascertaining whether the subterranean fire still retained its activity. Satisfied upon this point, they came to the conclusion that the eruption which had so suddenly ceased in one spot had certainly broken out in another.

February, March, April, May, passed wearily by; but day succeeded to day with such gloomy sameness that it was little wonder that no notice was taken of the lapse of time. The people seemed rather to vegetate than to live, and their want of vigor became at times almost alarming. The readings around the long table ceased to be attractive, and the debates, sustained by few, became utterly wanting in animation. The Spaniards could hardly be roused to quit their beds, and seemed to have scarcely energy enough to eat. The Russians, constitutionally of more enduring temperament, did not give way to the same extent, but the long and drear confinement was beginning to tell upon them all. Servadac, the count, and the lieutenant all knew well enough that it was the want of air and exercise that was the cause of much of this mental depression; but what could they do? The most serious remonstrances on their part were entirely in vain. In fact, they themselves occasionally fell a prey to the same lassitude both of body and mind. Long fits of drowsiness, combined with an utter aversion to food, would come over them. It almost seemed as if their entire nature had become degenerate, and that, like tortoises, they could sleep and fast till the return of summer.

Strange to say, little Nina bore her hardships more bravely than any of them. Flitting about, coaxing one to eat, another to drink, rousing Pablo as often as he seemed yielding to the common languor, the child became the life of the party. Her merry prattle enlivened the gloom of the grim cavern like the sweet notes of a bird; her gay Italian songs broke the monotony of the depressing silence; and almost unconscious as the half-dormant population of Gallia were of her influence, they would have missed her bright presence sorely. The months glided on; how, it seemed impossible for the inhabitants of the living tomb to say. There was a dead level of dullness.

At the beginning of June the general torpor appeared slightly to relax its hold upon its victims. This partial revival was probably due to the somewhat increased influence of the sun, still far, far away. During the first half of the Gallian year, Lieutenant Procope had taken careful note of Rosette's monthly announcements of the comet's progress, and he was able now, without reference to the professor, to calculate the rate of advance on its way back towards the sun. He found that Gallia had recrossed the orbit of Jupiter, but was still at the enormous distance of 197,000,000 leagues from the sun, and he reckoned that in about four months it would have entered the zone of the telescopic planets.

Gradually, but uninterruptedly, life and spirits continued to revive, and by the end of the month Servadac and his little colony had regained most of their ordinary physical and mental energies. Ben Zoof, in particular, roused himself with redoubled vigor, like a giant refreshed from his slumbers. The visits, consequently, to the long-neglected galleries of Nina's Hive became more and more frequent.

One day an excursion was made to the shore. It was still bitterly cold, but the atmosphere had lost nothing of its former stillness, and not a cloud was visible from horizon to zenith. The old footmarks were all as distinct as on the day in which they had been imprinted, and the only portion of the shore where any change was apparent was in the little creek. Here the elevation of the ice had gone on increasing, until the schooner and the tarton had been uplifted to a height of 150 feet, not only rendering them quite inaccessible, but exposing them to all but certain destruction in the event of a thaw.

Isaac Hakkabut, immovable from the personal oversight of his property in the cavern, had not accompanied the party, and consequently was in blissful ignorance of the fate that threatened his vessel. "A good thing the old fellow wasn't there to see," observed Ben Zoof; "he would have screamed like a peacock. What a misfortune it is," he added, speaking to himself, "to have a peacock's voice, without its plumage!"

During the months of July and August, Gallia advanced 164,000,000 leagues along her orbit. At night the cold was still intense, but in the daytime the sun, here full upon the equator, caused an appreciable difference of 20° in the temperature. Like birds, the population spent whole days exposed to its grateful warmth, rarely returning till nightfall to the shade of their gloomy home.

This spring-time, if such it may be called, had a most enlivening influence upon all. Hope and courage revived as day by day the sun's disc expanded in the sky, and every evening the earth assumed a greater magnitude among the fixed stars. It was distant yet, but the goal was cheeringly in view.

"I can't believe that yonder little speck of light contains my mountain of Montmartre," said Ben Zoof, one night, after he had been gazing long and steadily at the far-off world.

"You will, I hope, some day find out that it does," answered his master.

"I hope so," said the orderly, without moving his eye from the distant sphere. After meditating a while, he spoke again. "I suppose Professor Rosette couldn't make his comet go straight back, could he?"

"Hush!" cried Servadac.

Ben Zoof understood the correction.

"No," continued the captain; "it is not for man to disturb the order of the universe. That belongs to a Higher Power than ours!"

CHAPTER XIV

THE PROFESSOR PERPLEXED

ANOTHER month passed away, and it was now September, but it was still impossible to leave the warmth of the subterranean retreat for the more airy and commodious quarters of the Hive, where "the bees" would certainly have been frozen to death in their cells. It was altogether quite as much a matter of congratulation as of regret that

the volcano showed no symptoms of resuming its activity; for although a return of the eruption might have rendered their former resort again habitable, any sudden outbreak would have been disastrous to them where they were, the crater being the sole outlet by which the burning lava could escape.

"A wretched time we have had for the last seven months," said the orderly one day to his master; "but what a comfort little Nina has been to us all!"

"Yes, indeed," replied Servadac; "she is a charming little creature. I hardly know how we should have got on without her."

"What is to become of her when we arrive back at the earth?"

"Not much fear, Ben Zoof, but that she will be well taken care of. Perhaps you and I had better adopt her."

"Ay, yes," assented the orderly. "You can be her father, and I can be her mother."

Servadac laughed. "Then you and I shall be man and wife."

"We have been as good as that for a long time," observed Ben Zoof, gravely.

By the beginning of October, the temperature had so far moderated that it could scarcely be said to be intolerable. The comet's distance was scarcely three times as great from the sun as the earth from the sun, so that the thermometer rarely sunk beyond 35° below zero. The whole party began to make almost daily visits to the Hive, and frequently proceeded to the shore, where they resumed their skating exercise, rejoicing in their recovered freedom like prisoners liberated from a dungeon. Whilst the rest were enjoying their recreation, Servadac and the count would hold long conversations with Lieutenant Procope about their present position and future prospects, discussing all manner of speculations as to the results of the anticipated collision with the earth, and wondering whether any measures could be devised for mitigating the violence of a shock which might be terrible in its consequences, even if it did not entail a total annihilation of themselves.

There was no visitor to the Hive more regular than Rosette. He had already directed his telescope to be moved back to his former observatory, where, as much as the cold would permit him, he persisted in making his all-absorbing studies of the heavens.

The result of these studies no one ventured to inquire; but it became generally noticed that something was very seriously disturbing the professor's equanimity. Not only would he be seen toiling more frequently up the arduous way that lay between his nook below and his telescope above, but he would be heard muttering in an angry tone that indicated considerable agitation.

One day, as he was hurrying down to his study, he met Ben Zoof, who, secretly entertaining a feeling of delight at the professor's manifest discomfiture, made some casual remark about things not being very straight. The way in which his advance was received the good orderly never divulged, but henceforward he maintained the firm conviction that there was something very much amiss up in the sky.

To Servadac and his friends this continual disquietude and ill-humor on the part of the professor occasioned no little anxiety. From what, they asked, could his dissatisfaction arise? They could only conjecture that he had discovered some flaw in his reckonings; and if this were so, might there not be reason to apprehend that their anticipations of coming into contact with the earth, at the settled time, might all be falsified?

Day followed day, and still there was no cessation of the professor's discomposure. He was the most miserable of mortals. If really his calculations and his observations were at variance, this, in a man of his irritable temperament, would account for his perpetual perturbation. But he entered into no explanation; he only climbed up to his telescope, looking haggard and distressed, and when compelled by the frost to retire, he would make his way back to his study more furious than ever. At times he was heard giving vent to his vexation. "Confound it! what does it mean? what is she doing? All behind! Is Newton a fool? Is the law of universal gravitation the law of universal nonsense?" And the little man would seize his head in both hands, and tear away at the scanty locks which he could ill afford to lose.

Enough was overheard to confirm the suspicion that there was some irreconcilable discrepancy between the results of his computation and what he had actually observed; and yet, if he had been called upon to say, he would have sooner insisted that there was derangement in the laws of celestial mechanism, than have owned there was the least probability of error in any of his own calculations. Assuredly, if the poor professor had had any flesh to lose he would have withered away to a shadow.

But this state of things was before long to come to an end. On the 12th, Ben Zoof, who was hanging about outside the great hall of the cavern, heard the professor inside utter a loud cry. Hurrying in to ascertain the cause, he found Rosette in a state of perfect frenzy, in which ecstasy and rage seemed to be struggling for the predominance.

"Eureka! Eureka!" yelled the excited astronomer.

"What, in the name of peace, do you mean?" bawled Ben Zoof, in open-mouthed amazement.

"Eureka!" again shrieked the little man.

"How? What? Where?" roared the bewildered orderly.

"Eureka! I say," repeated Rosette; "and if you don't understand me, you may go to the devil!"

Without availing himself of this polite invitation, Ben Zoof betook himself to his master. "Something has happened to the professor," he said; "he is rushing about like a madman, screeching and yelling 'Eureka!'"

"Eureka?" exclaimed Servadac. "That means he has made a discovery;" and, full of anxiety, he hurried off to meet the professor.

But, however great was his desire to ascertain what this discovery implied, his curiosity was not yet destined to be gratified. The professor kept muttering in incoherent phrases: "Rascal! he shall pay for it yet. I will be even with him! Cheat! Thrown me out!" But he did not vouchsafe any reply to Servadac's inquiries, and withdrew to his study.

From that day Rosette, for some reason at present incomprehensible, quite altered his behavior to Isaac Hakkàbut, a man for whom he had always hitherto evinced the greatest repugnance and contempt. All at once he began to show a remarkable interest in the Jew and his affairs, paying several visits to the dark little storehouse, making inquiries

as to the state of business and expressing some solicitude about the state of the exchequer.

The wily Jew was taken somewhat by surprise, but came to an immediate conclusion that the professor was contemplating borrowing some money; he was consequently very cautious in all his replies.

It was not Hakkabut's habit ever to advance a loan except at an extravagant rate of interest, or without demanding far more than an adequate security. Count Timascheff, a Russian nobleman, was evidently rich; to him perhaps, for a proper consideration, a loan might be made: Captain Servadac was a Gascon, and Gascons are proverbially poor; it would never do to lend any money to him; but here was a professor, a mere man of science, with circumscribed means; did *he* expect to borrow? Certainly Isaac would as soon think of flying, as of lending money to him. Such were the thoughts that made him receive all Rosette's approaches with a careful reservation.

It was not long, however, before Hakkabut was to be called upon to apply his money to a purpose for which he had not reckoned. In his eagerness to effect sales, he had parted with all the alimentary articles of his cargo without having the precautionary prudence to reserve enough for his own consumption. Amongst other things that failed him was his stock of coffee, and as coffee was a beverage without which he deemed it impossible to exist, he found himself in considerable perplexity.

He pondered the matter over for a long time, and ultimately persuaded himself that, after all, the stores were the common property of all, and that he had as much right to share as anyone else. Accordingly, he made his way to Ben Zoof, and, in the most amiable tone he could assume, begged as a favor that he would let him have a pound of coffee.

The orderly shook his head dubiously.

"A pound of coffee, old Nathan? I can't say."

"Why not? You have some?" said Isaac.

"Oh yes! plenty—a hundred kilograms."

"Then let me have one pound. I shall be grateful."

"Hang your gratitude!"

"Only one pound! You would not refuse anybody else."

"That's just the very point, old Samuel; if you were anybody else, I should know very well what to do. I must refer the matter to his Excellency."

"Oh, his Excellency will do me justice."

"Perhaps you will find his justice rather too much for you." And with this consoling remark, the orderly went to seek his master.

Rosette meanwhile had been listening to the conversation, and secretly rejoicing that an opportunity for which he had been watching had arrived. "What's the matter, Master Isaac? Have you parted with all your coffee?" he asked, in a sympathizing voice, when Ben Zoof was gone.

"Ah! yes, indeed," groaned Hakkabut, "and now I require some for my own use. In my little black hole I cannot live without my coffee."

"Of course you cannot," agreed the professor.

"And don't you think the governor ought to let me have it?"

"No doubt."

"Oh, I must have coffee," said the Jew again.

"Certainly," the professor assented. "Coffee is nutritious; it warms the blood. How much do you want?"

A pound. A pound will last me for a long time."

"And who will weigh it for you?" asked Rosette, scarcely able to conceal the eagerness that prompted the question.

"Why, they will weigh it with my scale, of course. There is no other balance here." And as the Jew spoke, the professor fancied he could detect the faintest of sighs.

"Good, Master Isaac; all the better for you! You will get your seven pounds instead of one!"

"Yes; well, seven, or thereabouts—thereabouts," stammered the Jew with considerable hesitation.

Rosette scanned his countenance narrowly, and was about to probe him with further questions, when Ben Zoof returned. "And what does his Excellency say?" inquired Hakkabut.

"Why, Nehemiah, he says he shan't give you any."

"Merciful heavens!" began the Jew.

"He says he doesn't mind selling you a little."

"But, by the holy city, why does he make me pay for what anybody else could have for nothing?"

"As I told you before, you are not anybody else; so, come along. You can afford to buy what you want. We should like to see the color of your money."

"Merciful heavens!" the old man whined once more.

"Now, none of that! Yes or no? If you are going to buy, say so at once, if not, I shall shut up shop."

Hakkabut knew well enough that the orderly was not a man to be trifled with, and said, in a tremulous voice, "Yes, I will buy."

The professor, who had been looking on with much interest, betrayed manifest symptoms of satisfaction.

"How much do you want? What will you charge for it?" asked Isaac mournfully, putting his hand into his pocket and clinking his money.

"Oh, we will deal gently with you. We will not make any profit. You shall have it for the same price that we paid for it. Ten francs a pound, you know."

The Jew hesitated.

"Come now, what is the use of your hesitating? Your gold will have no value when you go back to the world."

"What do you mean?" asked Hakkabut, startled.

"You will find out some day," answered Ben Zoof, significantly.

Hakkabut drew out a small piece of gold from his pocket, took it close under the lamp, rolled it over in his hand, and pressed it to his lips. "Shall you weigh me the coffee with my scale?" he asked, in a quavering voice that confirmed the professor's suspicions.

"There is nothing else to weigh it with; you know that well enough, old Shechem," said Ben Zoof. The spring balance was then produced; a tray was suspended to the hook, and upon this coffee was thrown until the needle registered the weight of one pound. Of course, it took seven pounds of coffee to do this.

"There you are! There's your coffee, man!" Ben Zoof said.

"Are you sure?" inquired Hakkabut, peering

down close to the dial. "are you quite sure that the needle touches the point?"

"Yes; look and see."

"Give it a little push, please."

"Why?"

"Because—because——"

"Well, because of what?" cried the orderly, impatiently.

"Because I think, perhaps—I am not quite sure—perhaps the scale is not quite correct."

The words were not uttered before the professor, fierce as a tiger, had rushed at the Jew, had seized him by the throat, and was shaking him till he was black in the face.

"Help! help!" screamed Hakkabut. "I shall be strangled."

"Rascal! consummate rascal! thief! villain!" the professor reiterated, and continued to shake the Jew furiously.

Ben Zoof looked on and laughed, making no attempt to interfere; he had no sympathy with either of the two.

The sound of the scuffling, however, drew the attention of Servadac, who, followed by his companions, hastened to the scene. The combatants were soon parted. "What is the meaning of all this?" demanded the captain.

As soon as the professor had recovered his breath, exhausted by his exertions, he said, "The old reprobate, the rascal has cheated us! His scale is wrong! He is a thief!"

Captain Servadac looked sternly at Hakkabut.

"How is this, Hakkabut? Is this a fact?"

"No, no—yes—no, your Excellency, only——"

"He is a cheat, a thief!" roared the excited astronomer. "His weights deceive!"

"Stop, stop!" interposed Servadac; "let us hear. Tell me, Hakkabut——"

"The scale lies! It cheats! it lies" roared the irrepressible Rosette.

"Tell me, Hakkabut, I say," repeated Servadac.

The Jew only kept on stammering, "Yes—no—I don't know."

But heedless of any interruption, the professor continued, "False weights! That confounded spring balance! It gave a false result! The mass was wrong! The observations contradicted the calculations; they were wrong! She was out of place! Yes, out of place entirely."

"What!" cried Servadac and Procope in a breath, "out of place?"

"Yes, completely," said the professor.

"Gallia out of place?" repeated Servadac, agitated with alarm.

"I did not say Gallia," replied Rosette, stamping his foot impetuously; "I said Nerina."

"Oh, Nerina," answered Servadac. "But what of Gallia?" he inquired, still nervously.

"Gallia, of course, is on her way to the earth. I told you so. But that Jew is a rascal!"

CHAPTER XV

A JOURNEY AND A DISAPPOINTMENT

IT was as the professor had said. From the day that Isaac Hakkabut had entered upon his mercantile career, his dealings had all been carried on by a system of false weight. That deceitful spring balance had been the mainspring of his fortune. But when it had become his lot to be the purchaser instead of the vendor, his spirit had groaned within him at being compelled to reap the fruits of his own dishonesty. No one who had studied his character could be much surprised at the confession that was extorted from him, that for every supposed kilogram that he had ever sold the true weight was only 750 grams, or just five and twenty per cent. less than it ought to have been.

The professor, however, had ascertained all that he wanted to know. By estimating his comet at a third as much again as its proper weight, he had found that his calculations were always at variance with the observed situation of the satellite, which was immediately influenced by the mass of its primary.

But, now, besides enjoying the satisfaction of having punished old Hakkabut, Rosette was able to recommence his calculations with reference to the elements of Nerina upon a correct basis, a task to which he devoted himself with redoubled energy.

It will be easily imagined that Isaac Hakkabut, thus caught in his own trap, was jeered most unmercifully by those whom he had attempted to make his dupes. Ben Zoof, in particular, was never wearied of telling him how on his return to the world he would be prosecuted for using false weights, and would certainly become acquainted with the inside of a prison. Thus badgered, he secluded himself more than ever in his dismal hole, never venturing, except when absolutely obliged, to face the other members of the community.

On the 7th of October the comet re-entered the zone of the telescopic planets, one of which had been captured as a satellite, and the origin of the whole of which is most probably correctly attributed to the disintegration of some large planet that formerly revolved between the orbits of Mars and Jupiter. By the beginning of the following month half of this zone had been traversed, and only two months remained before the collision with the earth was to be expected. The temperature was now rarely below 12° below zero, but that was far too cold to permit the slightest symptoms of a thaw. The surface of the sea remained as frozen as ever, and the two vessels, high up on their icy pedestals, remained unaltered in their critical position.

It was about this time that the question began to be mooted whether it would not be right to reopen some communication with the Englishmen at Gibraltar. Not that any doubt was entertained as to their having been able successfully to cope with the rigors of the winter; but Captain Servadac, in a way that did honor to his generosity, represented that, however uncourteous might have been their former behavior, it was at least due to them that they should be informed of the true condition of things, which they had no opportunity of learning; and, moreover, that they should be invited to cooperate with the population of Nina's Hive, in the event of any measures being suggested by which the shock of the approaching collision could be mitigated.

The count and the lieutenant both heartily concurred in Servadac's sentiments of humanity and prudence, and all agreed that if the intercourse were to be opened at all, no time could be so suitable as the present, while the surface of the sea presented

a smooth and solid footing. After a thaw should set in, neither the yacht nor the tartan could be reckoned on for service, and it would be inexpedient to make use of the steam launch, for which only a few tons of coal had been reserved, just sufficient to convey them to Gourbi Island when the occasion should arise. As to the yawl, which, transformed into a sledge, had performed so successful a trip to Formentera, the absence of wind would make that quite unavailable. It was true that with the return of summer temperature, there would be certain to be a derangement in the atmosphere of Gallia, which would result in wind, but for the present the air was altogether too still for the yawl to have any prospects of making its way to Gibraltar.

The only question remaining was the possibility of going on foot. The distance was somewhere about 240 miles. Captain Servadac declared himself quite equal to the undertaking. To skate sixty or seventy miles a day would be nothing, he said, to a practiced skater like himself. The whole journey there and back might be performed in eight days. Provided with a compass, a sufficient supply of cold meat, and a spirit lamp, by which he might boil his coffee, he was perfectly sure he should, without the least difficulty, accomplish an enterprise that chimed in so exactly with his adventurous spirit.

Equally urgent were both the count and the lieutenant to be allowed to accompany him; nay, they even offered to go instead; but Servadac, expressing himself as most grateful for their consideration, declined their offer, and avowed his resolution of taking no other companion than his own orderly.

Highly delighted at his master's decision, Ben Zoof expressed his satisfaction at the prospect of "stretching his legs a bit," declaring that nothing could induce him to permit the captain to go alone. There was no delay. The departure was fixed for the following morning, the 2nd of November.

Although it is not to be questioned that a genuine desire of doing an act of kindness to his fellow-creatures was a leading motive of Servadac's proposed visit to Gibraltar, it must be owned that another idea, confided to nobody, least of all to Count Timascheff, had been conceived in the brain of the worthy Gascon. Ben Zoof had an inkling that his master was "up to some other little game," when, just before starting, he asked him privately whether there was a French tricolor among the stores. "I believe so," said the orderly.

"Then don't say a word to anyone, but fasten it up tight in your knapsack."

Ben Zoof found the flag, and folded it up as he was directed. Before proceeding to explain this somewhat enigmatical conduct of Servadac, it is necessary to refer to a certain physiological fact, coincident but unconnected with celestial phenomena, originating entirely in the frailty of human nature. The nearer that Gallia approached the earth, the more a sort of reserve began to spring up between the captain and Count Timascheff. Though they could not be said to be conscious of it, the remembrance of their former rivalry, so completely buried in oblivion for the last year and ten months, was insensibly recovering its hold upon their minds, and the question was all but coming to the surface as to what would happen if, on their return to earth, the handsome Madame de L—— should still be free. From companions in peril, would they not again be avowed rivals? Conceal it as they would, a coolness was undeniably stealing over an intimacy which, though it could never be called affectionate, had been uniformly friendly and courteous.

Under these circumstances, it was not surprising that Hector Servadac should not have confided to the count a project which, wild as it was, could scarcely have failed to widen the unacknowledged breach that was opening in their friendship.

The project was the annexation of Ceuta to the French dominion. The Englishmen, rightly enough, had continued to occupy the fragment of Gibraltar, and their claim was indisputable. But the island of Ceuta, which before the shock had commanded the opposite side of the strait, and had been occupied by Spaniards, had since been abandoned, and was therefore free to the first occupant who should lay claim to it. To plant the tricolor upon it, in the name of France, was now the cherished wish of Servadac's heart.

"Who knows," he said to himself, "whether Ceuta, on its return to earth, may not occupy a grand and commanding situation? What a proud thing it would be to have secured its possesson to France!"

Next morning, as soon as they had taken their brief farewell of their friends, and were fairly out of sight of the shore, Servadac imparted his design to Ben Zoof, who entered into the project with the greatest zest, and expressed himself delighted, not only at the prospect of adding to the dominions of his beloved country, but of stealing a march upon England.

Both travelers were warmly clad, the orderly's knapsack containing all the necessary provisions. The journey was accomplished without special incident; halts were made at regular intervals, for the purpose of taking food and rest. The temperature by night as well as by day was quite endurable, and on the fourth afternoon after starting, thanks to the straight course which their compass enabled them to maintain, the adventurers found themselves within a few miles of Ceuta.

As soon as Ben Zoof caught sight of the rock on the western horizon, he was all excitement. Just as if he were in a regiment going into action, he talked wildly about "columns" and "squares" and "charges." The captain, although less demonstrative, was hardly less eager to reach the rock. They both pushed forward with all possible speed till they were within a mile and a half of the shore, when Ben Zoof, who had a very keen vision, stopped suddenly, and said that he was sure he could see something moving on top of the island.

"Never mind, let us hasten on," said Servadac. A few minutes carried them over another mile, when Ben Zoof stopped again.

"What is it, Ben Zoof?" asked the captain.

"It looks to me like a man on a rock, waving his arms in the air," said the orderly.

"Plague on it!" muttered Servadac; "I hope we are not too late." Again they went on; but soon Ben Zoof stopped for the third time.

"It is a semaphore, sir; I see it quite distinctly." And he was not mistaken; it had been a telegraph in motion that had caught his eye.

"Plague on it!" repeated the captain.

"Too late, sir, do you think?" said Ben Zoof.

"Yes, Ben Zoof; if that's a telegraph—and there is no doubt of it—somebody has been before us and

erected it; and, moreover, if it is moving, there must be somebody working it now."

He was keenly disappointed. Looking towards the north, he could distinguish Gibraltar faintly visible in the extreme distance, and upon the summit of the rock both Ben Zoof and he fancied they could make out another semaphore, giving signals, no doubt, in response to the one here.

"Yes, it is only too clear; they have already occupied it, and established their communications," said Servadac.

"And what are we to do, then?" asked Ben Zoof.

"We must pocket our chagrin, and put as good a face on the matter as we can," replied the captain.

"But perhaps there are only four or five Englishmen to protect the place," said Ben Zoof, as if meditating an assault.

"No, no, Ben Zoof," answered Servadac; "we must do nothing rash. We have had our warning, and unless our representations can induce them to yield their position, we must resign our hope."

Thus discomfited, they had reached the foot of the rock, when all at once, like a "Jack-in-the-box," a sentinel started up before them with the challenge:

"Who goes there?"

"Friends. Vive la France!" cried the captain.

"Hurrah for England!" replied the soldier.

By this time four other men had made their appearance from the upper part of the rock.

"What do you want?" asked one of them, whom Servadac remembered to have seen before at Gibraltar.

"Can I speak to your commanding officer?" Servadac inquired.

"Which?" said the man. "The officer in command of Ceuta?"

"Yes, if there is one."

"I will acquaint him with your arrival," answered the Englishman, and disappeared.

In a few minutes the commanding officer, attired in full uniform, was seen descending to the shore. It was Major Oliphant himself.

Servadac could no longer entertain a doubt that the Englishmen had forestalled him in the occupation of Ceuta. Provisions and fuel had evidently been conveyed thither in the boat from Gibraltar before the sea had frozen, and a solid casemate, hollowed in the rock, had afforded Major Oliphant and his contingent ample protection from the rigor of the winter. The ascending smoke that rose above the rock was sufficient evidence that good fires were still kept up; the soldier appeared to have thriven well on what, no doubt, had been a generous diet, and the major himself, although he would scarcely have been willing to allow it, was slightly stouter than before.

Being only about twelve miles distant from Gibraltar, the little garrison at Ceuta had felt itself by no means isolated in its position; but by frequent excursions across the frozen strait, and by the constant use of the telegraph, had kept up their communication with their fellow-countrymen on the other island. Colonel Murphy and the major had not even been forced to forego the pleasures of the chessboard. The game that had been interrupted by Captain Servadac's former visit was not yet concluded; but, like the two American clubs that played their celebrated game in 1846 between Washington and Baltimore, the two gallant officers made use of the semaphore to communicate their well-digested moves.

The major stood waiting for his visitor to speak.

"Major Oliphant, I believe?" said Servadac, with a courteous bow.

"Yes, sir, Major Oliphant, officer in command of the garrison at Ceuta," was the Englishman's reply. "And to whom," he added, "may I have the honor of speaking?"

"To Captain Servadac, the governor general of Gallia."

"Indeed!" said the major, with a supercilious look.

"Allow me to express my surprise," resumed the captain, "at seeing you installed as commanding officer upon what I have always understood to be Spanish soil. May I demand your claim to your position?"

"My claim is that of first occupant."

"But do you not think that the party of Spaniards now resident with me may at some future time assert a prior right to the proprietorship?"

"I think not, Captain Servadac."

"But why not?" persisted the captain.

"Because these very Spaniards have, by formal contract, made over Ceuta, in its integrity, to the British government."

Servadac uttered an exclamation of surprise.

"And as the price of that important cession," continued Major Oliphant, "they have received a fair equivalent in British gold."

"Ah!" cried Ben Zoof, "that accounts for that fellow Negrete and his people having such a lot of money."

Servadac was silent. It had become clear to his mind what had been the object of that secret visit to Ceuta which he had heard of as being made by the two English officers. The arguments that he had intended to use had completely fallen through; all that he had now to do was carefully to prevent any suspicion of his disappointed project.

"May I be allowed to ask, Captain Servadac, to what I am indebted for the honor of this visit?" asked Major Oliphant presently.

"I have come, Major Oliphant, in the hope of doing you and your companions a service," replied Servadac, rousing himself from his reverie.

"Ah, indeed!" replied the major, as though he felt himself quite independent of all services from exterior sources.

"I thought major, that it was not unlikely you were in ignorance of the fact that both Ceuta and Gibraltar have been traversing the solar regions on the surface of a comet."

The major smiled incredulously; but Servadac, nothing daunted, went on to detail the results of the collision between the comet and the earth, adding that, as there was the almost immediate prospect of another concussion, it had occurred to him that it might be advisable for the whole population of Gallia to unite in taking precautionary measures for the common welfare.

"In fact, Major Oliphant," he said in conclusion, "I am here to inquire whether you and your friends would be disposed to join us in our present quarters."

"I am obliged to you, Captain Servadac," answered the major stiffly, "but we have not the

slightest intention of abandoning our post. We have received no government orders to that effect; indeed, we have received no orders at all. Our own dispatch to the First Lord of the Admiralty still awaits the mail."

"But allow me to repeat," insisted Servadac, "that we are no longer on the earth, although we expect to come in contact with it again in about eight weeks."

"I have no doubt," the major answered, "that England will make every effort to reclaim us."

Servadac felt perplexed. It was quite evident that Major Oliphant had not been convinced of the truth of one syllable of what he had been saying.

"Then I am to understand that you are determined to retain your two garrisons here and at Gibraltar?" asked Servadac, with one last effort at persuasion.

"Certainly; these two posts command the entrance of the Mediterranean."

"But supposing there is no longer any Mediterranean?" retorted the captain, growing impatient.

"Oh, England will always take care of that," was Major Oliphant's cool reply. "But excuse me," he added presently; "I see that Colonel Murphy has just telegraphed his next move. Allow me to wish you good afternoon."

And without further parley, followed by his soldiers, he retired into the casement, leaving Captain Servadac gnawing his mustache with mingled rage and mortification.

"A fine piece of business we have made of this!" said Ben Zoof, when he found himself alone with his master.

"We will make our way back at once," replied Captain Servadac.

"Yes, the sooner the better, with our tails between our legs," rejoined the orderly, who this time felt no inclination to start off to the march of the Algerian zephyrs. And so the French tricolor returned as it had set out—in Ben Zoof's knapsack.

On the eighth evening after starting, the travelers again set foot on the volcanic promontory just in time to witness a great commotion.

Palmyrin Rosette was in a furious rage. He had completed all his calculations about Nerina, but that perfidious satellite had totally disappeared. The astronomer was frantic at the loss of his moon. Captured probably by some larger body, it was revolving in its proper zone of the minor planets.

CHAPTER XVI

A BOLD PROPOSITION

ON his return Servadac communicated to the count the result of his expedition, and, though perfectly silent on the subject of his personal project, did not conceal the fact that the Spaniards, without the smallest right, had sold Ceuta to the English.

Having refused to quit their post, the Englishmen had virtually excluded themselves from any further consideration; they had had their warning, and must now take the consequences of their own incredulity.

Although it had proved that not a single creature either at Gourbi Island, Gibraltar, Ceuta, Madalena, or Formentera had received any injury whatever at the time of the first concussion, there was nothing in the least to make it certain that a like immunity from harm would attend the second. The previous escape was doubtless owing to some slight, though unaccountable, modification in the rate of motion; but whether the inhabitants of the earth had fared so fortunately, was a question that had still to be determined.

The day following Servadac's return, he and the count and Lieutenant Procope met by agreement in the cave, formally to discuss what would be the most advisable method of proceeding under their present prospects. Ben Zoof was, as a matter of course, allowed to be present, and Professor Rosette had been asked to attend; but he declined on the plea of taking no interest in the matter. Indeed, the disappearance of his moon had utterly disconcerted him, and the probability that he should soon lose his comet also, plunged him into an excess of grief which he preferred to bear in solitude.

Although the barrier of cool reserve was secretly increasing between the captain and the count, they scrupulously concealed any outward token of their inner feelings, and without any personal bias applied their best energies to the discussion of the question which was of such mutual, nay, of such universal interest.

Servadac was the first to speak. "In fifty-one days, if Professor Rosette has made no error in his calculations, there is to be a recurrence of collision between this comet and the earth. The inquiry that we have now to make is whether we are prepared for the coming shock. I ask myself, and I ask you, whether it is in our power, by any means, to avert the evil consequences that are only too likely to follow?"

Count Timascheff, in a voice that seemed to thrill with solemnity, said: "In such events we are at the disposal of an over-ruling Providence; human precautions cannot sway the Divine will."

"But with the most profound reverence for the will of Providence," replied the captain, "I beg to submit that it is our duty to devise whatever means we can to escape the threatening mischief. Heaven helps them that help themselves."

"And what means have you to suggest, may I ask?" said the count, with a faint accent of satire.

Servadac was forced to acknowledge that nothing tangible had hitherto presented itself to his mind.

"I don't want to intrude," observed Ben Zoof, "but I don't understand why such learned gentlemen as you cannot make the comet go where you want it to go."

"You are mistaken, Ben Zoof, about our learning," said the captain; "even Professor Rosette, with all his learning, has not a shadow of power to prevent the comet and the earth from knocking against each other."

"Then I cannot see what is the use of all this learning," the orderly replied.

"One great use of learning," said Count Timascheff, with a smile, "is to make us know our own ignorance."

While this conversation had been going on, Lieutenant Procope had been sitting in thoughtful silence. Looking up, he now said, "Incident to this expected shock, there may be a variety of dangers. If, gentlemen, you will allow me, I will enumerate them; and we shall, perhaps, by taking them *seriatim*, be in a better position to judge whether we can

successfully grapple with them, or in any way mitigate their consequences."

There was a general attitude of attention. It was surprising how calmly they proceeded to discuss the circumstances that looked so threatening and ominous.

"First of all," resumed the lieutenant, "we will specify the different ways in which the shock may happen."

"And the prime fact to be remembered," interposed Servadac, "is that the combined velocity of the two bodies will be about 21,000 miles an hour."

"Express speed, and no mistake!" muttered Ben Zoof.

"Just so," assented Procope. "Now, the two bodies may impinge either directly or obliquely. If the impact is sufficiently oblique, Gallia may do precisely what she did before; she may graze the earth; she may, or she may not, carry off a portion of the earth's atmosphere and substance, and so she may float away again into space; but her orbit would undoubtedly be deranged, and if we survive the shock, we shall have small chance of ever returning to the world of our fellow-creatures."

"Professor Rosette, I suppose," Ben Zoof remarked, "would pretty soon find out all about that."

"But we will leave this hypothesis," said the lieutenant; "our own experience has sufficiently shown us its advantages and its disadvantages. We will proceed to consider the infinitely more serious alternative of direct impact; of a shock that would hurl the comet straight on to the earth, to which it would become attached."

"A great wart upon her face!" said Ben Zoof, laughing.

The captain held up his finger to his orderly, making him understand that he should hold his tongue.

"It is, I presume, to be taken for granted," continued Lieutenant Procope, "that the mass of the earth is comparatively so large that, in the event of a direct collision, her own motion would not be sensibly retarded, and that she would carry the comet along with her, as part of herself."

"Very little question of that, I should think," said Servadac.

"Well, then," the lieutenant went on, "what part of this comet of ours will be the part to come into collision with the earth? It may be the equator, where we are; it may be at the exactly opposite point, at our antipodes; or it may be at either pole. In any case, it seems hard to foresee whence there is to come the faintest chance of deliverance."

"Is the case so desperate?" asked Servadac.

"I will tell you why it seems so. If the side of the comet on which we are resident impinges on the earth, it stands to reason that we must be crushed to atoms by the violence of the concussion."

"Regular mincemeat?" said Ben Zoof, whom no admonitions could quite reduce to silence.

"And if," said the lieutenant, after a moment's pause, and the slightest possible frown at the interruption—"and if the collision should occur at our antipodes, the sudden check to the velocity of the comet would be quite equivalent to a shock *in situ*; and, another thing, we should run the risk of being suffocated, for all our comet's atmosphere would be assimilated with the terrestrial atmosphere, and we, supposing we were not dashed to atoms, should be left as it were upon the summit of an enormous mountain (for such to all intents and purposes Gallia would be), 450 miles above the level of the surface of the globe, without a particle of air to breathe."

"But would not our chances of escape be considerably better," asked Count Timascheff, "in the event of either of the comet's poles being the point of contact?"

"Taking the combined velocity into account," answered the lieutenant, "I confess that I fear the violence of the shock will be too great to permit our destruction to be averted."

A general silence ensued, which was broken by the lieutenant himself. "Even if none of these contingencies occur in the way we have contemplated, I am driven to the suspicion that we shall be burnt alive."

"Burnt alive!" they all exclaimed in a chorus of horror.

"Yes. If the deductions of modern science be true, the speed of the comet, when suddenly checked, will be transmuted into heat, and that heat will be so intense that the temperature of the comet will be raised to some millions of degrees."

No one having anything definite to allege in reply to Lieutenant Procope's forebodings, they all relapsed into silence. Presently Ben Zoof asked whether it was not possible for the comet to fall into the middle of the Atlantic.

Procope shook his head. "Even so, we should only be adding the fate of drowning to the list of our other perils."

"Then, as I understand," said Captain Servadac, "in whatever way or in whatever place the concussion occurs, we must be either crushed, suffocated, roasted, or drowned. Is that your conclusion, lieutenant?"

"I confess I see no other alternative," answered Procope, calmly.

"But isn't there another thing to be done?" said Ben Zoof.

"What do you mean?" his master asked.

"Why, to get off the comet before the shock comes."

"How could you get off Gallia?"

"That I can't say," replied the orderly.

"I am not sure that that could not be accomplished," said the lieutenant.

All eyes in a moment were riveted upon him, as, with his head resting on his hands, he was manifestly cogitating a new idea. "Yes, I think it could be accomplished," he repeated. "The project may appear extravagant, but I do not know why it should be impossible. Ben Zoof has hit the right nail on the head; we must try and leave Gallia before the shock."

"Leave Gallia! How?" said Count Timascheff.

The lieutenant did not at once reply. He continued pondering for a time, and at last said, slowly and distinctly, "By making a balloon!"

Servadac's heart sank.

"A balloon!" he exclaimed. "Out of the question! Balloons are exploded things. You hardly find them in novels. Balloon, indeed!"

"Listen to me," replied Procope. "Perhaps I can convince you that my idea is not so chimerical as you imagine." And, knitting his brow, he proceeded to establish the feasibility of his plan. "If we

can ascertain the precise moment when the shock is to happen, and can succeed in launching ourselves a sufficient time beforehand into Gallia's atmosphere, I believe it will transpire that this atmosphere will amalgamate with that of the earth, and that a balloon whirled along by the combined velocity would glide into the mingled atmosphere and remain suspended in midair until the shock of the collision is over."

Count Timascheff reflected for a minute, and said, "I think, lieutenant, I understand your project. The scheme seems tenable; and I shall be ready to co-operate with you, to the best of my power, in putting it into execution."

"Only, remember," continued Procope, "there are many chances to one against our success. One instant's obstruction and stoppage in our passage, and our balloon is burnt to ashes. Still, reluctant as I am to acknowledge it, I confess that I feel our sole hope of safety rests in our getting free from this comet."

"If the chances were ten thousand to one against us," said Servadac, "I think the attempt ought to be made."

"But have we hydrogen enough to inflate a balloon?" asked the count.

"Hot air will be all that we shall require," the lieutenant answered; "we are only contemplating about an hour's journey."

"Ah, a fire-balloon! A montgolfier!" cried Servadac. "But what are you going to do for a casing?"

"I have thought of that. We must cut it out of the sails of the *Dobryna;* they are both light and strong," rejoined the lieutenant. Count Timascheff complimented the lieutenant upon his ingenuity, and Ben Zoof could not resist bringing the meeting to a conclusion by a ringing cheer.

Truly daring was the plan of which Lieutenant Procope had thus become the originator; but the very existence of them all was at stake, and the design must be executed resolutely. For the success of the enterprise it was absolutely necessary to know, almost to a minute, the precise time at which the collision would occur, and Captain Servadac undertook the task, by gentle means or by stern, of extracting the secret from the professor.

To Lieutenant Procope himself was entrusted the superintendence of the construction of the montgolfier, and the work was begun at once. It was to be large enough to carry the whole of the twenty-three residents in the volcano, and, in order to provide the means of floating aloft long enough to give time for selecting a proper place for descent, the lieutenant was anxious to make it carry enough hay or straw to maintain combustion for a while, and keep up the necessary supply of heated air.

The sails of the *Dobryna,* which had all been carefully stowed away in the Hive, were of a texture unusually close, and quite capable of being made airtight by means of a varnish, the ingredients of which were rummaged out of the promiscuous stores of the tartan. The lieutenant himself traced out the pattern and cut out the strips, and all hands were employed in seaming them together. In was hardly the work for little fingers, but Nina persisted in accomplishing her own share of it. The Russians were quite at home at occupation of this sort, and having initiated the Spaniards into its mysteries, the task of joining together the casing was soon complete. Isaac Hakkabut and the professor were the only two members of the community who took no part in this somewhat tedious proceeding.

A month passed away, but Servadac found no opportunity of getting at the information he had pledged himself to gain. On the sole occasion when he had ventured to broach the subject with the astronomer, he had received for answer that as there was no hurry to get back to the earth, there need be no concern about any dangers of transit.

Indeed, as time passed on, the professor seemed to become more and more inaccessible. A pleasant temperature enabled him to live entirely in his observatory, from which intruders were rigidly shut out. But Servadac bided his time. He grew more and more impressed with the importance of finding out the exact moment at which the impact would take place, but was content to wait for a promising opportunity to put any fresh questions on the subject to the too reticent astronomer.

Meanwhile, the earth's disc was daily increasing in magnitude; the comet traveled 50,000,000 leagues during the month, at the close of which it was not more than 78,000,000 leagues from the sun.

A thaw had now fairly set in. The breaking up of the frozen ocean was a magnificent spectacle, and "the great voice of the sea," as the whalers graphically describe it, was heard in all its solemnity. Little streams of water began to trickle down the declivities of the mountain and along the shelving shore, only to be transformed, as the melting of the snow continued, into torrents or cascades. Light vapors gathered on the horizon, and clouds were formed and carried rapidly along by breezes to which the Gallian atmosphere had long been unaccustomed. All these were doubtless but the prelude to atmospheric disturbances of a more startling character; but as indications of returning spring, they were greeted with a welcome which no apprehensions for the future could prevent being glad and hearty.

A double disaster was the inevitable consequence of the thaw. Both the schooner and the tartan were entirely destroyed. The basement of the icy pedestal on which the ships had been upheaved was gradually undermined, like the icebergs of the Arctic Ocean, by warm currents of water, and on the night of the 12th the huge block collapsed *en masse,* so that on the following morning nothing remained of the *Dobryna* and the *Hansa* except the fragments scattered on the shore.

Although certainly expected, the catastrophe could not fail to cause a sense of general depression. Well-nigh one of their last ties to Mother Earth had been broken; the ships were gone, and they had only a balloon to replace them!

To describe Isaac Hakkabut's rage at the destruction of the tartan would be impossible! His oaths were simply dreadful; his imprecations on the accursed race were full of wrath. He swore that Servadac and his people were responsible for his loss; he vowed that they should be sued and made to pay him damages; he asserted that he had been brought from Gourbi Island only to be plundered; in fact, he became so intolerably abusive, that Servadac threatened to put him into irons unless he conducted himself properly; whereupon the Jew,

finding that the captain was in earnest, and would not hesitate to carry the threat into effect, was fain to hold his tongue, and slunk back into his dim hole.

By the 14th the balloon was finished, and, carefully sewn and well varnished as it had been, it was really a very substantial structure. It was covered with a network that had been made from the light rigging of the yacht, and the car, composed of wicker-work that had formed partitions in the hold of the *Hansa,* was quite commodious enough to hold the twenty-three passengers it was intended to convey. No thought had been bestowed upon comfort or convenience, as the ascent was to last for so short a time, merely long enough for making the transit from atmosphere to atmosphere.

The necessity was becoming more and more urgent to get at the true hour of the approaching contact, but the professor seemed to grow more obstinate than ever in his resolution to keep his secret.

On the 15th the comet crossed the orbit of Mars, at the safe distance of 56,000,000 leagues; but during that night the community thought that their last hour had taken them unawares. The volcano rocked and trembled with the convulsions of internal disturbances, and Servadac and his companions, convinced that the mountain was doomed to some sudden disruption, rushed into the open air.

The first object that caught their attention as they emerged upon the open rocks was the unfortunate professor, who was scrambling down the mountain-side, piteously displaying a fragment of his shattered telescope.

It was no time for condolence.

A new marvel arrested every eye. A fresh satellite, in the gloom of night, was shining conspicuously before them.

That satellite was a part of Gallia itself!

By the expansive action of the inner heat, Gallia, like Gambart's comet, had been severed in twain; an enormous fragment had been detached and launched into space!

The fragment included Ceuta and Gibraltar, with the two English garrisons!

CHAPTER XVII

THE VENTURE MADE

WHAT would be the consequences of this sudden and complete disruption, Servadac and his people hardly dared to think.

The first change that came under their observation was the rapidity of the sun's appearances and disappearances, forcing them to the conviction that although the comet still rotated on its axis from east to west, yet the period of its rotation had been diminished by about one-half. Only six hours instead of twelve elapsed between sunrise and sunrise; three hours after rising in the west the sun was sinking again in the east.

"We are coming to something!" exclaimed Servadac. "We have got a year of something like 2,880 days."

"I shouldn't think it would be an easy matter to find saints enough for such a calendar as that!" said Ben Zoof.

Servadac laughed, and remarked that they should have the professor talking about the 230th of June, and the 234th of December.

It soon became evident that the detached portion was not revolving round the comet, but was gradually retreating into space. Whether it had carried with it any portion of atmosphere, whether it possessed any other condition for supporting life, and whether it was likely ever again to approach to the earth, were all questions that were beyond means to determine. For themselves the all-important problem was—what effect would the rending asunder of the comet have upon its rate of progress? and as they were already conscious of a further increase of muscular power, and a fresh diminution of specific gravity, Servadac and his associates could not but wonder whether the alteration in the mass of the comet would not result in its missing the expected coincidence with the earth altogether.

Although he professed himself incompetent to pronounce a decided opinion, Lieutenant Procope manifestly inclined to the belief that no alteration would ensue in the rate of Gallia's velocity; but Rosette, no doubt, could answer the question directly, and the time had now arrived in which he must be compelled to divulge the precise moment of collision.

But the professor was in the worst of tempers. Generally taciturn and morose, he was more than usually uncivil whenever any one ventured to speak to him. The loss of his telescope had doubtless a great deal to do with his ill-humor; but the captain drew the most favorable conclusions from Rosette's continued irritation. Had the comet been in any way projected from its course, so as to be likely to fail in coming into contact with the earth, the professor would have been quite unable to conceal his satisfaction. But they required to know more than the general truth, and felt that they had no time to lose in getting at the exact details.

The desired opportunity soon came.

On the 18th, Rosette was overheard in furious altercation with Ben Zoof. The orderly had been taunting the astronomer with the mutilation of his little comet. A fine thing, he said, to split in two like a child's toy. It had cracked like a dry nut; and mightn't one as well live upon an exploding bomb? —with much more to the same effect. The professor, by way of retaliation, had commenced sneering at the "prodigious" mountain of Montmartre, and the dispute was beginning to look serious when Servadac entered.

Thinking he could turn the wrangling to some good account, so as to arrive at the information he was so anxiously seeking, the captain pretended to espouse the views of his orderly; he consequently brought upon himself the full force of the professor's wrath.

Rosette's language became more and more violent, till Servadac, feigning to be provoked beyond endurance, cried:

"You forget, sir, that you are addressing the Governor-General of Gallia."

"Governor-General! humbug!" roared Rosette. "Gallia is my comet!"

"I deny it," said Servadac. "Gallia has lost its chance of getting back to the earth. Gallia has nothing to do with you. Gallia is mine; and you must submit to the government which I please to ordain."

"And who told you that Gallia is not going back to the earth?" asked the professor, with a look of withering scorn.

"Why, isn't her mass diminished? Isn't she split

in half? Isn't her velocity all altered?" demanded the captain.

"And pray who told you this?" again said the professor, with a sneer.

"Everybody. Everybody knows it, of course," replied Servadac.

"Everybody is very clever. And you always were a very clever scholar too. We remember that of old, don't we?"

"Sir!"

"You nearly mastered the first elements of science, didn't you?"

"Sir!"

"A credit to your class!"

"Hold your tongue, sir!" bellowed the captain again, as if his anger was uncontrollable.

"Not I," said the professor.

"Hold your tongue!" repeated Servadac.

"Just because the mass is altered you think the velocity is altered?"

"Hold you tongue!" cried the captain, louder than ever.

"What has mass to do with the orbit? Of how many comets do you know the mass, and yet you know their movements? Ignorance!" shouted Rosette.

"Insolence!" retorted Servadac.

Ben Zoof, really thinking that his master was angry, made a threatening movement towards the professor.

"Touch me if you dare!" screamed Rosette, drawing himself up to the fullest height his diminutive figure would allow. "You shall answer for your conduct before a court of justice!"

"Where? On Gallia?" asked the captain.

"No; on the earth."

"The earth! Pshaw! You know we shall never get there; our velocity is changed."

"On the earth," repeated the professor, with decision.

"Trash!" cried Ben Zoof. "The earth will be too far off!"

"Not too far off for us to come across her orbit at 42 minutes and 35.6 seconds past two o'clock on the morning of this coming 1st of January."

"Thanks, my dear professor—many thanks. You have given me all the information I required;" and, with a low bow and a gracious smile, the captain withdrew. The orderly made an equally polite bow, and followed his master. The professor, completely nonplussed, was left alone.

Thirteen days, then—twenty-six of the original Gallian days, fifty-two of the present—was all the time for preparation that now remained. Every preliminary arrangement was hurried on with the greatest earnestness.

There was a general eagerness to be quit of Gallia. Indifferent to the dangers that must necessarily attend a balloon ascent under such unparalleled circumstances, and heedless of Lieutenant Procope's warning that the slightest check in their progress would result in instantaneous combustion, they all seemed to conclude that it must be the simplest thing possible to glide from one atmosphere to another, so that they were quite sanguine as to the successful issue of their enterprise. Captain Servadac made a point of showing himself quite enthusiastic in his anticipations, and to Ben Zoof the going up in a baloon was the supreme height of his ambition. The count and the lieutenant, of colder and less demonstrative temperament, alike seemed to realize the possible perils of the undertaking, but even they were determined to put a bold face upon every difficulty.

The sea had now become navigable, and three voyages were made to Gourbi Island in the steam launch, consuming the last of their little reserve of coal.

The first voyage had been made by Servadac with serveral of the sailors. They found the gourbi and the adjacent building quite uninjured by the severity of the winter weather; numbers of little rivulets intersected the pasture-land! new plants were springing up under the influence of the equatorial sun, and the luxuriant foliage was tenanted by the birds which had flown back from the volcano. Summer had almost abruptly succeeded to winter, and the days, though only three hours long, were intensely hot.

Another of the voyages to the island had been to collect the dry grass and straw which was necessary for inflating the balloon. Had the balloon been less cumbersome it would have been conveyed to the island, whence the start would have been effected; but as it was, it was more convenient to bring the combustible material to the balloon.

The last of the coal having been consumed, the fragments of the shipwrecked vessels had to be used day by day for fuel. Hakkabut began making a great hubbub when he found that they were burning some of the spars of the *Hansa;* but he was effectually silenced by Ben Zoof, who told him that if he made any more fuss, he should be compelled to pay 50,000 francs for a balloon-ticket, or else he should be left behind.

By Christmas Day everything was in readiness for immediate departure. The festival was observed with a solemnity still more marked than the anniversary of the preceding year. Every one looked forward to spending New Year's Day in another sphere altogether, and Ben Zoof had already promised Pablo and Nina all sorts of New Year's gifts.

It may seem strange, but the nearer the critical moment approached, the less Hector Servadac and Count Timascheff had to say to each other on the subject. Their mutual reserve became more apparent; the experiences of the last two years were fading from their minds like a dream; and the fair image that had been the cause of their original rivalry was ever rising, as a vision, between them.

The captain's thoughts began to turn to his unfinished rondo; in his leisure moments, rhymes suitable and unsuitable, possible and impossible, were perpetually jingling in his imagination. He labored under the conviction that he had a work of genius to complete. A poet he had left the earth, and a poet he must return.

Count Timascheff's desire to return to the world was quite equaled by Lieutenant Procope's. The Russian sailors' only thought was to follow their master, wherever he went. The Spaniards, though they would have been unconcerned to know that they were to remain upon Gallia, were nevertheless looking forward with some degree of pleasure to revisiting the plains of Andalusia; and Nina and Pablo were only too delighted at the prospect of accompanying their kind protectors on any fresh excursion whatever.

The only malcontent was Palyrin Rosette. Day and night he persevered in his astronomical pursuits, declared his intentoin of never abandoning his comet, and swore positively that nothing should induce him to set foot in the car of the balloon.

The misfortune that had befallen his telescope was a never-ending theme of complaint; and just now, when Gallia was entering the narrow zone of shooting-stars, and new discoveries might have been within his reach, his loss made him more inconsolable than ever. In sheer desperation, he endeavored to increase the intensity of his vision by applying to his eyes some belladonna which he found in the *Dobryna's* medicine chest; with heroic fortitude he endured the tortures of the experiment, and gazed up into the sky until he was nearly blind. But all in vain; not a single fresh discovery rewarded his sufferings.

No one was quite exempt from the feverish excitement which prevailed during the last days of December. Lieutenant Procope superintended his final arrangements. The two lower masts of the schooner had been erected firmly on the shore, and formed supports for the balloon, which had been duly covered with the netting, and was ready at any moment to be inflated. The car was close at hand. Some inflated skins had been attached to its sides, so that the balloon might float for a time, in the event of its descending in the sea at a short distance from the shore. If unfortunately, it should come down in mid-ocean, nothing but the happy chance of some passing vessel could save them all from the certain fate of being drowned.

The 31st came. Twenty-four hours hence and the balloon, with its large living freight, would be high in the air. The atmosphere was less buoyant than that of the earth, but no difficulty in ascending was to be apprehended.

Gallia was now within 96,000,000 miles of the sun, consequently not much more than 4,000,000 miles from the earth; and this interval was being diminished at the rate of nearly 208,000 miles an hour, the speed of the earth being about 70,000 miles, that of the comet being little less than 138,000 miles an hour.

It was determined to make the start at two o'clock, three-quarters of an hour, or, to speak correctly 42 minutes 35.6 seconds, before the time predicted by the professor as the instant of collision. The modified rotation of the comet caused it to be daylight at the time.

An hour previously the balloon was inflated with perfect success, and the car was securely attached to the network. It only awaited the stowage of the passengers.

Isaac Hakkabut was the first to take his place in the car. But scarcely had he done so, when Servadac noticed that his waist was encompassed by an enormous girdle that bulged out to a very extraordinary extent. "What's all this, Hakkabut?" he asked.

"It's only my little bit of money, your Excellency; my modest little fortune—a mere bagatelle," said the Jew.

"And what may your little fortune weigh?" inquired the captain.

"Only about sixty-six pounds!" said Isaac.

"Sixty-six pounds!" cried Servadac. "We haven't reckoned for this."

"Merciful heavens!" began the Jew.

"Sixty-six pounds!" repeated Servadac. "We can hardly carry ourselves; we can't have any dead weight here. Pitch it out, man, pitch it out!"

"God of Israel!" whined Hakkabut.

"Out with it, I say!" cried Servadac.

"What, all my money, which I have saved so long, and toiled for so hard?"

"It can't be helped," said the captain, unmoved.

"Oh, your Excellency!" cried the Jew.

"Now, old Nicodemus, listen to me," interposed Ben Zoof; "You just get rid of that pouch of yours, or we will get rid of you. Take your choice. Quick, or out you go!"

The avaricious old man was found to value his life above his money; he made a lamentable outcry about it, but he unfastened his girdle at last, and put it out of the car.

Very different was the case with Palmyrin Rosette. He avowed over and over again his intention of never quitting the nucleus of his comet. Why should he trust himself to a balloon, that would blaze up like a piece of paper? Why should he leave the comet? Why should he not go once again upon its surface into the far-off realms of space?

His volubility was brought to a sudden check by Servadac's bidding two of the sailors, without more ado, to take him in their arms and put him quietly down at the bottom of the car.

To the great regret of their owners, the two horses and Nina's pet goat were obliged to be left behind. The only creature for which there was found a place was the carrier-pigeon that had brought the professor's message to the Hive. Servadac thought it might probably be of service in carrying some communication to the earth.

When every one, except the captain and his orderly, had taken their places, Servadac said, "Get in, Ben Zoof."

"After you, sir," said Ben Zoof, respectfully.

"No, no!" insisted Servadac; "the captain must be the last to leave the ship!"

A moment's hesitation and the orderly clambered over the side of the car. Servadac followed. The cords were cut. The balloon rose with stately calmness into the air.

CHAPTER XVIII

SUSPENSE

WHEN the balloon had reached an elevation of about 2,500 yards, Lieutenant Procope determined to maintain it at that level. A wire-work stove, suspended below the casing, and filled with lighted hay, served to keep the air in the interior at a proper temperature.

Beneath their feet was extended the basin of the Gallian Sea. An inconsiderable speck to the north marked the site of Gourbi Island. Ceuta and Gibraltar, which might have been expected in the west, had utterly disappeared. On the south rose the volcano, the extremity of the promontory that jutted out from the continent that formed the framework of the sea; whilst in every direction the strange soil, with its commixture of tellurium and gold, gleamed under the sun's rays with a perpetual iridescence.

Apparently rising with them in their ascent, the horizon was well-defined. The sky above them was

perfectly clear; but away in the northwest, in opposition to the sun, floated a new sphere, so small that it could not be an asteroid, but like a dim meteor. It was the fragment that the internal convulsion had rent from the surface of the comet, and which was now many thousands of leagues away, pursuing the new orbit into which it had been projected. During the hours of daylight it was far from distinct, but after nightfall it would assume a definite luster.

The object of supreme interest, however, was the great expanse of the terrestrial disc, which was rapidly drawing down obliquely towards them. It totally eclipsed an enormous portion of the firmament above, and approaching with an ever-increasing velocity, was now within half its average distance from the moon. So close was it, that the two poles could not be embraced in one focus. Irregular patches of greater or less brilliancy alternated on its surface, the brighter betokening the continents, the more somber indicating the oceans that absorbed the solar rays. Above, there were broad white bands, darkened on the side averted from the sun, exhibiting a slow but unintermittent movement; these were the vapors that pervaded the terrestrial atmosphere.

But as the aeronauts were being hurried on at a speed of 70 miles a second, this vague aspect of the earth soon developed itself into definite outlines. Mountains and plains were no longer confused, the distinction between sea and shore was more plainly identified, and instead of being, as it were, depicted on a map, the surface of the earth appeared as though modelled in relief.

Twenty-seven minutes past two, and Gallia is only 72,000 miles from the terrestrial sphere; quicker and quicker is the velocity; ten minutes later, and they are only 36,000 miles apart!

The whole configuration of the earth is clear.

"Europe! Russia! France!" shouted Procope, the count, and Servadac, almost in a breath.

And they are not mistaken. The eastern hemisphere lies before them in the full blaze of light, and there is no possibility of error in distinguishing continent from continent.

The surprise only kindled their emotion to yet keener intensity, and it would be hard to describe the excitement with which they gazed at the panorama that was before them. The crisis of peril was close at hand, but imagination overleaped all consideration of danger; and everything was absorbed in the one idea that they were again within reach of that circle of humanity from which they had supposed themselves severed forever.

And, truly, if they could have paused to study it, that panorama of the states of Europe which was outstretched before their eyes, was conspicuous for the fantastic resemblances with which Nature on the one hand, and international relations on the other, have associated them. There was England, marching like some stately dame towards the east, trailing her ample skirts and coroneted with the cluster of her little islets; Sweden and Norway, with their bristling spine of mountains, seemed like a splendid lion eager to spring down from the bosom of the ice-bound north; Russia, a gigantic polar bear, stood with its head towards Asia, its left paw resting upon Turkey, its right upon Mount Caucasus; Austria resembled a huge cat curled up and sleeping a watchful sleep; Spain, with Portugal as a pennant, like an unfurled banner, floated from the extremity of the continent; Turkey, like an insolent cock, appeared to clutch the shores of Asia with the one claw, and the land of Greece with the other; Italy, as it were a foot and leg encased in a tight-fitting boot, was juggling deftly with the islands of Sicily, Sardinia, and Corsica; Prussia, a formidable hatchet imbedded in the heart of Germany, its edge just grazing the frontiers of France; whilst France itself suggested a vigorous torso with Paris at its breast.

All at once Ben Zoof broke the silence: "Montmartre! I see Montmartre!" And, smile at the absurdity as others might, nothing could induce the worthy orderly to surrender his belief that he could actually make out the features of his beloved home.

The only individual whose soul seemed unstirred by the approaching earth was Palmyrin Rosette. Leaning over the side of the car, he kept his eyes fixed upon the abandoned comet, now floating about a mile and a half below him, bright in the general irradiation which was flooding the surrounding space.

Chronometer in hand, Lieutenant Procope stood marking the minutes and seconds as they fled; and the stillness which had once again fallen upon them all was only broken by his order to replenish the stove, that the balloon might retain its necessary level. Servadac and the count continued to gaze upon the earth with an eagerness that almost amounted to awe. The balloon was slightly in the rear of Gallia, a circumstance that augured somewhat favorably, because it might be presumed that if the comet preceded the balloon in its contact with the earth, there would be a break in the suddenness of transfer from one atmosphere to the other.

The next question of anxiety was, where would the balloon alight? If upon *terra firma*, would it be in a place where adequate resources for safety would be at hand? If upon the ocean, would any passing vessel be within hail to rescue them from their critical position? Truly, as the count observed to his comrades, none but a Divine Pilot could steer them now.

"Forty-two minutes past!" said the lieutenant, and his voice seemed to thrill through the silence of expectation.

There was not 20,000 miles between the comet and the earth!

The calculated time of impact was 2 hours, 47 minutes, 35.6 seconds. Five minutes more and collision must ensue!

But was it so? Just at this moment, Lieutenant Procope observed that the comet deviated sensibly in an oblique course. Was it possible that after all collision would not occur?

The deviation, however, was not great; it did not justify any anticipation that Gallia would merely graze the earth, as it had done before; it left it certain that the two bodies would inevitably impinge.

"No doubt," said Ben Zoof, "this time we shall stick together."

Another thought occurred. Was it not only too likely that, in the fusion of the two atmospheres, the balloon itself, in which they were being conveyed, would be rent into ribbons, and every one of its passengers hurled into destruction, so that not a

Gallian should survive to tell the tale of their strange peregrinations?

Moments were precious; but Hector Servadac resolved that he would adopt a device to secure that at least some record of their excursion in solar distances should survive themselves.

Tearing a leaf from his note-book, he wrote down the name of the comet, the list of the fragments of the earth it had carried off, the names of his companions, and the date of the comet's aphelion; and having subscribed it with his signature, turned to Nina and told her he must have the carrier-pigeon which was nestling in her bosom.

The child's eyes filled with tears; but she did not say a word, and imprinting a kiss upon its soft plumage, she surrendered it at once, and the message was hurriedly fastened to its neck. The bird wheeled round and round in a few circles that widened in their diameter, and quickly sunk to an altitude in the comet's atmosphere much inferior to the balloon.

Some minutes more were thus consumed and the interval of distance was reduced to less than 8,000 miles.

The velocity became inconceivably great, but the increased rate of motion was in no way perceptible; there was nothing to disturb the equilibrium of the car in which they were making their aerial adventure.

"Forty-six minutes!" announced the lieutenant.

The glowing expanse of the earth's disc seemed like a vast funnel, yawning to receive the comet and its atmosphere, balloon and all, into its open mouth.

"Forty-seven!" cried Procope.

There was half a minute yet. A thrill ran through every vein. A vibration quivered through the atmosphere. The balloon elongated to its utmost stretch, was manifestly being sucked into a vortex. Every passenger in the quivering car involuntarily clung spasmodically to its sides, and as the two atmospheres amalgamated, clouds accumulated in heavy masses, involving all around in dense obscurity, while flashes of lurid flame threw a weird glimmer on the scene.

In a mystery every one found himself upon the earth again. They could not explain it, but here they were once more upon terrestrial soil; in a swoon they had left the earth, and in a similar swoon they had come back!

Of the balloon not a vestige remained, and contrary to previous computation, the comet had merely grazed the earth, and was traversing the regions of space, again far away!

CHAPTER XIX

BACK AGAIN

"IN Algeria, captain?"

"Yes, Ben Zoof, in Algeria; and not far from Mostaganem." Such were the first words which, after their return to consciousness, were exchanged between Servadac and his orderly.

They had resided so long in the province that they could not for a moment be mistaken as to their whereabouts, and although they were incapable of clearing up the mysteries that shrouded the miracle, yet they were convinced at the first glance that they had been returned to the earth at the very identical spot where they had quitted it.

In fact, they were scarcely more than a mile from Mostaganem, and in the course of an hour, when they had all recovered from the bewilderment occasioned by the shock, they started off in a body and made their way to the town. It was a matter of extreme surprise to find no symptom of the least excitement anywhere as they went along. The population was perfectly calm; every one was pursuing his ordinary avocation; the cattle were browsing quietly upon the pastures that were moist with the dew of an ordinary January morning. It was about eight o'clock; the sun was rising in the east; nothing could be noticed to indicate that any abnormal incident had either transpired or been expected by the inhabitants. As to a collision with a comet, there was not the faintest trace of any such phenomenon crossing men's minds, and awakening, as it surely would, a panic little short of the certified approach of the millennium.

"Nobody expects us," said Servadac; "that is very certain."

"No, indeed," answered Ben Zoof, with a sigh; he was manifestly disappointed that his return to Mostaganem was not welcomed with a triumphal reception.

They reached the Mascara gate. The first persons that Servadac recognized were the two friends that he had invited to be his seconds in the duel two years ago, the colonel of the 2nd Fusiliers and the captain of the 8th Artillery. In return to his somewhat hesitating salutation, the colonel greeted him heartily, "Ah! Servadac, old fellow! is it you?"

"I, myself," said the captain.

"Where on earth have you been to all this time? In the name of peace, what have you been doing with yourself?"

"You would never believe me, colonel," answered Servadac, "if I were to tell you; so on that point I had better hold my tongue."

"Hang your mysteries!" said the colonel; "tell me, where have you been?"

"No, my friend, excuse me," replied Servadac; "but shake hands with me in earnest, that I may be sure I am not dreaming." Hector Servadac had made up his mind, and no amount of persuasion could induce him to divulge his incredible experiences.

Anxious to turn the subject, Servadac took the earliest opportunity of asking, "And what about Madame de L——?"

"Madame de L——!" exclaimed the colonel taking the words out of his mouth; "the lady is married long ago; you did not suppose that she was going to wait for you. 'Out of sight, out of mind,' you know."

"True," replied Servadac; and turning to the count he said, "Do you hear that? We shall not have to fight our duel after all."

"Most happy to be excused," rejoined the count. The rivals took each other by the hand, and were united henceforth in the bonds of a sincere and confiding friendship.

"An immense relief," said Servadac to himself, "that I have no occasion to finish that confounded rondo!"

It was agreed between the captain and the count that it would be desirable in every way to maintain the most rigid silence upon the subject of the inexplicable phenomena which had come within their

experience. It was to them both a subject of the greatest perplexity to find that the shores of the Mediterranean had undergone no change, but they coincided in the opinion that it was prudent to keep their bewilderment entirely to themselves. Nothing induced them to break their reserve.

The very next day the small community was broken up.

The *Dobryna's* crew, with the count and the lieutenant, started for Russia, and the Spaniards, provided, by the count's liberality, with a competency that ensured them from want, were despatched to their native shores. The leave taking was accomplished by genuine tokens of regard and goodwill.

For Isaac Hakkabut alone there was no feeling of regret. Doubly ruined by the loss of his tarton, and by the abandonment of his fortune, he disappeared entirely from the scene. It is needless to say that no one troubled himself to institute a search after him, and as Ben Zoof sententiously remarked, "Perhaps old Jehoram is making money in America by exhibiting himself as the latest arrival from a comet!"

But however great was the reserve which Captain Servadac might make on his part, nothing could induce Professor Rosette to conceal his experiences. In spite of the denial which astronomer after astronomer gave to the appearance of such a comet as Gallia at all, and of its being refused admission to the catalogue, he published a voluminous treatise, not only detailing his own adventures, but setting forth, with the most elaborate precision, all the elements which settled its period and its orbit. Discussions arose in scientific circles; an overwhelming majority decided against the representations of the professor; an unimportant minority declared themselves in his favor, and a pamphlet obtained some degree of notice, ridiculing the whole debate under the title of "The History of an Hypothesis." In reply to this impertinent criticism of his labors, Rosette issued a rejoinder full of the most vehement asseveration that a fragment of Gibraltar was still traversing the regions of space, carrying thirteen Englishmen upon its surface, and concluding by saying that it was the great disappointment of his life that he had not been taken with them.

Pablo and little Nina were adopted, the one by Servadac, the other by the count, and under the supervision of their guardians, were well educated and cared for. Some years later, Colonel (no longer Captain) Servadac, his hair slightly streaked with grey, had the pleasure of seeing the handsome young Spaniard united in marriage to the Italian, now grown into a charming girl, upon whom the count bestowed an ample dowry; the young people's happiness in no way marred by the fact that they had not been destined, as once seemed likely, to be the Adam and Eve of a new world.

The career of the comet was ever a mystery which neither Servadac nor his orderly could eliminate from the regions of doubt. Anyhow, they were firmer and more confiding friends than ever.

One day, in the environs of Montmartre, where they were secure from eavesdroppers, Ben Zoof incidentally referred to the experiences in the depths of Nina's Hive; but stopped short and said, "However, those things never happened, sir, did they?"

His master could only reply, "Confound it, Ben Zoof! What is a man to believe?"

THE END

*METTO'S
INISH MOSS,
'E OAKS &
HER
PICAL
LIAGE*

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Scene on the bluffs at Villa Tasso. Note the man below for height

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