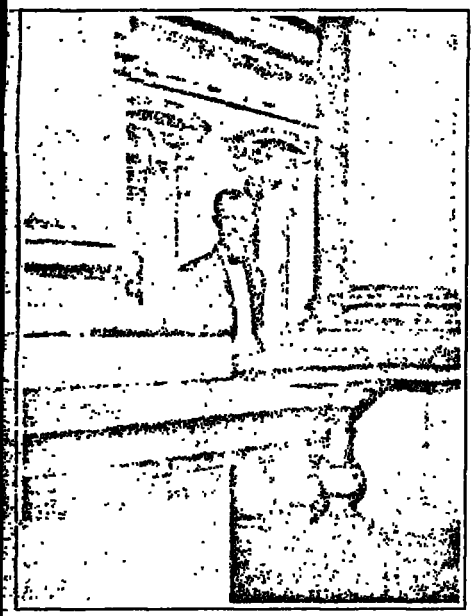
CIPHERS—By Herbert O. Yardley



The Author in Washington, 1918

GENERALLY speaking, it may be said that a code message is one in which the letters, syllables, words or sentences of the original text are represented by arbitrary signs—usually letters or figures—and that a cipher message is one in which the letters or groups of letters of the original text are either transposed or represented by arbitrary signs.

The types of cipher we dealt with in Military Intelligence are too numerous to mention in anything but a scientific treatise on cryptography. However, it is a safe generalization that all ciphers fall into two types: substitution and transposition.

Single-alphabet-substitution ciphers are of the Gold Bug type and are easily deciphered even by amateurs. The next variety in difficulty is the multiple-alphabet-substitution cipher. While I was organizing the American Black Chamber, directly after we entered the war, the President sent a mission to Russia headed by George Creel. By that time all code messages filed with the cable companies were coming to my desk in the day's routine.

Voltaire's Error

MR. CREEL was using a multiple-alphabet substitution so simple of solution that his secret dispatches were used as elementary examples in the training of student cryptographers.

It was this type of cipher, too, of which Voltaire expressed the opinion that persons who boasted of their ability to read secret messages without knowing the key word and the system employed were mountebanks and liars, to the same degree as men who might pretend to understand a language unknown to them. Voltaire was wrong.

But the multiple-alphabet cipher lends itself to many difficult forms of substitution, such as periodic multiple alphabets produced by wheels, disks, and other mechanical devices. Some produce a cipher which, to the eye, does not repeat for as many as 4,000,000,000 letters. Mathematical formulas, however, will reveal repetitions in all forms of substitution ciphers in which attempt is made to conceal these repetitions. All are soluble. The only indecipherable code or cipher is one in which there are no repetitions to conceal—a method recommended by the American Black Chamber to the United States Government to supersede its antiquated systems, but, unfortunately, never adopted.

A transposition cipher is, of course, one in which the letters of the original text are disarranged by a prearranged diagram. There are also infinite varieties of combination substitution-transposition ciphers. The great cipher genius of the French, Capt. Georges Painvin, whom I knew and studied under in France, was the first to solve the famous ADFGVX German substitution-transposition cipher which the enemy put into use a few days before the long-heralded offensive of the spring of 1918.

While in London studying under the British, I had the good luck to solve a combination substitution-transposition cipher which had been recommended for use by the British Army on the western front.

The most famous cipher document in American history is the Pablo Waberski identification card—a transposition cipher. Early in February, 1918, Colonel Van Deman rang for me and told me to report to him at once. Without comment he handed me a sheet of ordinary writing paper on which was typed the following:

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secfnatupk    asiheihbbn    uersdausnn
lrseggiesn    nkleznsimn    ehneshmppb
asueasriht    htsuravnsm    eaincouasi
insnrnvegi    esnbtnnrcn    dtdrzbsnuk
kolselzdnn    ausbfkbpsa    tasecisdgt
ihuktnaele    tisbaeuera    thnoieaesn
hsdaeaiakn    ethnnneecd    ckdkonesdu

eszadehpsa    bbilseecoe    ethouzkdal
neuiiurarn    zwhnesgver    eodhicsiac
niusrdnso     drgsurriec    egrcauasep
eatgrsheho    etruseelca    umtpaatlee
cicxrnprga    awsutemair    nasnutedea
errrcheim     eahktauhdt    cokdtgceic
esfighihre    litfiueunl    eelserunna
znai
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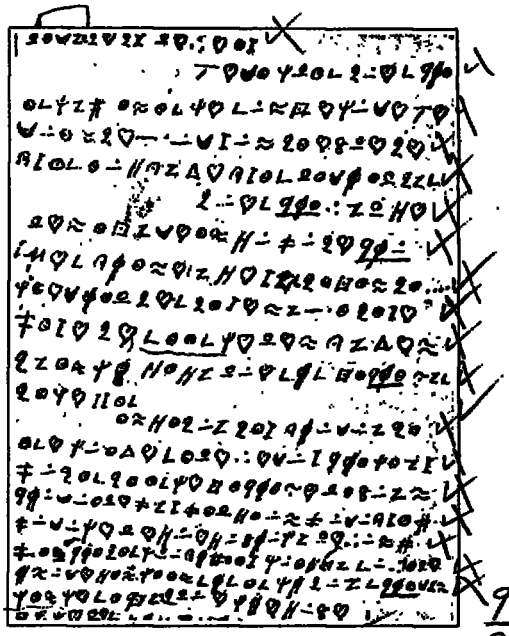

A Type of Love Letter Held Up by the Censor

There was neither address nor signature—nothing but a jumble of letters bearing the date January 15, 1918.

I had been with the War Department now for nearly eight months, and though thousands of code and cipher documents as well as secret-ink letters had passed through my hands, I still always felt the thrill of the mystery of the unknown when a jumble of letters met my eye. And aside from this I well knew that Colonel Van Deman did not ask me to see him personally unless he had something out of the ordinary to discuss.

Reading Waberski's Death Sentence

I TOOK it for granted that this was an important cipher, but I could not know that I was holding in my hand a document that would be responsible for the death sentence of a daring German spy.

"What do you make of it?" Van Deman asked.

"It looks like cipher and not code to me," I replied. "There are long sequences of consonants such as 'shmppb' in the second line, and 'snbtnnrendtdrzb' in the fourth line. Usually code groups are formed by combinations of vowels and consonants. Yes, I'm quite sure this is cipher. Would you mind telling me the source of the message—where it came from?"

"Have you ever heard of Pablo Waberski?" he asked.

"Not a great deal—nothing except that he is suspected of being one of the most dangerous German spies operating across the Mexican border."

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U. S. SIGNAL CORPS OFFICIAL PHOTO, FROM KEYSTONE & UNDERWOOD

Colonel R. H. Van Deman

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Social Democrats, who will be called upon to make great sacrifices for financial reform, and whose reason for supporting him is not solidarity with his program, but the fear of something worse.

Above all, Chancellor Bruening is pressed for time. In 1932 the German people, under the constitution, must hold the presidential and Prussian state elections. The presidential election might be avoided by the passage of a special law making Hindenburg president for life. Such a move has been proposed. But it is difficult to see how the constitution can be circumvented or altered to postpone the Prussian elections. And unless the situation notably improves before then, these elections may throw the republic into the bitterest inner conflict of its history. The German nation will certainly emerge from this or any other conflict, but it is by no means certain that the German Republic will do so.

Chancellor Bruening has believed from the beginning that if the Fascist Nazis can be held in check for a few months they will disintegrate, through inaction, from the lack of any genuine inner cohesion in their ranks, and through the stupidity of their demagogic leadership. The chancellor is shrewd and wise, and recent events indicate that his presumption is correct. German Fascism appears to be splitting into two camps—reactionary chauvinists and radical nationalists of almost communistic tendencies.

Meanwhile, however, the chancellor defends the democracy by the only means available. He repeatedly invokes special powers for the president, using Paragraph 48 of the constitution to do so—a public admission that the state is seriously menaced. From a practical point of view his action, as the supporter of law and order, seems unavoidable.

But it is obviously dangerous to *defend republican democracy by suspending it.* When the republican government assumes dictatorial powers for the sake of avoiding a dictatorship of the republic's enemies, it loses morally, however much it may gain strategically.

The German Republic is definitely challenged, and it is not, I think, rhetorical to say that 1931 is its critical year.

Editor's Note—This is the last of two articles by Miss Thompson.

CIPHERS

(Continued from Page 38)

"Well, we arrested him on the border a few days ago. Nothing was found on his person but this slip of paper. And since he is traveling on a Russian passport, we shall be unable to hold him, even though we know that he is a German spy, unless this cipher contains incriminating evidence." He paused and looked me squarely in the eyes. "Yardley, I want this message deciphered," he said in an incisive voice. "I am depending upon the cleverness and ingenuity of MI-8. Don't come back until you can bring me the decipherment"—and he curtly dismissed me.

Only on one other occasion had I ever seen Van Deman, usually so even tempered, quite so exercised over a cipher message. Several months earlier he had given me a spy message and almost demanded a decipherment by the next morning. I had worked on it all night and, basing my opinion on scientific analysis, had told him the document was not a cipher but a fraud, or, as we called it, a fake cipher. Van Deman was very impatient at my report, but in the face of criticism I maintained that the message was a pure fraud and had been constructed by someone who simply sat before a typewriter and pecked out a jumble of letters.

Van Deman's secret operator was plainly disgusted with both me and my report, but at my insistence consented to give the two principals in the case a severe cross-examination. As a result they confessed that they had made up the cipher out of pure malice in order to implicate a third person. The suspect was released from jail, and from that day no report from MI-8 was ever questioned.

Experiences of this type, however, led to one very grave difficulty—it soon became a tradition that MI-8 could decipher anything, and this often placed us in an awkward light. I wondered how successful we should be on the Waberski cipher.

I hurried through the corridors to the photostat room and had six copies of the document made; then rushed upstairs to my office with the negatives still damp from their chemical bath. Since I was already convinced that I knew the type of ciphor we had to deal with, I distributed the six copies to different clerks with instructions to prepare the preliminary work.

To the experienced cryptographer this message would appear offhand to be a transposition cipher written in German. A student of cryptography would arrive at this conclusion by the following analysis:

The first step is to discover how often each letter occurs in the cipher by making a frequency table. A normal language frequency is shown—that is, the letters A, E, I, N, R, S, T occur most often, which is to be expected in Spanish, English and German. Since the cipher was found on a German, crossing from a Spanish-speaking country into the United States, it is fair to assume that it is written in one of these languages. But which one?

We immediately discard Spanish, for this message contains twelve K's; a letter which does not occur in that language. Aside from this, Q is very common in Spanish, and there are no Q's here. Is it in English? Z and K are uncommon in English, and in this message Z occurs ten times, K twelve times. We disregard English.

That leaves German, but to make more certain, we make a scientific comparison, reducing the Waberski frequency table to a basis of 200 letters and superimposing it on a normal German frequency table which has been reduced from a count of 10,000 letters to a basis of 200 letters. They check closely. It is a German transposition cipher.

How does one go about deciphering a transposition cipher? If, in the spring of 1918, you had searched the libraries of the world you would not have discovered so much as one word that would give you the least idea how to attack such a problem. Even the pamphlet used by the United States Army for instruction in codes and ciphers would have given you no clews. This is what I meant earlier when I

made the statement that the cryptographer, in order to be successful, must make his own discoveries; there is no beaten path to follow.

Now, in German, the letter C is always followed by the letter H or K, except in a few rare words and proper names. If you first write a message in German and then disarrange the letters by a formula, it follows that the letters of all the digraphs CH and CK are disturbed or disarranged in the same manner. And if you can discover a method for matching up correctly all the C's with their affinity H's or K's, you have made a long stride in the solution of the message.

The scientific method as developed by MI-8 for such a problem is first the tabulating of the number of letters in the cipher message that separate each C and each H or K. The message, therefore, was turned over to clerks to compile these statistics.

German Operations in Mexico

Was it possible, I wondered, that German cryptographers had not made this discovery? Evidently not, for the Waberski cipher was, without question, a transposition cipher. Perhaps it was a double transposition! Oh, well, the charts being prepared would tell the story.

While this preliminary work was being done, I went down to see the officer who had charge of the Southern Department, for I wished to learn more about Waberski. The solution of a problem is often possible only when one knows all the circumstances under which the cipher message was intercepted.

The officer handed me a large file to read, and was extremely excited when I told him that we were working on the Waberski cipher and that there was a fair chance of our being able to read it, even though the message was not very long.

To understand the importance that officials attached to the Waberski case, one must keep in mind the ancient and private feud between President Wilson and President Carranza of Mexico, the punitive expedition into Mexico of American troops in 1916, the publication of the Zimmermann-Carranza note, in which the German Minister for Foreign Affairs promised Mexico the states of Texas, New Mexico and Arizona if she declared war against the United States.

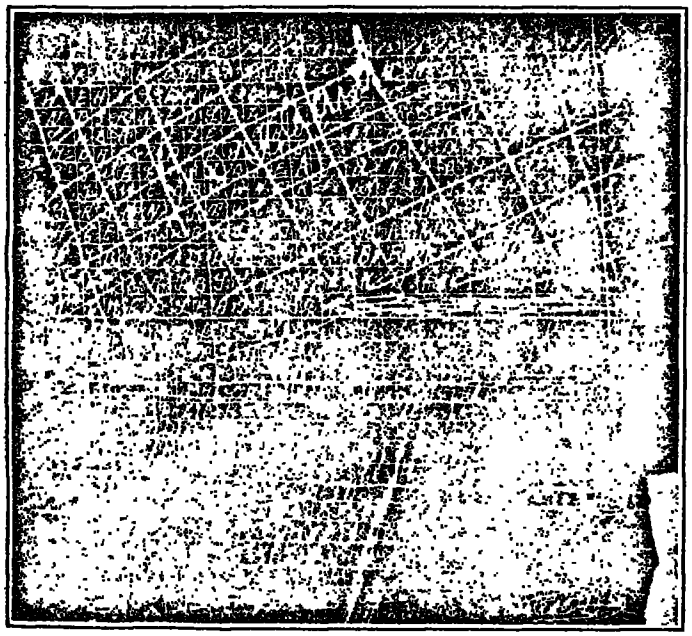
Mexico was openly pro-German. Our own spies who had been sent into Mexico reported that hundreds of German reservists who fled across the border at the declaration of war were recruiting and drilling Mexican troops; and that high German officials, such as Jahnke, the chief of German Secret Service, Von Eckhardt, the German Minister, and the German Consul General to Mexico, were extremely friendly with President Carranza and pursued their operations openly.

Our agents reported that German spy plans were of a most ambitious nature—destruction at the opportune moment of the Tampico oil fields; establishment of a wireless station for direct communication with Berlin, with the knowledge and coöperation of General Carranza; stirring up strikes in the United States through the I. W. W.; fomenting discontent among the Negroes in the South, who, at the proper moment, were to start a series of massacres; destruction of war industries in the United States; and every other conceivable phase of wartime espionage.

We were, of course, deciphering all the Mexican Government's diplomatic cipher telegrams, which gave us a fair picture of the attitude of General Carranza toward the United States. That our own spies were not exaggerating matters may be gleaned from the Nauen messages.

A Message From the Consul General

That Von Eckhardt, the Consul General and Jahnke were not only ambitious but ruthless in their activities may be surmised from the following, which is a translation of a German cipher message, deciphered by MI-8, sent by the German Consul General in Mexico to all German consuls a few weeks after the Armistice. A copy of the cipher message was sent to MI-8



A Photostat of Pablo Waberski's Original Pencil Notations Which He Made in Prison

by a spy I placed in the Mexican Telegraph Office in Mexico City shortly after I arrived at the War College, for the purpose of stealing copies of German diplomatic and consular code and cipher messages from the Mexican Telegraph Company files. The translated message follows:

Please carefully and immediately burn without remainder, and destroy the ashes of, all papers connected with the war, the preservation of which is not absolutely necessary, especially papers now in your hands or reaching you hereafter which have to do with the Secret Service and the service of the representatives of our General Staff and Admiralty Staff [strictest silence concerning the existence and activity of these representatives is to be observed now and for all future time, even after the conclusion of peace] which might be compromising or even unpleasant for us if they came to the knowledge of our enemies, who are still endeavoring to obtain possession of such papers.

Lists, registers, accounts, receipts, account books, etc., are especially included in these papers, as well as correspondence with this Embassy by letter and telegraph on the subjects mentioned.

Cipher books, codes and cipher keys and directions that are still in use are excepted for the present, and most particular attention must be paid to keeping them in absolute safety.

Please report in writing *en claire* the execution of this order so far as it relates to papers now on hand, and then burn this so-called order for burning, which, for further reference, I herewith designate as PQR, and the contents of which, together with this designation, you will please retain in memory.

[Signed by the German Consul General]

General Churchill, who was Director of Military Intelligence at the time we received this message, made the following comment about its decipherment:

Referring to the decipherment of document PQR which was presented to me yesterday morning, I desire to express officially my appreciation of the painstaking skill which has resulted in the successful decipherment of this vitally important document. It is an achievement worthy of the high standard which MI-8 has always maintained.

Please express my appreciation to all officers and clerks who have contributed to this success. Furnish them a copy of this letter.

The foregoing is without question the most frank and open document treating on the subject of espionage, excepting one Soviet spy document, that I have ever seen. I am always amused at the frankness with which diplomats express themselves in secret-code telegrams, and their childlike faith that a cipher or a code can keep their utmost secrets from prying eyes.

Keeping Tab on Waberski

In retrospect, it is no wonder that my superiors were concerned about the cipher document found on Pablo Waberski, for Mexico was full of spies operating across the border and, so the reports read, Pablo Waberski was the most dangerous of them all. There were even reports from the British, who suspected him of being responsible for the Black Tom explosion in New York Harbor in July, 1916.

Pablo Waberski, so the reports stated, entered the United States at Nogales, Arizona, on February 1, 1918, traveling on a Russian passport. He was not aware that our secret agents in Mexico had reported his activities and was surprised when arrested as he crossed the border.

He was rushed to the Military Intelligence officer at the camp of the 35th Infantry and searched. Nothing but a sheet of writing paper containing this series of ten-letter groups of letters was found on his person. However, since our authorities already had reports of his activities, he was kept under close guard.

I returned to MI-8 with no small concern, for I understood better the importance of the Waberski document. Van Deman had placed the issue squarely in the hands of MI-8.

When I returned, a great deal of progress had already been made. All the necessary statistics had been prepared and several cryptographers, under the direction of Captain Manly, were busily engaged in piecing the message together.

Breaking Down the Cipher

The Waberski cipher had been retyped and each letter given a number; thus:

s	e	o	f	n	a	t	u	p	k
1	2	3	4	5	6	7	8	9	10

Our frequency table already tells us that there are fifteen C's and twenty H's. All the C's were underlined in red and all the H's in blue, so that the eye could readily find them. They were then typed on another sheet of paper together with their letter numbers; thus:

H	H	H	H	H	H	H
14	17	52	56	69	71	152
H	H	H	H	H	H	H
172	181	193	217	253	264	307
H	H	H	H	H	H	C
309	367	373	378	396	398	85
C	C	C	C	C	C	C
109	145	199	201	259	266	270
C	C	C	C	C	C	C
290	294	319	331	333	381	387

Now, as already explained, our problem is to find the mathematical formula that the Germans used in disarranging the original text. And since in German the letter C is nearly always followed by H or K—only the digraph CH will be considered in this problem, as the analysis of CK will not be necessary—if we subtract the letter numbers of all the C's from the letter numbers of all the H's, we should find a common factor, unless the cipher is a grille, or double transposition.

Let us, therefore, take this first step and see whether the resultant figures indicate the type of cipher we are dealing with.

The distances between the C's and H's can be graphically shown by writing the H's and their letter numbers in a horizontal column, and the C's with their letter numbers in a vertical column, on cross-section paper. By subtracting each figure in the vertical column from each figure in the horizontal column, we arrive at the distance, or number of letters, between each C and each H.

In cases where the H number is smaller than the C number it will first be necessary to add 424, the number of letters in the message, to the H number before subtracting; thus in the first case H-14 plus 424 equals H-438, minus C-85 equals 353.

By carefully examining this chart we find that the figure 108 is common to all the lines except five. This can hardly be a coincidence. If not, it means that the formula used by the Germans in disarranging the original message has separated each C from its H by 108 letters.

We now retype the original cipher message in vertical columns of 108 letters and see whether such an arrangement throws any of these C's and H's together.

1	scha	37	iche	73	ehei
2	enpa	38	einr	74	usch
3	odet	39	sser	75	rder
4	ftal	40	nder	76	mage
5	ndbe	41	ngge	77	veri
6	arbe	42	ktvo	78	naci
7	tzic	43	lich	79	sist
8	ubli	44	ehre	80	mauf
9	peso	45	zuei	81	ekai
10	kmex	46	nkom	82	ansu
11	ausr	47	stde	83	iese
12	skon	48	inha	84	ntpu
13	ikop	49	maih	85	chen
14	hoer	50	neck	86	onal
15	eleg	51	eimt	87	unte
16	ista	52	heim	88	ange
17	hena	53	ntau	89	serl
18	blow	54	eich	90	iess
19	bzus	55	send	91	iche
20	ndzu	56	hbit	92	nder
21	unkt	57	maue	93	schu
22	ende	58	peso	94	nkon
23	rasm	59	punk	95	rdem
24	sula	60	berd	96	nkta
25	deni	61	ardt	97	vorz
26	aber	62	sang	98	enun
27	ufun	63	utsc	99	gesa
28	skia	64	ehoe	100	isei
29	nbis	65	andi	101	ede
30	npun	66	sorc	102	sul
31	lsru	67	rige	103	nec
32	rant	68	iese	104	bsa
33	stre	69	hauf	105	tzu
34	eand	70	teri	106	nam
35	gsze	71	herg	107	ndt
36	geva	72	tnih	108	rep

It does join the digraph CH in eight instances—SCHA in Line 1, ICHE in Line 37, LICH in Line 43, EICH in Line 54, USCH in Line 74, CHEN in Line 85, ICHE in Line 91 and SCHU in Line 93.

Our first rearrangement has accounted for eight of the fifteen C's in the cipher, which is much better than we could have hoped for. Moreover, we detect many common German syllables, and here and there either German words or parts of German words.

In Line 58, in particular, we find a word not German, but Spanish—PESO, meaning "dollar" in Mexico, and the message was smuggled across the Mexican border. Do not forget that what we began with was no more than a meaningless jumble of vowels and consonants bearing no resemblance to any language.

It seems certain that we are on the right track, though it is hard to believe that MI-8 is cleverer than the German cryptographers, who surely cannot have discovered a method of solving transposition ciphers, or they would never have recommended such a system. Let us be fair, however, to German cryptographers. Perhaps German officials are like our own and do not take the recommendations of cryptographers very seriously.

The Trail Gets Warmer

Let us see if we can place the remaining seven C's. In Line 50, C is followed by K; CK is a very common German digraph.

C, Line 78, is followed by I in the four-letter group N A C I. This is most unusual, because in pure German the letter I never follows C. Have we made an error? Perhaps the copyist has made an error, or the German who enciphered the message. If not, and we are on the right track, N A C I must be a group of letters from a foreign word. We already have noted the Spanish word PESO. Perhaps NACI is the beginning of the Spanish word NACIONAL—"national." This seems reasonable, for in Line 86 we find ONAL.

There are digraphs CH in C-333, H-17 and C-387, H-71. If the lines in which these digraphs occur are brought

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together, we have PESCHENA and UTSCHERG.

We are now well along in the solution of this document. Here and there we see words and parts of words, and are tempted to try to join up the lines, but we must proceed cautiously. For if the cipher reveals any important information about Pablo Waberski, the suspected spy, we may need mathematical proof that we have arrived at the correct solution. Aside from this it is always safer and often quicker to attempt to discover the underlying system. Once this is discovered, all the letters of the cipher will fall into their proper places.

Let us examine again the eight-letter group UTSCHERG that we have just placed together. Do these letters suggest a German word? By prefacing the letters DE we have the German word for German—DEUTSCHER [G]. Let us, therefore, turn to our chart and search for a group ending in DE. The first one we find is in Line 47—STDE.

Finishing an All-Night Job

By placing these letters before our eight-letter group we have [ST] DEUTSCHER [G]. Do these letters suggest another word—either one ending with ST or another beginning with G? It looks as if we have gone as far as we can. Suppose we start at another place.

Turn back to the chart and search for a familiar word. Do we find a line that suggests a word? How about Line 10—KMEX? The letter X is very uncommon in any language. For this reason we should be able to guess a word from the combination KMEX.

Pablo Waberski has been arrested as he crossed the border from Mexico. MEX certainly suggests the German word for Mexico—MEXIKO. Let us see if we can find a line beginning with IKO. This we find in Line 13—IKOP. Placing these two groups together, we now have [K] MEXIKO [P]. Can you think of a word ending in K that might precede the word MEXIKO? How about REPUBLIK MEXIKO? Let us try this.

In Line 8 we find UBLI and in Line 108 we find REP. By placing these in their proper order, we now have REPUBLIK MEXIKO [P]. Does the letter P suggest a word? If not, we shall have to begin all over again.

Before doing this, however, let us summarize the words and groups we have brought together and see if we can discover a system. The following table gives the lines in which the groups of letters have been discovered and the intervals or number of lines between the combination of groups:

LINES		INTERVALS
78–86	NACIONAL	8
9–17	PESCHENA	8
63–71	UTSCHERG	8
47–63–71	[ST] DEUTSCHER [G]	16–8
10–13	[K] MEXIKO [P]	3
108–8–10–13	REPUBLIK MEXIKO [P]	8–2–3

In order to follow the next analysis, it will be necessary to understand what is meant by the word "intervals." Take the first case, for example. We found NACI in Line 78 and ONAL in Line 86. The interval between Lines 78 and 86 is eight. In the last case we found REP in Line 108, UBLI in Line 8, KMEX in Line 10, IKOP in Line 13. From Line 108 to Line 8 the interval is eight; from Line 8 to Line 10 the interval is two; from Line 10 to Line 13 the interval is three. The intervals, then, are eight-two-three.

This doesn't seem a great deal to work with, but note the intervals sixteen-eight between the lines in which we discovered [ST] DEUTSCHER [G]. Note also the intervals between the lines of REPUBLIK MEXIKO [P]—eight-two-three. These two groups give us the sequences—sixteen-eight and eight-two-three. Since the figure eight is repeated in both sequences, let us drop eight in one of them and join them together. We now have the sequence sixteen-eight-two-three. Let us, therefore, take [ST] DEUTSCHER [G], interval sixteen-eight, and join to it the lines in intervals two-three.

The last four letters of [ST] DEUTSCHER [G] we find in Line 71. Now, beginning with Line 71 and counting forward two lines, the next interval, we find EHEI, Line 73. The next interval is three; so the next line should be 76. Here we find MAGE. Let us now join EHEI MAGE to [ST] DEUTSCHER [G]. This gives us [ST] DEUTSCHER GEHEIM [AGE].

GEHEIM! Secret! DEUTSCHER GEHEIM! German secret! German secret what? The last three letters are AGE. Is it possible this stands for AGENT? German secret agent! Yes. We find it in Line 84. [ST] DEUTSCHER GEHEIM AGENT [PU]: German secret agent.

The word AGENT gives us the next sequence—eight, which, in turn, after following the same analysis, gives us the remainder of the sequence. We now have the entire sequence—sixteen-eight-two-three-eight-twelve-eight-eleven.

Tracing the entire cipher message backward and forward by using this sequence, the message falls into twelve sections, all having the same sequence.

It takes MI-8 all night to decipher the complete message, as follows:

An Die Kaiserlichen Konsular-Beharden
In Der Republik Mexiko Punkt

Strenggeheim Ausrufungszeichen!

Der inhaber dieses ist ein reichsangehariger der unter dem namen pablo waberski als russe reist punkt er ist deutscher geheimagent punkt absatz ich bitte ihm auf ansuchen schutz und beistand zu gewehren komma ihm auch auf verlangen bis zu ein tausend pesos oro nacional vorzuschiessen und seine code-telegramme an diese gesandtschaft als konsularamtliche depeschen absenden punkt

VON ECKARDT

It was daylight before the message was completely deciphered and translated. It was too late to telephone Van Deman. Aside from this, I hesitated to telephone the fact that the Waberski document had been solved. Since it was Sunday, he would not be at the office before ten o'clock. The result had produced too much excitement for sleep; so there seemed nothing to do but wait for him.

Good News for the Chief

I tried to appear calm when Colonel Van Deman entered his office. He seemed a bit surprised when he found me waiting.

"What's on your mind, Yardley?" he asked as he sat down at his desk.

"I have a very important document for you," I began, and I think my voice trembled a bit; "but I hesitated to telephone you—the message seemed too important to telephone."

He made no comment and I handed him a translation of the Waberski cipher.

To the Imperial Consular Authorities
in the Republic of Mexico
Strictly Secret!

The bearer of this is a subject of the Empire who travels as a Russian under the name of Pablo Waberski. He is a German secret agent.

Please furnish him, on request, protection and assistance, also advance him on

demand up to one thousand pesos of Mexican gold and send his code telegrams to this embassy as official consular dispatches. VON ECKARDT

Van Doman read the translation over and over again. He leaned back in his chair.

"A most amazing document," he said. "It ought to hang Waberski." Then: "What kind of cipher was it?"

"Here is the German from which we made a translation," I began, handing him the German text. "It is a German transposition cipher. The address, signature and the message itself were first written in German and then by a prearranged diagram the letters were mixed up. Our problem was to discover the formula by which the letters were disarranged."

"Have you discovered the diagram?"

"Yes."

"Please offer my sincere congratulations to the personnel of MI-8," he said. "If for no other reason, the decipherment of this document justifies your bureau."

For an hour or more we discussed the decipherment of the Waberski document, and the feasibility, now that we had discovered the German espionage method of identifying their secret agents, of drafting identification ciphers along the line of the Waberski cipher for use by our own agents in Mexico, so that they could pose as German spies.

On February sixteenth Pablo Waberski, manacled and under heavy guard, was taken by train to San Antonio, and from there to the military prison at Fort Sam Houston. Though carefully guarded while incarcerated here and awaiting trial, Waberski composed a cipher message and attempted to have it smuggled out of prison. It was intercepted and sent to MI-8 for decipherment.

It was addressed to Señor K. Tanusch, Calle Tacuba 81, Mexico, D. F. The translation reads:

Need my notebook, which I left in Mr. Paglasch's safe. Very necessary. The address, Señor Jesus Andrada, Box 681, San Antonio, is absolutely safe, and it will be delivered to me in secret. I have forgotten certain names and addresses which I need in order to show the people here that I am innocent. Need money.

Waberski obviously recognized that he was in a desperate position.

In the hope of intercepting the reply, our authorities mailed the cipher message. But no answer ever came.

Finally, in August, 1918, Pablo Waberski, whose real name was Lather Witzke, was tried before military court on the charge of being a German spy. The trial lasted two days. He was found guilty and the court sentenced him to be hanged by the neck until dead.

The failure of Pablo Waberski, like that of many other spies, was due to the skill of MI-8. As our skill increased, our power as an organization was not only to affect the life of a single person but was also to shape the decisions of governments.

THE EUROPEAN LOW-PRICE MYTH

(Continued from Page 40)

for "elevator" gives an erroneous idea. The French *ascenseur* is a tiny little cage usually large enough for only two persons, working automatically and creeping at a snail's pace. Custom prescribes that one must not ride down in it, as it might get overtaxed, and even old ladies at the top floor docilely walk down the eight flights.

The rental of my apartment—one room, bath and kitchen, well furnished—was about forty-five dollars a month, and this was low. In New York, fairly well located, it would cost double, at least, but in Chicago I have seen its equivalent for sixty-five dollars; in other cities, for less. However, when I speak of American rentals I also mean American conditions and service. It costs money to heat a large apartment house adequately, to install and operate good elevators, to maintain an adequate staff of employes; all these are added to American rentals, and it is the lack of them which helps to keep French rentals low and makes them appear so very much cheaper than our own.

The elements of comfort, convenience and time are so often ignored in other phases of Paris life that detailed comparison with America on a price basis is frequently impossible. The American, in America, demands service, and the American store, bank, restaurant or business house hastens to provide it as an essential, and then adds the cost as a matter of course. In Paris the service is poorer, the cost is less. The French have not the same idea about time meaning money as we have, and it is only the fact that the American is in a holiday mood that keeps him from being driven to frenzy at the beginning by the tiresome delays he meets everywhere.

It is next to impossible to be served quickly in a Paris restaurant, and here no fault should be found with the French; a good meal cannot be prepared and served quickly, or appreciated if gobbled hurriedly. In the good restaurants the service is faultless, but in the cheap restaurants and cafés, where frequently the waiters pay fees for the privilege of working and so try to serve as many tables as possible, the delays are nerve-racking.

On the subject of the French meal there is much to be said, and not a few special little myths to be dispelled. Unquestionably Paris reigns supreme in the realm of cookery. Here are served up pheasants, partridges, quail, venison, the finest of wild game, sizzling in their golden juices; plump chickens cooked with truffles in great copper kettles, bursting forth, juicy and tender, to welcome the first caress of the fork; savory meats basking luxuriously in rich gravies; delicate fish from many waters smothered under blankets of shrimps, mussels and creamy sauces; flaky tarts brimful of luscious fruits; marvelous *crêpes* flaming over spirit lamps; desserts that are symphonies and poems. Here, indeed, is food for kings. But, alas, our prince on thirty dollars a week, it is not for you!

One can dine in Paris for thirty-six cents and again for ten dollars, as I have done, and will find that price makes the same difference as in the States. No miracles of cuisine can be expected in the low-priced restaurant, and those who must live on forty dollars a week or thereabouts will be limited largely to this type. But the French are good cooks—there is no denying that—and could take shoe leather and make it palatable. Often,

in cheap restaurants, the meat one gets starts out no better than that, but, with the aid of sauces and gravies, may become an object for lip smacking by the time it has run the gamut of French cooking technic.

At this point, for reasons which will presently appear not so irrelevant, I am reminded of a beautiful French girl whom I met soon after I got to Paris. At that time my knowledge of French was what the charitably minded might call inexpert, and I gathered from what the young lady was saying that she loved horses. Being a Kentuckian by birth and loving horses myself, I immediately felt here a common bond.

"Yes," she continued, "and I love it best raw, run through a grinder with onions and bread crumbs."

Now, really, there is nothing wrong with horse meat. After a time one gets used to the idea. Everywhere there are horse-meat butcher shops, and the poor French families eat it constantly. Actually, horse meat is preferred by many, and is prescribed for invalids and children. But most Americans would shudder at the thought of eating it. They certainly would refuse to eat it in the States. And yet many of them must know that in the very cheap restaurants and *bistros* what they get in their stews and goulashes is frequently horse meat and not beef.

The Disappearing Table d'Hôte

In regard to French restaurant prices, if one first takes a trip to the stores and markets and ascertains the cost of raw foods, it becomes obvious at once that no marvels of economy can be expected in French meals. Meat, butter, eggs, flour, bread, fruit and staple foods of all kinds cost, on the average, almost as much in Paris as in New York, and are higher than in many other American cities. The French canning industry, except for peas and hors d'œuvres, lags behind our own, to the point that American canned fruits, vegetables and other edibles are sold everywhere in Paris and France, and at prices from 50 to 100 per cent higher than in the United States. Cooking with a can opener turns out to be an expensive process in Paris, and offers no salvation to poor young newly-weds. In the end, Americans in Paris, as well as many average French couples, find it more economical to eat in restaurants.

Raw-food prices being high, it is only the fact of cheap labor and lower overhead which makes it possible for French restaurants to offer any savings at all under American prices. As it is, only in comparing à la carte prices in Paris and in American cities will any great difference be found; and it will come as another surprise to many to hear that the good table-d'hôte restaurants in Paris are rare and rapidly disappearing. They linger on in the student sections and laborers' quarters, where dinners, *vin compris*, are served for as low as thirty-five cents, but these cannot be recommended as consistent fares for delicate stomachs. Very few good restaurants, fewer proportionately than in New York, now offer table-d'hôte dinners.

To those accustomed to table-d'hôte meals in America, it will be difficult to find in Paris anything to equal the wholesome fifty and sixty cent luncheons offered anywhere in our tea rooms; nor, for that matter, does Paris offer anything better or cheaper for the quality than our dollar dinners, which, if not so savory perhaps as French meals, are apt to be much better for the digestion.

Those looking for cheaper meals can find them in New York as well as in Paris. Right on Fifth Avenue, in one of a chain of many stores, can be obtained the following meal: Soup, two sausages, two rolls and butter, pie and coffee—all for twenty-five cents! And no tip!

Throughout the East Side and in foreign sections of New York, one can get seven-course dinners for as low as fifty cents, and a fairly good dinner, with music thrown in free, for seventy-five cents.

"But I wouldn't think of eating in those messy places!" many a New Yorker will say. It is precisely in such places that he is quite content to eat in Paris. For what is messy in New York often becomes atmosphere over there. The difference is that, whereas here the cheap restaurants, coffeepots, cafeteria lunches and lunch wagons can easily be distinguished as such, in Paris all restaurants look more or less the same, with their sidewalk tables and potted ferns. But one can't fool one's stomach. Most of the Americans I know who have been eating in those marvelously cheap French restaurants are carrying around, at the end of a year, little bottles, capsules, boxes of pills and powders, which they partake of surreptitiously before or after meals.

The part that wine and liqueurs play in determining prices of French meals can hardly be ignored. Every French restaurant looks to its wine card to bring in fat profits, to the extent that if wine and drinks were eliminated there is no doubt that it would have to raise prices. A comparison between American and Paris restaurant prices cannot be made without considering this point. Indeed, except for teetotalers, when the wine check is added up with the dinner check, the cost of the Paris dinner often will be found greater than the one at home.

A New Use for Raspberries

Glancing merely at the prices opposite the dishes, one gets the deceptive impression that French restaurant prices are lower than they really are. Even the cheapest restaurants charge a *couvert* of six or eight cents for the bread and napkin. And here French economy asserts itself. What, pay each time for a napkin? Of course not! So, in the humble little restaurants, the patron is given the privilege of keeping his napkin for as many meals as he likes. A rack with numbered pigeonholes is provided for the purpose.

The first time I was aware of this was when I sat down at a table and saw a fat couple come in and get their napkins from the rack. They took seats opposite me and unfolded the napkins. They compared them studiously, and there was a debate as to which belonged to which. Finally a triumphant smile lit up the face of the woman.

"*Voilà!*" she exclaimed. "This one is mine. Here are the raspberry stains I left on it the last time!"

To get back to the menus. Butter is extra, ice and lemon are extra. Potatoes, side dishes and vegetables are not commonly served with meat orders, as at home. Catchup and prepared sauces—if available—are extra. And it is almost imperative to order wine or mineral water.

I have before me a menu from a cheap restaurant on the Avenue des Gobelins. An order of beef tongue is twenty cents, roast veal is twenty-two cents, pot roast is twenty cents and a pork chop is twenty-five cents. But try as hard as one might, it is impossible to figure out a simple dinner for less than seventy-five cents.

It is the little items in the day's expenses that fool Americans into thinking Paris prices are so low. Taxi fares are about nine cents a mile during the day, but double up after eleven at night, bringing them somewhere near the New York figure. Street cars and busses operate on the zone basis, starting at two cents. The subway fare is four cents, first-class, but one may forget that for five cents in New York one can ride five times as far and three times as fast. After midnight the subways and almost all street cars and busses stop running, and one is forced to take taxis.

Haircuts in the average shop are twenty cents, and manicures the same. Beauty-parlor rates, the girls report, are unbelievably low. It costs only seventy-two cents to get a suit cleaned and pressed, but forty cents just to get it pressed; a discrepancy which doesn't seem clear.

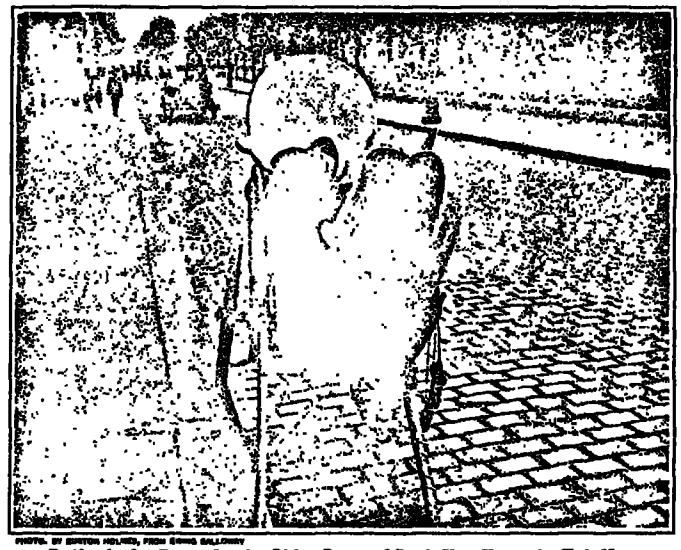

PHOTO. BY BURTON HOLMES, FROM EWING GALLOWAY

Bathtubs for Rent. In the Older Parts of Paris You Hear the Tub Man Crying His Tubs in the Street and Signal Him to Bring One Up

(Continued on Page 152)