

"That our Harold is not to be a soldier!" finished Iva, so scattering warmer words that a different answer would assuredly have betrayed Captain Ryland into uttering.

Thus, quickly the minutes went by; the shadows lengthened; the golden light gathered about the tree-tops; and not one thought did these young people give to time, till a church bell, sounding over the hill-side, startled Iva.

"Six o'clock!" she exclaimed, opening wide her eyes as if just waking. "And the boys not back! Perhaps they went the other way, after all, and have left the boat for me. Oh! if I've kept you here for nothing, I *am* so sorry!"

"But I'm not—I never shall be!" was the reply, in a low tone that stirred a curious answering thrill. "And must we hurry now? Here, stay," as a long branch of roses caught her dress; "let me just gather you some of these before we go."

A bunch of roses, a half-hour's homeward stroll side by side in an almost silence more eloquent than speech, three minutes' row across the narrow stream (would they have made it hours if they could?) and the brief drama drew to its last act.

The boat was moored under the willow. As the occupants stepped out, one forgot to let loose the hand that lay in his. For a few seconds they lingered so—she gazing over the peaceful meadows to the dim Welsh hills, that all to-night seemed dressed in some

new beauty, he looking down on her—beauty enough for him. Suddenly, "Iva!" shouted a boyish voice; and Harold came racing down the steep lane, with a flood of questionings and explainings anent fishing and wading that lasted the whole way up to the Manor. There the home party, earlier returned, awaited them, Aunt Helen in their midst, and some one, strange, whom she brought forward with many smiles; and—

"Now you'll forgive me for going off to Swanley Junction alone, Captain Ryland! I wanted to make sure of her coming before I told you a word about it."

The next minute a fair young woman, with the calm air of proprietorship begotten of long engagement, was holding the gentleman's arm; and how happy he might be looking Iva never saw, for with a little cry—of welcome?—she had run to her mother, glad—ah, strange to say, glad almost to tears—to shelter once again by her safe side.

\* \* \* \* \*

But that was years ago. Iva—"Olivia" in these days—is now a gracious young matron, loving and dearly loved, the garden of her life filled with such blossoms as womanhood prizes above all others. But now and again across her thoughts, like first notes of a melody never completed, flits a memory of warm June hours, of the first throb of an unknown pleasure, of a nameless pain—of a glimpse into possibility never fulfilled—of the farewell she bade her childhood in a midsummer day's dream.



### THE TRANSMISSION OF SECRETS.

THE reader has, no doubt, frequently heard of letters or telegrams, containing private information of an important kind, being written in cipher, and has probably wished to know something of the nature of this system of writing. We shall, therefore, endeavour to satisfy this laudable curiosity by explaining a few of the many methods that have been in use from time to time.

The earliest system of cipher-writing, and the simplest, is easily explained, and merely consists in transposing the letters of the alphabet. Thus, instead of taking *a* as the first letter of the alphabet, *b* might be taken, and if so taken would stand for *a*; *c* would then stand for *b*, *d* for *c*, and so on. Of course any letter agreed upon by the correspondents may be taken as the first—*m*, for instance, may be taken for *a*, when *n* would be *b*, and *l* would be *c*—the last letter of the alphabet. The key to a cipher of this kind lies in knowing what letter is taken as the initial letter. Suppose we take *d* as our initial letter, and express the message, "Come at once," in this cipher. The easiest way to do so is to write the letters of the alphabet, beginning with *d* and ending with *c*, in one line; and below this line to write the alphabet in its natural order, putting *a* below *d*, *b* below *e*, &c.

Taking our message now, we have first the letter *c*; it stands below *f*; therefore, *f* will take the place of *c* in the cipher; *o*, being below *r*, is discarded for that letter. Proceeding in this way, we arrive at the barbarous and foreign-looking form—"Frph dw rqlh." This cipher, as we have said, was the earliest used, at least the earliest that we have any record of, and was adopted by Julius Cæsar and his successor, Augustus, the former taking *d* as his initial letter, and the latter *e*. An instance of its use also occurs in the twenty-fifth chapter of Jeremiah, where *Sheshach* is written for Babel—in this case, of course, the reader must remember that the Hebrew alphabet is employed.

Another method easy enough to explain, but impossible to decipher, is for each correspondent to have a book—say a certain edition of Shakespeare—the pages numbered exactly alike, and the same number of lines on each page. Then a message may be sent in the form of figures, representing the place of the words of the message in the book. The first number represents the page, the second the line, and the third the number of the word from the beginning of the line. In this way every word in the message would require three numbers. If the words of the message be all taken from one page, however, and each word be indicated by a number expressing its



position from the first word on the page, then one number is quite sufficient for each word. Thus, taking Addison's *Spectator*, page 112, the message, "I am very well, and think it best the people meet the whole week," would be written :—

112.

1, 2, 4, 5, 11, 24, 28, 30, 37, 48, 74, 114, 115, 116.

Some time ago there fell upon the writer's eye this advertisement :—"Two John—I at Monday will Cross evening meet street at you on seven." Now, to put a secret in that form is the very height of simplicity ; any one with the slightest knowledge of cipher-writing can read it at once. It is evident that the word "street" should be read immediately after "Cross." If the advertiser had put a small *c* instead of a capital, it would not have been so bad ; even then, however, it would be apparent enough. Once we have discovered that "street" should be read immediately after "Cross," we have the key. There are two words between "Cross" and "street," therefore write the message in this way :—

I	will	meet	you
at	Cross	street	on
Monday	evening	at	seven.

Now read along the top column, then the second, and then the bottom one. The "Two" with which the advertisement begins is to give the number of words between the successive words. This kind of cipher was used by the Earl of Argyle in his conspiracy against the Crown.

Charles I. wrote in cipher, and we have some of his letters to his son, which have been deciphered. He used a numeral cipher, which we may illustrate by an example. Let the number 231 be the key, and let us throw this message into cipher :—

23 123 123 123 1 231231 23 1 231  
Imprison the leaders at once.

Begin by writing the key number in the manner indicated, a figure above each letter. Above *i*, the first letter, we find the figure 2, which means that instead of *i* we are to use the second letter from *i*—that is, *k*; *m*, the next letter, has 3 above it, we therefore substitute for *m* the letter *p*. Going on in this way, we get the heterogeneous mixture, "kpqtlqq ujh mgdegut cw ppff." The recipient of these outlandish words applies the key number, 231, putting the 2 above *k*, 3 above *p*, &c., and thus restores the message to an intelligible form. In this cipher the reader will observe that the same letter may do duty for different letters. The word "once," for instance, containing four different letters, becomes in the cipher "ppff," where we have only two different letters—the reason is obvious. Such a cipher is pretty safe for a short message ; for a long message, however, it is as open as plain English to a man skilled in deciphering.

We shall explain two other methods, reminding the reader, however, that there are a great many more. Take first a numeral system ;—

	1	2	3	4	5	
a	f	l	q	v		1
b	g	m	r	w		2
c	h	n	s	x		3
d	i	o	t	y		4
e	k	p	u	z		5

This table is the key, a copy of which is kept by each of the correspondents. A message is thrown into this cipher by replacing the letters with the numbers above and at the side of each letter—the former preceding the latter. Thus *f* would be written 21 ; *m*, 32 ; *s*, 43, &c. The word "escape" would be represented by the numbers 15, 43, 13, 11, 35, 15. Instead of the numbers 1, 2, 3, 4, 5, any others will do ; one must know these numbers to decipher a communication in this form.

A more secret method than any we have as yet touched upon is what is known as the square cipher. In this case each party has twenty-six alphabets, placed one under the other in the form of a square, thus :—

a	b	c	d	e	f	g	h	i	&c.
b	c	d	e	f	g	h	i	j	„
c	d	e	f	g	h	i	j	k	„
d	e	f	g	h	i	j	k	l	„
e	f	g	h	i	j	k	l	m	„
f	g	h	i	j	k	l	m	n	„
g	h	i	j	k	l	m	n	o	„
h	i	j	k	l	m	n	o	p	„
i	j	k	l	m	n	o	p	q	„

A key-word is now agreed upon, and in this lies the virtue of the square cipher ; for any combination of letters will answer this purpose. Suppose we take "geda" as our key, and express the words, "idea," "beach," and "bed," write the key-word over these words in this way :—

geda	gedag	eda
idea	beach	bed

*i* is the first letter, and the key letter above it is *g* ; therefore we look in the table for the line beginning with *i* and the column beginning with *g*. The line beginning with *i* is the bottom one in our example, and the column beginning with *g* has *o* in this line ; *o*, therefore, is the letter we are in quest of. Our second letter is *d*, above it is *e*. The line beginning with *d* and the column beginning with *e* intersect in *h*, which is to take the place of *d*. In this way these three familiar words, "idea," "beach," and "bed," take on the Gaelic-looking aspect—"ohha hidcn fhnd." From this example the reader will doubtless see clearly enough how to work the square cipher. To find the intersection of the column and the line, a square card may be used ; this renders the operation of more speedy performance.

Formerly this kind of writing engaged the attention of men to a greater degree than at the present day. The fact is, there are not so many secrets now-a-days as there used to be ; the majority of people are busy with work of an honest kind, and they have very little time to write even in plain English, let alone the laborious cipher. Indeed ordinary writing is beginning to prove rather slow for this electric age, and many people now find it necessary to resort to shorthand,