

The Cryptogram by Jules Verne

From the introduction to the (undated) Amereon House reprint of *The Cryptogram*:

“The Cryptogram,” published in 1881, is the second book dealing with “The Giant Raft.” The first part, “Eight Hundred Leagues on the Amazon,” had been, as its name suggests, mainly a geographical tale. Readers were this time conducted through the tropical forests and across the boundless prairies of Peru and Brazil.

In “The Cryptogram,” however, the geographical interest is almost entirely subordinate to the story. The solving of the cryptogram becomes the central feature, in working out which our author shows a skill scarce inferior to that of Poe himself. Here, for the first time in the body of his works, Verne takes express care to state his fondness for and indebtedness to the work of Poe, whom he denominates “that great analytical genius.” He points to Poe’s “Gold Bug” as the source of his own tale, calling the earlier story a masterpiece “never to be forgotten.” The handling and appreciation of cipher writings in “The Cryptogram” are as different from the superficial explanation of the cipher in Verne’s earlier “Center of the Earth,” as is the appreciation of a master from that of the most idle amateur.

From a January, 2000, review by Louis Kruh of the Amereon reprint in *Cryptologia*:

Originally published in 1881 as the second part of Verne's two-part book, *The Giant Raft*, *The Cryptogram* has been reprinted as a hardcover book in a limited edition of only 80 copies.

Part one of the original edition "Eight Hundred Leagues on the Amazon" is mainly a geographical story that takes readers through the tropical forests and prairies of Peru and Brazil. In *The Cryptogram*,

the solving of the enciphered message takes center stage as a judge struggles to find the solution of a Gronsfeld cipher that can save an innocent man from the gallows. Disappointingly, he concentrates on trying to find the key instead of using cryptanalytical techniques to solve the cryptogram.

Ironically, in the book, Verne refers to Edgar Allan Poe as a "great analytical genius" and refers to *The Gold Bug* as the inspiration for his work, but does not emulate its cryptanalytic methods. Nevertheless, it is an interesting story and an opportunity to own a reprint of a rare item, if you act quickly.

What follows is an excerpt from the Amereon House reprint:

His spectacles were on his nose, his snuff-box on the table. He took a good pinch so as to develop the *finesse* and sagacity of his mind. He picked up the document and became absorbed in meditation, which soon became materialized in the shape of a monologue. The worthy justice was one of those unreserved men who think more easily aloud than to themselves. "Let us proceed with method," he said. "No method, no logic; no logic, no success."

Then, taking the document, he ran through it from beginning to end, without understanding it in the least.

The document contained a hundred lines, which were divided into half a dozen paragraphs.

"Hum!" said the judge, after a little reflection; "to try every paragraph, one after the other, would be to lose precious time, and be of no use. I had better select one of these paragraphs, and take the one which is likely to prove the most interesting. Which of them would do this better than the last, where the recital of the whole affair is probably summed up? Proper names might put me on the track, among others that of Joam Dacosta; and if he has anything to do with this document, his name will evidently not be absent from its concluding paragraph."

The magistrate's reasoning was logical, and he was decidedly right in bringing all his resources to bear in the first place on the gist of the cryptogram as contained in its last paragraph.

Here is the paragraph, for it is necessary to again bring it before the eyes of the reader so as to show how an analyst set to work to discover its meaning:

"Phyjslyddqfdaxgasgzqgehxrghfn
drxunjgiocytdxvksbkhnyphodvry
mhnupnydkjoxphetozsleinhpmvffovpdp
ajxhynojyggaymeqymfnqqlmvllyfgsn
zmqistlbqgyuqsqenbvnrcredgruzblr
mxyuhghpzdrrgrcrohcbqxunfiwvrbph
onthvddqfghqsnitzhnhnfepmqkyuuerk
togsghkyuumfvjiddpazjqsykrplxhxq
rymvrkl0hhotozvdkspswvjhd."

At the outset, Judge Jarriguez noticed that the lines of the document were not divided either into words or phrases, and that there was a complete absence of punctuation. This fact could but render the reading of the document more difficult.

"Let me see, however," he said, "if there is not some assemblage of the letters which appears to form a word—I mean a pronounceable word, whose number of consonants is in proportion to its vowels. And at the beginning I see the word *phy*; farther on the word *gas*. Hallo! *nyng*. Does this mean the African town on the banks of Tanganykal? What has this got to do with all this? Farther on here is the word *yo*. Is it Greek, then? Close by here are *rjm* and *py*, and *fox*, and *photos*, and *tyggy*, and *mz*, and *griz*. And before that we had got *red* and *let*. That is good! those are two English words. Then *oh*—*syk*; then *rjm* once more, and then the word *oto*."

Judge Jarriguez let the paper drop, and thought for a few minutes.

"All the words I see in this thing seem queer!" he said. "In fact, there is nothing to give a clue to their origin. Some look like Greek, some like Dutch; some have an English twist, and some look like nothing at all! To say nothing of these series of consonants which are not wanted in any human pronunciation. Most assuredly it would not be very easy to find the key to this cryptogram."

The magistrate's fingers commenced to beat a tattoo on his desk—a kind of reveille to arouse his dormant faculties.

"Let us see," he said, "how many letters there are in the paragraph."

He then counted them, pen in hand. "Two hundred and seventy-six!" he said. "Well, now let us try what proportion these different letters bear to each other."

This occupied him for some time. The judge took up the document, and, with his pen in his hand, he noted each letter in alphabetical order.

In a quarter of an hour he had obtained the following table:—

a	=	3	times.
b	=	4	—
c	=	3	—
d	=	16	—
e	=	9	—
f	=	10	—
g	=	13	—
h	=	23	—
i	=	4	—
j	=	8	—
k	=	9	—
l	=	9	—
m	=	9	—
n	=	9	—
o	=	12	—
p	=	16	—
q	=	16	—
r	=	12	—
s	=	10	—
t	=	8	—
u	=	17	—
v	=	13	—
x	=	12	—
y	=	19	—
z	=	12	—

Total . . . 276 times.

"Ah, ah!" he exclaimed. "One thing strikes me at once, and that is that in this paragraph all the letters of the alphabet are used. This is very strange. If we take up a book and open it by chance it will be very seldom that we hit upon two hundred and seventy-six letters with all the signs of the alphabet figuring among them. After all, it may be chance," and then he passed to a different train of thought. "One important point is to see if the vowels and consonants are in their normal proportion."

And so he seized his pen, counted up the vowels, and obtained the following result:—

a	=	3	times.
e	=	9	—
i	=	4	—
o	=	12	—
u	=	17	—
y	=	19	—

Total . . . 64 vowels.

"And thus there are in this paragraph, after we have done our subtraction, sixty-four vowels and two hundred and twelve consonants. Good! that is the normal proportion. That is about a fifth, as in the alphabet, where there are six vowels among twenty-five letters. It is possible, therefore, that the document is written in the language of our country, and that only the signification of each letter is changed. If it has been modified in regular order, and a *b* is always represented by an *l*, an *o* by a *v*, a *g* by a *k*, an *u* by an *r*, etc., I will give up my judgment if I do not read it. What can I do better than follow the method of that great analytical genius, Edgar Allan Poe?"

Judge Jarriguez herein alluded to a story by the great American romancer, which is a masterpiece. Who has not read the "Gold Bug"? In this novel a cryptogram, composed of ciphers, letters, algebraic signs, asterisks, full-stops, and commas, is submitted to a truly mathematical analysis, and is deciphered under extraordinary conditions, which the admirers of that strange genius can never forget. On the reading of the American document depended only a treasure, while on that of this one depended a man's life. Its solution was consequently all the more interesting.

The magistrate, who had often read and re-read his "Gold Bug," was perfectly acquainted with the steps in the analysis so minutely described by Edgar Poe, and he resolved to proceed in the same way on this occasion. In doing so he was certain, as he had said, that if the value or signification of each letter remained constant, he would, sooner or later, arrive at the solution of the document.

"What did Edgar Poe do?" he repeated. "First of all he began by finding out the sign—here there are only letters, let us say the letter—which was reproduced the oftenest. I see that that is *h*, for it is met with twenty-three

times. This enormous proportion shows, to begin with, that *h* does not stand for *h*, but, on the contrary, that it represents the letter which recurs most frequently in our language, for I suppose the document is written in Portuguese. In English or French it would certainly be *e*, in Italian it would be *i* or *a*, in Portuguese it will be *a* or *o*. Now let us say that *h* signifies *a* or *o*."

After this was done, the judge found out the letter which recurred most frequently after *h*, and so on, and he formed the following table:—

<i>h</i>	=	23	times.
<i>y</i>	=	19	—
<i>u</i>	=	17	—
<i>d p q</i>	=	16	—
<i>g v</i>	=	13	—
<i>o r x z</i>	=	12	—
<i>f s</i>	=	10	—
<i>e k l m n</i>	=	9	—
<i>i t</i>	=	8	—
<i>b i</i>	=	4	—
<i>a c</i>	=	3	—

"Now the letter *a* only occurs thrice!" exclaimed the judge, "and it ought to occur the oftenest. Ah! that clearly proves that the meaning has been changed. And now, after *a* or *o*, what are the letters which figure oftenest in our language? Let us see," and Judge Jarriguez, with truly remarkable sagacity, which denoted a very observant mind, started on this new quest. In this he was only imitating the American romancer, who, great analyst as he was, had, by simple induction, been able to construct an alphabet corresponding to the signs of the cryptogram, and by means of it to eventually read the pirate's parchment note with ease.

The magistrate set to work in the same way, and we may affirm that he was no whit inferior to his illustrious master. Thanks to his previous work at logographs and squares, rectangular arrangements, and other enigmas, which depend only on an arbitrary disposition of the letters, he was already pretty strong in such mental pastimes. On this occasion he sought to establish the order in which the

letters were reproduced—vowels first, consonants afterwards.

Three hours had elapsed since he began. He had before his eyes an alphabet which, if his procedure were right, would give him the right meaning of the letters in the document. He had only to successively apply the letters of his alphabet to those of his paragraph. But before making this application some slight emotion seized upon the judge. He fully experienced the intellectual gratification—much greater than, perhaps, would be thought—of the man who, after hours of obstinate endeavor, saw the impatiently sought-for sense of the logograph coming into view.

"Now let us try," he said; "and I shall be very much surprised if I have not got the solution of the enigma!"

Judge Jarriguez took off his spectacles and wiped the glasses; then he put them back again, and bent over the table. His special alphabet was in one hand, the cryptogram in the other. He commenced to write under the first line of the paragraph the true letters, which, according to him, ought to correspond exactly with each of the cryptographic letters. As with the first line so did he with the second, and the third, and the fourth, until he had reached the end of the paragraph.

Oddity as he was, he did not stop to see as he wrote if the assemblage of letters made intelligible words. No; during the first stage his mind refused all verification of that sort. What he desired was to give himself the ecstasy of reading it all straight off at once.

And now he had done.

"Let us read!" he exclaimed.

And he read. Good heavens! what cacophony! The lines he had formed with the letters of his alphabet had no more sense in them than those of the document! It was another series of letters, and that was all. They formed no word; they had no value. In short, they were just as hieroglyphic. "Confound the thing!" exclaimed Judge Jarriguez.

It was seven o'clock in the evening. Judge Jarriguez had all the time been absorbed in working at the puzzle—and was no farther advanced—and had forgotten the time of repast and the time of repose, when there came a knock at his study door.

It was time. An hour later, and all the cerebral substance of the vexed magistrate would certainly have evaporated under the intense heat into which he had worked his head.

At the order to enter—which was given in an impatient tone—the door opened and Manoel presented himself. The young doctor had left his friends on board the jangada at work on the indecipherable document, and had come to see Judge Jarriguez. He was anxious to know if he had been fortunate in his researches. He had come to ask if he had at length discovered the system on which the cryptogram had been written.

The magistrate was not sorry to see Manoel come in. He was in that state of excitement that solitude was exasperating to him. He wanted some one to speak to, some one as anxious to penetrate the mystery as he was. Manoel was just the man.

"Sir," said Manoel, as he entered, "one question! Have you succeeded better than we have?"

"Sit down first," exclaimed Judge Jarriguez, who got up and began to pace the room. "Sit down! If we are both of us standing, you will walk one way and I shall walk the other, and the room will be too narrow to hold us."

Manoel sat down and repeated his question.

"No! I have not had any success!" replied the magistrate; "I do not think I am any better off. I have got nothing to tell you; but I have found out a certainty."

"What is that, sir?"

"That the document is not based on conventional signs, but on what is known in cryptology as a cipher, that is to say, on a number."

"Well, sir," answered Manoel, "cannot a document of that kind always be read?"

"Yes," said Jarriguez, "if a letter is invariably repre-

ented by the same letter; if an a , for example, is always a p , and a p is always an x ; if not, it cannot."

"And in this document?"

"In this document the value of the letter changes with the arbitrarily selected cipher which necessitates it. So a b which will in one place be represented by a k will later on become a x , later on a n or an m or an f , or any other letter."

"And then, I am sorry to say, the cryptogram is indecipherable."

"Indecipherable!" exclaimed Manoel. "No, sir; we shall end by finding the key of the document on which a man's life depends."

Manoel had risen, a prey to the excitement he could not control; the reply he had received was too hopeless, and he refused to accept it for good. At a gesture from the judge, however, he sat down again, and in a calmer voice asked, "And in the first place, sir, what makes you think that the basis of this document is a number, or, as you call it, a cipher?"

"Listen to me, young man," replied the judge, "and you will be forced to give in to the evidence."

The magistrate took the document and put it before the eyes of Manoel and showed him what he had done.

"I began," he said, "by treating this document in the proper way, that is to say, logically, leaving nothing to chance. I applied to it an alphabet based on the proportion the letters bear to one another which is usual in our language, and I sought to obtain the meaning by following the precepts of our immortal analyst, Edgar Poe. Well, what succeeded with him collapsed with me."

"Collapsed!" exclaimed Manoel.

"Yes, my dear young man, and I at once saw that success sought in that fashion was impossible. In truth, a stronger man than I might have been deceived."

"But I should like to understand," said Manoel, "and I do not——"

"Take the document," continued Judge Jarriguez; "first look at the disposition of the letters, and read it through."

Manoel obeyed.

"Do you not see that the combination of several of the letters is very strange?" asked the magistrate.

"I do not see anything," said Manoel, after having for perhaps the hundredth time read through the document.

"Well! study the last paragraph! There you understand the sense of the whole is bound to be summed up. Do you see anything abnormal?"

"Nothing."

"There is, however, one thing which absolutely proves that the language is subject to the laws of number."

"And that is?"

"That is that you see three *h's* coming together in two different places."

What Jarriguez said was correct, and it was of a nature to attract attention. The two hundred and fourth, two hundred and fifth, and two hundred and sixth letters of the paragraph, and the two hundred and fifty-eighth, two hundred and fifty-ninth, and two hundred and sixtieth letters of the paragraph, were consecutive *h's*. At first this peculiarity had not struck the magistrate.

"And that proves?" asked Manoel, without divining the deduction that could be drawn from the combination.

"That simply proves that the basis of the document is a number. It shows *a priori* that each letter is modified in virtue of the ciphers of the number and according to the place which it occupies."

"And why?"

"Because in no language will you find words with three consecutive repetitions of the letter *h*."

Manoel was struck with the argument; he thought about it, and, in short, had no reply to make.

"And had I made the observation sooner," continued the magistrate, "I might have spared myself a good deal of trouble and a headache which extends from my occiput to my sinciput."

"But, sir," asked Manoel, who felt the little hope vanishing on which he had hitherto rested, "what do you mean by a cipher?"

"Tell me a number."

"Any number you like."

"Give me an example and you will understand the explanation better."

Judge Jarriguez sat down at the table, took up a sheet of paper and a pencil, and said:

"Now, Mr. Manoel, let us choose a sentence by chance, the first that comes; for instance—

Judge Jarriguez has an ingenious mind.

I write this phrase so as to space the letters differently, and I get—

JudgJarriqwezhasaningeniousmind.

That done," said the magistrate, to whom the phrase seemed to contain a proposition beyond dispute, looking Manoel straight in the face, "suppose I take a number by chance, so as to give a cryptographic form to this natural succession of words; suppose now this word is composed of three ciphers, and let these ciphers be 2, 3 and 4. Now on the line below I put the number 234, and repeat it as many times as are necessary to get to the end of the phrase, and so that every cipher comes underneath a letter. This is what we get—

J u d g e j a r r i q u e z h a s a n i n g e n i o u s m i n d .
2 3 4 2 3 4 2 3 4 2 3 4 2 3 4 2 3 4 2 3 4 2 3 4 2 3 4 2 3

And now, Mr. Manoel, replacing each letter by the letter in advance of it in alphabetical order according to the value of the cipher, we get—

<i>j</i>	plus 2	equal	<i>l</i>
<i>u</i>	plus 3	equal	<i>x</i>
<i>d</i>	plus 4	equal	<i>h</i>
<i>g</i>	plus 2	equal	<i>i</i>
<i>e</i>	plus 3	equal	<i>h</i>
<i>j</i>	plus 4	equal	<i>n</i>
<i>a</i>	plus 2	equal	<i>c</i>
<i>r</i>	plus 3	equal	<i>n</i>
<i>r</i>	plus 4	equal	<i>v</i>
<i>i</i>	plus 2	equal	<i>k</i>
<i>q</i>	plus 3	equal	<i>t</i>
<i>u</i>	plus 4	equal	<i>y</i>
<i>e</i>	plus 2	equal	<i>g</i>
<i>s</i>	plus 3	equal	<i>c</i>
<i>h</i>	plus 4	equal	<i>t</i>
<i>a</i>	plus 2	equal	<i>c</i>
<i>s</i>	plus 3	equal	<i>v</i>
<i>a</i>	plus 4	equal	<i>e</i>
<i>n</i>	plus 2	equal	<i>p</i>

i plus 3 equal l
 # plus 4 equal r
 g plus 2 equal i
 e plus 3 equal h
 # plus 4 equal r
 i plus 2 equal k
 o plus 3 equal r
 # plus 4 equal y
 s plus 2 equal w
 and so on.

"If, on account of the value of the ciphers which compose the number, I come to the end of the alphabet without having enough complementary letters to deduct, I begin again at the beginning. That is what happens at the end of my name when the *s* is replaced by the 3. As after *s* the alphabet has no more letters, I commence to count from *a* and so get the *c*. That done, when I get to the end of this cryptographic system, made up of the 234—which was arbitrarily selected, do not forget l—the phrase which you recognize above is replaced by—

lxmhmcwkygclcevephwkrvuhmbyg.

"And now, young man, just look at it, and do you not think it is very much like what is in the document? Well, what is the consequence? Why, that the signification of the letters depends on a cipher which chance put beneath them, and the cryptographic letter which answers to a true one is not always the same. So in this phrase the first *j* is represented by an *l*, the second by an *n*; the first *e* by an *h*, the second by a *g*, the third by an *h*; the first *d* is represented by an *h*, the last by a *g*, and so on. Now you see that if you do not know the cipher 234 you will never be able to read the lines, and consequently if we do not know the number of the document, it remains indecipherable!"

On hearing the magistrate reason with such careful logic, Manoel was at first overwhelmed, but, raising his head, he exclaimed:

"No, sir, I will not renounce the hope of finding the number!"

"We might have done so," answered Judge Jarriguez, "if the lines of the document had been divided into words."
 "And why?"

"For this reason, young man. I think we can assume that in the last paragraph all that is written in these earlier paragraphs is summed up. Now I am convinced that in it will be found the name of Joam Dacosta. Well, if the lines had been divided into words, in trying the words one after the other—I mean the words composed of seven letters, as the name of Dacosta is—it would not have been impossible to evolve the number which is the key of the document."

"Will you explain to me how you ought to proceed to do that, sir?" asked Manoel, who probably caught a glimpse of one more hope.

"Nothing can be more simple," answered the judge. "Let us take, for example, one of the words in the sentence we have just written—my name, if you like. It is represented in the cryptogram by this queer succession of letters, *mcwkygc*. Well, arranging these letters in a column, one under the other, and then placing them against the letters of my name, and deducting one from the other the numbers of their places in alphabetical order, I get the following result:—

Between *n* and *j* we have 4 letters

—	c	—	a	—	2	—
—	n	—	r	—	3	—
—	v	—	r	—	4	—
—	k	—	i	—	2	—
—	f	—	q	—	3	—
—	y	—	n	—	4	—
—	g	—	e	—	2	—
—	c	—	s	—	3	—

"Now what is the column of ciphers made up of that we have got by this simple operation? Look here! 423, 423, 423, that is to say, of repetitions of the numbers 423, or 234, or 342."

"Yes, that is it!" answered Manoel.

"You understand, then, by this means, that in calculating the true letter from the false, instead of the false from the true, I have been able to discover the number with ease; and the number I was in search of is really the 234 which I took as the key to my cryptogram."

"Well, sir!" exclaimed Manoel, "if that is so, the name of Dacosta is in the last paragraph; and taking successively

each letter of these lines for the first of the seven letters which compose his name, we ought to get——”

“That would be impossible,” interrupted the judge, “except on one condition.”

“What is that?”

“That the first cipher of the number should happen to be the first letter of the word Dacosta, and I think you will agree with me that it is not probable.”

“Quite so!” sighed Manoel, who, with this improbability, saw the last chance vanish.

“And so we must trust to chance alone,” continued Jarriguez, who shook his head, “and chance does not often do much in things of this sort.”

“But still,” said Manoel, “chance might give us this number.”

“This number,” exclaimed the magistrate—“this number? But how many ciphers is it composed of? Of two, or three, or four, or nine, or ten? Is it made up of different ciphers only, or of ciphers in different order many times repeated? Do you not know, young man, that with the ordinary ten ciphers, using all at a time, but without any repetition, you can make 3,268,800 different numbers, and that if you use the same cipher more than once in the number, these millions of combinations will be enormously increased? And do you not know that if we employ every one of the 525,600 minutes of which the year is composed to try at each of these numbers, it would take you six years, and that you would want three centuries if each operation took you an hour? No! You ask the impossible!”

“Impossible, sir?” answered Manoel. “An innocent man has been branded as guilty, and Joam Dacosta is to lose his life and his honor while you hold in your hands the material proof of his innocence. That is what is impossible!”

“Ah, young man!” exclaimed Jarriguez, “who told you, after all, that Torres did not tell a lie? Who told you that he really did have in his hands a document written by the author of the crime? that this paper was the document, and that this document refers to Joam Dacosta?”

“Who told me so?” repeated Manoel, and his face was hidden in his hands.

In fact, nothing could prove for certain that the docu-

ment had anything to do with the affair in the diamond province. There was, in fact, nothing to show that it was not utterly devoid of meaning, and that it had been imagined by Torres himself, who was as capable of selling a false thing as a true one!

“It does not matter, Manoel,” continued the judge, rising; “it does not matter! Whatever it may be to which the document refers, I have not yet given up discovering the cipher. After all, it is worth more than a logogryph or a rebust!”

At these words Manoel rose, shook hands with the magistrate, and returned to the jangada, feeling more hopeless when he went back than when he set out.

CHAPTER XIII CHANCE I

A COMPLETE change took place in public opinion on the subject of Joam Dacosta. To anger succeeded pity. The population no longer thronged to the prison of Manaos to roar out cries of death to the prisoner. On the contrary, the most forward of them in accusing him of being the principal author of the crime of Tijuco now averred that he was not guilty, and demanded his immediate restoration to liberty. Thus it always is with the mob—from one extreme they run to the other. But the change was intelligible.

The events which had happened in the last few days—the struggle between Benito and Torres; the search for the corpse, which had reappeared under such extraordinary circumstances; the finding of the “indecipherable” document, if we can so call it; the information it concealed, the assurance that it contained, or rather the wish that it contained, the material proof of the guiltlessness of Joam Dacosta; and the hope that it was written by the real culprit—all these things had contributed to work the change in public opinion. What the people had desired and impatiently demanded forty-eight hours before, they now feared, and that was the arrival of the instructions due from Rio de Janeiro.

These, however, were not likely to be delayed.

Joam Dacosta had been arrested on the 24th of August,

and examined next day. The judge's report was sent off on the 26th. It was now the 28th. In three or four days more the Minister would have come to a decision regarding the convict, and it was only too certain that justice would take its course.

There was no doubt that such would be the case. On the other hand, that the assurance of Dacosta's innocence would appear from the document, was not doubted by anybody, neither by his family nor by the fickle population of Manaos, who excitedly followed the phases of this dramatic affair.

But, on the other hand, in the eyes of disinterested or indifferent persons who were not affected by the event, what value could be assigned to this document? and how could they even declare that it referred to the crime in the diamond arrayal? It existed, that was undeniable; it had been found on the corpse of Torres, nothing could be more certain. It could even be seen, by comparing it with the letter in which Torres gave the information about Joam Dacosta, that the document was not in the handwriting of the adventurer. But, as had been suggested by Judge Jarriguez, why should not the scoundrel have invented it for the sake of his bargain? And this was less unlikely to be the case, considering that Torres had declined to part with it until after his marriage with Dacosta's daughter—that is to say, when it would have been impossible to undo an accomplished fact.

All these views were held by some people in some form, and we can quite understand what interest the affair created. In any case, the situation of Joam Dacosta was most hazardous. If the document were not deciphered, it would be just the same as if it did not exist; and if the secret of the cryptogram were not miraculously divined or revealed before the end of the three days, the supreme sentence would inevitably be suffered by the doomed man of Tijuco. And this miracle a man attempted to perform! The man was Jarriguez, and he now really set to work more in the interest of Joam Dacosta than for the satisfaction of his analytical faculties. A complete change had also taken place in his opinion. Was not this man, who had voluntarily abandoned his retreat at Iquitos, who had come at the risk of his life to demand his rehabilitation at the hands of Brazilian justice, a moral enigma worth all the others put together? And so the judge

had resolved never to leave the document until he had discovered the cipher. He set to work at it in a fury. He ate no more; he slept no more! All his time was passed in inventing combinations of numbers, in forging a key to force this lock!

This idea had taken possession of Judge Jarriguez's brain at the end of the first day. Suppressed frenzy consumed him, and kept him in a perpetual heat. His whole house trembled; his servants, black or white, dared not come near him. Fortunately he was a bachelor; had there been a Madame Jarriguez she would have had a very uncomfortable time of it. Never had a problem so taken possession of this oddity, and he had thoroughly made up his mind to get at the solution, even if his head exploded like an overheated boiler under the tension of its vapor.

It was perfectly clear to the mind of the worthy magistrate that the key to the document was a number, composed of two or more ciphers, but what this number was all investigation seemed powerless to discover.

This was the enterprise on which Jarriguez, in quite a fury, was engaged, and during this 28th of August he brought all his faculties to bear on it, and worked away almost superhumanly.

To arrive at the number by chance, he said, was to lose himself in millions of combinations, which would absorb the life of a first-rate calculator. But if he could in no respect reckon on chance, was it impossible to proceed by reasoning? Decidedly not! And so it was "to reason till he became unreasoning" that Judge Jarriguez gave himself up after vainly seeking repose in a few hours of sleep. He who ventured in upon him at this moment after braving the formal defenses which protected his solitude, would have found him, as on the day before, in his study, before his desk, with the document under his eyes, the thousands of letters of which seemed all jumbled together and flying about his head.

"Ah!" he exclaimed, "why did not the scoundrel who wrote this separate the words in this paragraph? We might—we will try—but no! However, if there is anything here about the murder and the robbery, two or three words there must be in it—'arrayal,' 'diamond,' 'Tijuco,' 'Dacosta,' and others; and in putting down their cryptological equiva-

lents the number could be arrived at. But there is nothing—not a break!—not one word by itself! One word of two hundred and seventy-six letters! I hope the wretch may be blessed two hundred and seventy-six times for complicating his system in this way! He ought to be hanged two hundred and seventy-six times!”

And a violent thump with his fist on the document emphasized this charitable wish.

“But,” continued the magistrate, “if I cannot find one of the words in the body of the document, I might at least try my hand at the beginning and end of each paragraph. There may be a chance there that I ought not to miss.”

And impressed with this idea Judge Jarriguez successively tried if the letters which commenced or finished the different paragraphs could be made to correspond with those which formed the most important word, which was sure to be found somewhere, that of *Dacosta*.

To take only the last paragraph with which he began, the formula was—

$P = D$
 $h = a$
 $y = c$
 $j = o$
 $s = s$
 $l = t$
 $y = a$

Now at the very first letter Jarriguez was stopped in his calculations, for the difference in alphabetical position between the *d* and *h* gave him not one cipher but two, namely: 12, and in this kind of cryptogram only one letter can take the place of another.

It was the same for the seven last letters of the paragraph, *p s u v j h d*, of which the series also commences with a *p*, and which could in no case stand for the *d* in *Dacosta*, because these letters were in like manner twelve spaces apart.

So it was not his name that figured here.

The same observation applied to the words *arrayal* and *Tijuco*, which were successively tried, but whose construction did not correspond with the cryptographic series.

After he had got so far, Judge Jarriguez, with his head

nearly splitting, arose and paced his office, went for fresh air to the window, and gave utterance to a growl, at the noise of which a flock of humming-birds, murmuring among the foliage of a mimosa-tree, betook themselves to flight. Then he returned to the document.

He picked it up and turned it over.

“The humbug! the rascal!” he hissed; “it will end by driving me mad! But steady! Be calm! Don’t let our spirits go down! This is not the time!”

And then having refreshed himself by giving his head a thorough sluicing with cold water:—

“Let us try another way,” he said, “and as I cannot hit upon the number from the arrangement of the letters, let us see what number the author of the document would have chosen in confessing that he was the author of the crime at Tijuco.”

This was another method for the magistrate to enter upon, and maybe he was right, for there was a certain amount of logic about it.

“And first let us try a date. Why should not the culprit have taken the date of the year in which *Dacosta*, the innocent man he allowed to be sentenced in his place, was born? Was he likely to forget a number which was so important to him? Then Joam *Dacosta* was born in 1804. Let us see what 1804 will give us as a cryptological number.”

And Judge Jarriguez wrote the first letters of the paragraph, and putting over them the number 1804 repeated thrice, he obtained

1804 1804 1804
ph y j *sly d* *a q f d*

Then in counting up the spaces in alphabetical order he obtained

o y f *r d y.* *c i f.*

And this was meaningless! And he wanted three letters which he had to replace by points because the ciphers, 8, 4, and 4, which command the three letters, *h*, *d*, and *d*, do not give corresponding letters in ascending the series.

“That is not it again!” exclaimed Jarriguez. “Let us try another number.”

And he asked himself, if instead of this first date the

author of the document had not rather selected the date of the year in which the crime was committed.

This was in 1826.

And so proceeding as above, he obtained

1826	1826	1826
<i>ph y j</i>	<i>s l y d</i>	<i>d q f d</i>

and that gave

<i>o. v d</i>	<i>r d v.</i>	<i>c i d.</i>
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the same meaningless series, the same absence of sense, as many letters wanting as in the former instance, and for the same reason.

"Bother the number!" exclaimed the magistrate. "We must give it up again. Let us have another one! Perhaps the rascal chose the number of contos representing the amount of the booty!"

Now the value of the stolen diamonds was estimated at eight hundred and thirty-four contos, or about 2,500,000 francs, and so the formula became

834	834	834	834
<i>ph y</i>	<i>j s l</i>	<i>y d d</i>	<i>q f d</i>

and this gave a result as little gratifying as the others—

<i>h e l</i>	<i>b p h</i>	<i>p a.</i>	<i>i c.</i>
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"Confound the document and him who imagined it!" shouted Jarriguez, throwing down the paper, which was wanted to the other side of the room. "It would try the patience of a saint!"

But the short burst of anger passed away, and the magistrate, who had no idea of being beaten, picked up the paper. What he had done with the first letters of the different paragraphs he did with the last—and to no purpose. Then he tried everything his excited imagination could suggest.

He tried in succession the numbers which represented Dacosta's age, which should have been known to the author of the crime, the date of his arrest, the date of the sentence at the Villa Rica assizes, the date fixed for the execution, etc., even the number of victims at the affray at Tijuco!

Nothing! All the time nothing!

Judge Jarriguez had worked himself into such a state of

exasperation that there really was some fear that his mental faculties would lose their balance. He jumped about, and twisted about, and wrestled about as if he really had got hold of his enemy's body. Then suddenly he cried: "Now for chance! Heaven help me now, logic is powerless!"

His hand seized a bell-pull hanging near his table. The bell rang furiously, and the magistrate strode up to the door, which he opened. "Bobo!" he shouted.

A moment or two elapsed.

Bobo was a freed negro, who was the privileged servant of Jarriguez. He did not appear; it was evident that Bobo was afraid to come into his master's room.

Another ring at the bell; another call to Bobo, who, for his own safety, pretended to be deaf on this occasion. And now a third ring at the bell, which unhitched the crank and broke the cord.

This time Bobo came up. "What is it, sir?" asked Bobo, prudently waiting on the threshold.

"Advance, without uttering a single word!" replied the judge, whose flaming eyes made the negro quake again.

Bobo advanced.

"Bobo," said Jarriguez, "attend to what I say, and answer immediately; do not even take time to think, or I—"

Bobo, with fixed eyes and open mouth, brought his feet together like a soldier and stood at attention.

"Are you ready?" asked his master.

"I am."

"Now, then, tell me, without a moment's thought—you understand—the first number that comes into your head."

"76223," answered Bobo, all in a breath. Bobo thought he would please his master by giving him a pretty large one! Judge Jarriguez had run to the table, and, pencil in hand, had made out a formula with the number given by Bobo, and which Bobo had in his way only given him at a venture.

It is obvious that it was most unlikely that a number such as 76223 was the key of the document, and it produced no other result than to bring to the lips of Jarriguez such a vigorous ejaculation that Bobo disappeared like a shot!

"I come from the province where Torres pursued his calling as captain of the woods!" he gasped. "Mr. Judge, Torres told the truth. Stop—stop the execution!"

"You found the gang?"

"Yes."

"And you have brought me the cipher of the document?"

Fragoso did not reply.

"Come, leave me alone! leave me alone!" shouted Jarriguez, and, a prey to an outburst of rage, he grasped the document to tear it to atoms.

Fragoso seized his hands and stopped him. "The truth is there!" he said.

"I know," answered Jarriguez; "but it is a truth which will never see the light!"

"It will appear—it must! it must!"

"Once more, have you the cipher?"

"No," replied Fragoso; "but, I repeat, Torres has not lied. One of his companions, with whom he was very intimate, died a few months ago, and there can be no doubt but that this man gave him the document he came to sell to Joam Dacosta."

"No," answered Jarriguez—"no, there is no doubt about it—as far as we are concerned; but that is not enough for those who are to dispose of the doomed man's life. Leave me!"

Fragoso, repulsed, would not quit the spot. Again he threw himself at the judge's feet. "Joam Dacosta is innocent!" he cried; "you will not leave him to die? It was not he who committed the crime of Tijuco, it was the comrade of Torres, the author of that document! It was Ortega!"

As he uttered the name the judge bounded backward. A kind of calm swiftly succeeded to the tempest which raged within him. He dropped the document from his clenched hand, smoothed it out on the table, sat down, and, passing his hand over his eyes—"That name?" he said—"Ortega! Let us see," and then he proceeded with the new name brought back by Fragoso as he had done with the other names so vainly tried by himself.

After placing it above the first six letters of the paragraph, he obtained the following formula:

O r t e g a
P h y j s l

"Nothing!" he said. "That gives us—nothing!"

And in fact the *h* placed under the *r* could not be expressed by a cipher, for, in alphabetical order, this letter occupies an earlier position to that of the *r*.

The *p*, the *y*, the *j*, arranged beneath the letters *o*, *t*, *e*, disclosed the cipher 1, 4, 5, but as for the *s* and the *l* at the end of the word, the interval which separated them from the *g* and the *a* was a dozen letters, and hence impossible to express by a single cipher, so that they corresponded to neither *g* nor *a*.

And here appalling shouts arose in the streets; they were the cries of despair. Fragoso jumped to one of the windows, and opened it before the judge could hinder him.

The people filled the road. The hour had come at which the doomed man was to start from the prison, and the crowd was flocking back to the spot where the gallows had been erected.

Judge Jarriguez, quite frightful to look upon, devoured the lines of the document with a fixed stare. "The last letters!" he muttered. "Let us try once more the last letters!"

It was the last hope.

And then, with a hand whose agitation nearly prevented him from writing at all, he placed the name of Ortega over the six last letters of the paragraph, as he had done over the first.

An exclamation immediately escaped him. He saw, at first glance, that the six letters were inferior in alphabetical order to those which composed Ortega's name, and that consequently they might yield the number.

And when he reduced the formula, reckoning each later letter from the earlier letter of the word, he obtained

O r t e g a
4 3 2 5 1 3
S u v j h d

The number thus disclosed was 432513.

But was this number that which had been used in the document? Was it not as erroneous as those he had previously tried?

At this moment the shouts below redoubled—shouts of pity which betrayed the sympathy of the excited crowd. A few minutes more were all that the doomed man had to live!

Fragoso, maddened with grief, darted from the room. He wished to see, for the last time, his benefactor who was on his road to death! He longed to throw himself before the mournful procession and stop it, shouting: "Do not kill this just man! do not kill him!"

But already Judge Jarriguez had placed the given number above the first letters of the paragraph, repeating them as often as was necessary, as follows:

4 3 2 5 1 3 4 3 2 5 1 3 4 3 2 5 1 3 4 3 2 5 1 3
P h y j s l y d d q f d s x g a s g s s q q e h

And then, reckoning the true letters according to their alphabetical order, he read:

"Le véritable auteur du vol de—"

A yell of delight escaped him! This number, 432513, was the number sought for so long! The name of Ortega had enabled him to discover it! At length he held the key of the document, which would incontestably prove the innocence of Joam Dacosta, and without reading any more he flew from his study into the street, shouting, "Halt! Halt!"

To cleave the crowd, which opened as he ran, to dash to the prison, whence the convict was coming at the moment, with his wife and children clinging to him with the violence of despair, was but the work of a minute for Judge Jarriguez.

Stopping before Joam Dacosta, he could not speak for a second, and then these words escaped his lips: "Innocent! Innocent!"

CHAPTER XVIII
THE CRIME OF TITICO

ON the arrival of the judge the mournful procession halted. A roaring echo had repeated after him and again repeated the cry which escaped from every mouth: "Innocent! Innocent!"

Then complete silence fell on all. The people did not want to lose one syllable of what was about to be proclaimed.

Judge Jarriguez sat down on a stone seat, and then, while Minha, Benito, Manoel, and Fragoso stood round him, while Joam Dacosta clasped Yaquita to his heart, he first unraveled the last paragraph of the document by means of the number, and as the words appeared by the institution of the true letters for the cryptological ones, he divided and punctuated them, and then read it out in a loud voice. And this is what he read in the midst of profound silence:—

Le véritable auteur du vol des diamants est
43 251343251 343251 3432513433251343251
Ph yj sly d d q f d s x g a s g s s q q e h
de l'assassinat des soldats qui escortaient le
34 32513432513 432 5134325 134 32513432513 43
gi ocyid xv k s b x h n u y p o h d v y r y m h u h p y d k j o x p h
c o n v o i , c o m m i s d a n s l a n u i t d u v i n g t - d e u x j a n -
251343 251343 2513 43 2513 43 251343251 343
e t o a s t e t n p m v f f o v p d p a i x h y y n o j y g g a y m e q
v i e r m i l h u i t c e n t v i n g t - s i x , n ' e s t d o n c p a s J o a m
2513 432 5134 3251 343251 34 3251 3432513 4325
y n f u g l u m e l y f g s u z m g i s t l b q g y u g s q e u b v n r c r
D a c o s t a , i n j u s t e m e n t c o n d a m n é à m o r t , c ' e s t
1343251 34325134325 13432513 4 3251 3432
e d g r u e b l r m x y u h q h p s d r r g c r o h e p q x u f i v v
m o i , l e m i s é r a b l e e m p l o y é d e l' a d m i n i s t r a t i o n
513 43 251343251 3432513 43 251343251343251
r p l p h o n t h v d d q f h q s n t z h h h n f e p m g k y u e r k t o
d u d i s t r i c t d i a m a n t i n , o u i , m o i s e u l , q u i s i g n e
34 32513432 513432513 432 513 4325 134 32513
g s g k y u m f v i j d q d p z i q s y k r p l x h x q r y m v k l o h
d e m o n v r a i n o m , O r t e g a .
43 2513432 513 432513
h h o t o z v d k s p p s u v j h d .