

THE FIRST OF TWELVE LESSONS

IN THE

# Fundamental Principles

of the

# Baconian Ciphers



AND APPLICATION TO BOOKS OF THE  
SIXTEENTH AND SEVENTEENTH CENTURIES

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Compiled by George Fabyan

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# Foreword

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In certain volumes published in the 16th and 17th centuries, the use and commixture, without any apparent reason, of two forms of type, both in the roman and the italic letters, has long been a matter of comment and discussion among lovers of books and book lore, and although various theories have been advanced by researchers and students of Elizabethan literature, none of them have seemed to offer a solution of the problem.

Twenty years ago, Elizabeth Wells Gallup, an instructor in English, was reading an original of Sir Francis Bacon's *De Augmentis Scientiarum* and the chapter on Ciphers appealed strongly to her reason. Of the books of the Elizabethan period, none are of greater importance than the 1623 Shakespeare Folio, which contains a vast number of examples of the use of two forms of type. She asked herself whether there might not be concealed within this work a cipher such as Bacon described.

Bacon explains in the above mentioned chapter how a secret or interior note may be infolded within an apparently simple open or exterior message by the use of two forms of type very similar in appearance but still showing to the closely observant or experienced eye distinct characteristics, by means of which these two forms may be distinguished. Bacon calls attention to the mathematical fact that the transposition of only two different objects (blocks, letters, etc.) arranged in groups of five, will yield thirty-two dissimilar combinations, of which only twenty-four would be necessary to represent all the letters of our alphabet (I and J, U and V, being used interchangeably in the 16th century). By referring to the cipher code given by Bacon it will readily be seen that if a row of fifteen blocks in which the 1st, 4th, 8th, 9th, 10th, and 13th were black, the rest white, were divided off into groups of five, the three groups would produce the word "the;" since in this code, baabat, aabbbh, and aabaae. If black and white blocks are replaced by the capital and small letters respectively, in the following line:

## BiliterAL CipHer

the small letters represent the *a* of the cipher code, the capitals the *b* of the code, the line is found to contain the hidden word "the". But now suppose the differences between the two forms (called for convenience the *a* and the *b* forms) are not so apparent as in the above examples; suppose that in this name "Biliteral Cipher," letters of two only very slightly different, but still distinguishable, forms were used, it is clear that the word "the" could still be infolded within it. Hence by the appropriate use of type of two forms, a sentence, a paragraph, a page or an entire book, might be made to infold a hidden message of an import wholly different from the apparent language of the printed page. Nor is this *reading between* the lines, but it is *discovering in* the lines something not apparent at a cursory glance. Neither is it necessary in order to achieve this that the original language of the printed page be framed, altered, or modified for the purpose in any manner whatsoever. It is only necessary that after the obvious or open language of the manuscript is written, some distinguishing mark

should be placed, for the direction of the printer, under each letter which is to be set up from the *b*-form. All the other letters would naturally be set up from the *a*-form. To decipher such material then, it would be necessary first to be able to recognize the *a* and the *b* forms in the type used, and secondly, to know the code which had been employed.

Having mastered the examples given by Lord Bacon in both the editions of *De Augmentis Scientiarum* or "The Advancement of Learning," Mrs. Gallup determined to apply the principles of Bacon's Biliteral Cipher to the 1623 Shakespeare Folio. Opening the Folio at random she turned the leaves to select the page of the most characteristic italic type she could find, and chose the page containing the Prologue to "Troilus and Cressida", in which even a casual inspection will disclose the presence of two forms of type for certain letters. (Note such outstanding examples as the capital *P*'s, the capital *N*'s, the capital *T*'s, and the small *w*'s.) Having noticed the undoubted presence of two forms of type, Mrs. Gallup's first step in endeavoring to determine whether this page does or does not contain the Biliteral Cipher, was to study the differences between these two forms; her next step was to decide which was to be termed the *a*-form and which the *b*-form. The fact that in Bacon's code the *a*'s predominate over the *b*'s, suggested to Mrs. Gallup that the *a*-form might probably be that occurring more frequently on the printed page, *if the code given by Bacon had actually been used*. Examining each letter under a magnifying glass, she tentatively assigned each one as an *a* or a *b* form, marking it accordingly. Having completed the marking in this manner, she applied Bacon's own code but without any intelligible result. She noticed, however, near the bottom of the page, that the groups of *a* and *b* resulted in giving by application of the Code a collection of letters as follows:

ELIZ<sub>x</sub>BE<sub>x</sub>H

She realized that this combination of letters was probably intended to spell out the word "Elizabeth." She changed carefully the markings of the groups which formed the letters here designated by *x*, making, as she did so, sketches of the characteristics and differences of the letters she so changed in producing the word "Elizabeth." Then with this additional information, Mrs. Gallup carefully marked each letter of the Prologue anew—to find to her own amazement, when she had finished, the astounding message which the student will himself have the pleasure of deciphering in a succeeding lesson. After the Prologue, she studied and deciphered other passages concealed in the apparently meaningless type forms. Later she applied the methods to a number of 16th and 17th century works, with negative results in certain cases, but positive results in others.

Such, then, is the history of the discovery of the use in certain of the aforementioned volumes of a cryptic or secret writing, which for three hundred years escaped detection—The Biliteral Cipher of Sir Francis Bacon.

The advantages to be gained from the study of the Biliteral Cipher are many and various:—it calls into play both literary knowledge and technical and mechanical skill; it trains the eye to close observance; it trains the hands in printing, which is

now almost a lost art; it requires and teaches not only accuracy, but the absolute necessity of accuracy, which is highly desirable in any walk of life—in a word, the study of the Cipher may, when pursued earnestly and accurately, give a most vigorous mental training. As for its historical value, that is inestimable, as the search after Truth is the greatest of all pursuits. In addition, its practical values are numerous: it may be utilized in kindergarten teaching in blocks, beads, weaving, or colors; in the entertainment and education of children, old people, or invalids, it may be an easy and most pleasant factor; and in the instruction of the blind, the use of the Cipher embossed and placed vertically would require the learning of but *two* differences or characters in place of *twenty-six*; and finally, let it not be forgotten that the Cipher permits of transmission of messages, regardless of censorship or the curiosity of others.

The mastering of the principles of the Biliteral Cipher is really a simple matter. Young people of fourteen years and upwards, it is found, note readily differences in type. One young student in the Riverbank Laboratories marked 940 letters in three hours with only eight errors. But the application of these principles to the Elizabethan volumes which contain the Biliteral Cipher is a more difficult matter; first, because in order to escape suspicion and detection at a premature time, and secondly, because of the unavoidable variation due to the imperfect methods of printing in use at that time, the two forms of type are not so clearly distinguishable as in the examples given by Bacon himself. However, the earnest student will in time overcome these obstacles, and by concentrated application learn to decipher even the most difficult passages and works. After all possible mechanical assistance has been provided, the requisites on the part of the student are only earnest purpose, good eyes, and a good mind.

## General Instructions for the Study of the Baconian Biliteral Cipher.

It is earnestly recommended that the student secure and read a copy of the *New Atlantis*. This will serve to give him some comprehensive idea of the great brain of Sir Francis Bacon. It is, of course, to be desired that the student familiarize himself with all of Bacon's works, but as a beginning we recommend the *New Atlantis*. It is contained in a pocket edition of Bacon's Works, George Newnes, London, 1902.


For the study of the ciphers it is necessary that the eye be trained to distinguish minute differences, which requires time, but it is time well spent.

The possession and use of a reading glass is indispensable for this purpose.

All of our facsimile photographs may be compared with the original first folio at any of our large libraries.

It is manifest that original editions, good facsimiles, or photographs of originals, are required for the working of the Biliteral Cipher, as the two forms of type found in the originals do not exist in the modern editions.

## LESSON 1

Sir Francis Bacon's own description of the Biliteral Cipher, with examples, is found in his work *De Augmentis Scientiarum* or *The Advancement of Learning*. A small edition of the first two books was published in 1605; here Bacon says (see page 7) that the perfection of a cipher is that which uses the "proportion quintuple"—a term which he uses to refer to the groupings of five of the Biliteral Cipher. In 1623 a revised edition of the work enlarged to nine books and translated into Latin, was published, in which the Cipher, only referred to in the former edition, was explained in detail with examples. This explanation should be carefully read and the examples studied (see pages 8-11, beginning at the point marked by )

Then for the lesson proper begin by studying the alphabets at the bottom of Page 12 which show the two forms or "fonts" used—designated by Bacon—the *a*-form and the *b*-form.

Note:—The word *alphabets* in this work will refer to all "Alphabets in two forms" (for explanation of this phrase see p. 9 and the bottom of p. 11). "Alphabets in two letters" (p. 8), are called *cipher codes* to distinguish them from alphabets in two forms.

To discover and master the difference between the *a*-form and the *b*-form, is the first and most important step in learning to decipher.

Try to observe and memorize the characteristics of each letter in both the *a* and the *b*-forms, so that you will not be deceived, by faulty printing and badly made fonts, into considering differences which are not *distinguishing* differences. In these alphabets you will see at a glance, that the *a*-form (modern) is as a rule heavier and broader than the *b*-form (old style). Close study will develop less noticeable, but more vital distinctions.

EXAMPLE—small *r*. (See pages 10 and 12 for the two forms)

<i>a</i> -form	<i>b</i> -form
Heavier in the stem than in the <i>b</i> -form.	It is narrower than in the <i>a</i> -form.
Left kern is long and slender.	Left kern is closer to the stem.
Right kern is heavy, pointing downward.	Right kern points outward and joins the stem in a truer curve than in the <i>a</i> -form.

When you have made clear to yourself the fundamental differences between the *a*-form and the *b*-form, turn to the Student Sheet on page 13, and place a mark under each letter, to indicate whether it belongs to the *a*-form or the *b*-form, using a horizontal line for the *a*-form, and a vertical line for the *b*-form, thus:—

D	o	n	o	t	g	o	t	i	l	l	i	c	o	m	e
--	/	-	/	-	-	/	-	/	-	/	-	/	-	/	-
a	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a

Note:—A reading glass is essential to accurate work.

The conscientious student will find it very good practice to write out descriptions of the differences between the two forms of letters.



## *Of the Advancement of Learning.*

For CYPHARS; they are commonly in Letters Alphabets, but may bee in Wordes. The

kindes of CYPHARS, (besides the SIMPLE CYPHARS with Changes, and intermixtures of NVLLES, and NONSIGNIFICANTS) are many, according to the Nature or Rule of the infoulding: WHEELCYPHARS, KEY-CYPHARS, DOVBLES, &c. But the vertues of them, whereby they are to be preferred, are three; that they be not laborious to write and reade; that they bee impossible to discypher; and in some cases, that they bee without suspition. The highest Degree whereof, is to write OMNIA PER OMNIA; which is vndoubtedly possible, with a proportion Quintuple at most, of the writing infoulding, to the writing infoulded, and no other restraints whatsoever. This Arte of *Cypheringe*, hath for Relatiue, an Art of *Discypheringe*; by supposition vnprofitable; but, as things are, of great vse. For suppose that *Cyphars* were well managed, there bee Multitudes of them which exclude the *Discypherer*. But in regarde of the rawnesse and vnskilfulnesse of the handes, through which they passe, the greatest Matters, are many times carryed in the weakest *Cyphars*.

(London, 1605.)

PHOTOGRAPHED FROM THE ORIGINAL 1605 EDITION

speak of stories or metre) it is (as I said before) like a luxuriant plant, that comes of the lust of the earth, without any formal seed. Wherefore it spreads everywhere and is scattered far and wide,—so that it would be vain to take thought about the defects of it. With this therefore we need not trouble ourselves. And with regard to Accents of words, it is too small a matter to speak of; unless perhaps it be thought worth remarking, that while the accentuation of *words* has been exquisitely observed, the accentuation of *sentences* has not been observed at all. And yet it is common to all mankind almost to drop the voice at the end of a period, to raise it in asking a question, and other things of the kind not a few. And so much for the part of Grammar which relates to Speech.

As for Writing, it is performed either by the common alphabet (which is used by everybody) or by a secret and private one, agreed upon by particular persons; which they call *ciphers*. And with regard to the common orthography itself, a controversy and question has been raised among us,—namely, whether words ought to be written as they are pronounced, or in the usual way. But this apparently reformed style of writing (viz. in which the spelling should agree with the pronunciation) belongs to the class of unprofitable subtleties. For the pronunciation itself is continually changing; it does not remain fixed; and the derivations of words, especially from foreign tongues, are thereby completely obscured. And as the spelling of words according to the fashion is no check at all upon the fashion of pronunciation, but leaves it free, to what purpose is this innovation?

Let us proceed then to Ciphers. Of these there are many kinds: simple ciphers; ciphers mixed with non-significant characters; ciphers containing two different letters in one character; wheel-ciphers; key-ciphers; word-ciphers; and the like. But the virtues required in them are three; that they be easy and not laborious to write; that they be safe, and impossible to be deciphered; and lastly that they be, if possible, such as not to raise suspicion. For if letters fall into the hands of those who have power either over the writers or over those to whom they are addressed, although the cipher itself may be safe and impossible to decipher, yet the matter comes under examination and question; unless the cipher be such as either to raise no suspicion or to elude inquiry. Now for this



elusion of inquiry, there is a new and useful contrivance for it, which as I have it by me, why should I set it down among the desiderata, instead of propounding the thing itself? It is this: let a man have two alphabets, one of true letters, the other of non-significants; and let him infold in them two letters at once; one carrying the secret, the other such a letter as the writer would have been likely to send, and yet without anything dangerous. Then if any one be strictly examined as to the cipher, let him offer the alphabet of non significants for the true letters, and the alphabet of true letters for non-significants. Thus the examiner will fall upon the exterior letter; which finding probable, he will not suspect anything of another letter within. But for avoiding suspicion altogether, I will add another contrivance, which I devised myself when I was at Paris in my early youth, and which I still think worthy of preservation. For it has the perfection of a cipher, which is to make anything signify anything; subject however to this condition, that the infolding writing shall contain at least five times as many letters as the writing infolded: no other condition or restriction whatever is required. The way to do it is this: First let all the letters of the alphabet be resolved into transpositions of two letters only. For the transposition of two letters through five places will yield thirty-two differences; much more twenty-four, which is the number of letters in our alphabet. Here is an example of such an alphabet.

*Example of an Alphabet in two letters.*

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>	<i>G</i>
<i>Aaaaa.</i>	<i>aaaab.</i>	<i>aaaba.</i>	<i>aaabb.</i>	<i>aabaa.</i>	<i>aabab.</i>	<i>aubba.</i>
<i>H</i>	<i>I</i>	<i>K</i>	<i>L</i>	<i>M</i>	<i>N</i>	<i>O</i>
<i>aabbb.</i>	<i>abaaa.</i>	<i>abaab.</i>	<i>ababa.</i>	<i>ababb.</i>	<i>abbaa.</i>	<i>abbab.</i>
<i>P</i>	<i>Q</i>	<i>R</i>	<i>S</i>	<i>T</i>	<i>V</i>	<i>W</i>
<i>abbba.</i>	<i>abbbb.</i>	<i>baaaa.</i>	<i>baaab.</i>	<i>baaba.</i>	<i>baabb.</i>	<i>babaa.</i>
<i>X</i>	<i>Y</i>	<i>Z.</i>				
<i>babab.</i>	<i>babba.</i>	<i>babbb.</i>				

Nor is it a slight thing which is thus by the way effected. For hence we see how thoughts may be communicated at any distance of place by means of any objects perceptible either to the eye or ear, provided only that those objects are capable of two differences; as by bells, trumpets, torches, gunshots, and the

like. But to proceed with our business: when you prepare to write, you must reduce the interior epistle to this biliteral alphabet. Let the interior epistle be

*Fly.*

*Example of reduction.*

F L Y.  
aabab. ababa. babba.

Have by you at the same time another alphabet in two forms; I mean one in which each of the letters of the common alphabet, both capital and small, is exhibited in two different forms, — any forms that you find convenient.

*Example of an Alphabet in two forms.*

a	b	a	b	a	b	a	b	a	b	a	b
A	A	a	a	B	B	b	b	C	C	c	c
D	D	d	d	E	E	e	e	F	F	f	f
G	G	g	g	H	H	h	h	I	I	i	i
K	K	k	k	L	L	l	l	M	M	m	m
N	N	n	n	O	O	o	o	P	P	p	p
Q	Q	q	q	R	R	r	r	S	S	s	s
T	T	t	t	U	U	u	u	V	V	v	v
W	W	w	w	X	X	x	x	Y	Y	y	y
				Z	Z	z	z				

Then take your interior epistle, reduced to the biliteral shape, and adapt to it letter by letter your exterior epistle in the biform character; and then write it out. Let the exterior epistle be,

*Do not go till I come.*

*Example of Adaptation.*

F L Y.  
aa bab. ab aba.b a bba.  
*Do not go till I come.*

I add another larger example of the same cipher, — of the writing of anything by anything.

The interior epistle; for which I have selected the Spartan despatch, formerly sent in the *Scytale*.

*All is lost. Mindarus is killed. The soldiers want food. We can neither get hence, nor stay longer here.*

PHOTOGRAPHED FROM

VOL. IV. JAMES SPEEDING'S EDITION OF LORD BACON'S WORK, 1857

The exterior epistle, taken from Cicero's first letter, and containing the Spartan despatch within it.

*In all duty or rather piety towards you I satisfy every body except myself. Myself I never satisfy. For so great are the services which you have rendered me, that seeing you did not rest in your endeavours on my behalf till the thing was done, I feel as if life had lost all its sweetness, because I cannot do as much in this cause of yours. The occasions are these: Ammonius the King's ambassador openly besieges us with money: the business is carried on through the same creditors who were employed in it when you were here, &c.*

The doctrine of Ciphers carries along with it another doctrine, which is its relative. This is the doctrine of deciphering, or of detecting ciphers, though one be quite ignorant of the alphabet used or the private understanding between the parties; a thing requiring both labour and ingenuity, and dedicated, as the other likewise is, to the secrets of princes. By skilful precaution indeed it may be made useless; though as things are it is of very great use. For if good and safe ciphers were introduced, there are very many of them which altogether elude and exclude the decipherer, and yet are sufficiently convenient and ready to read and write. But such is the rawness and unskilfulness of secretaries and clerks in the courts of kings, that the greatest matters are commonly trusted to weak and futile ciphers.

It may be suspected perhaps that in this enumeration and *census*, as I may call it, of arts, my object is to swell the ranks of the sciences thus drawn up on parade, that the numbers of them may raise admiration; whereas in so short a treatise, though the numbers may perhaps be displayed, the force and value of them can hardly be explained. But I am true to my design, and in framing this globe of knowledge I do not choose to omit even the smaller and more remote islands. And though my handling of these things be cursory, it is not (as I think) superficial; but out of a large mass of matter I pick out with a fine point the kernels and marrows of them. Of this however I leave those to judge who are most skilful in such arts. For whereas most of those who desire to be thought multiscient are given to parade the terms and externals of arts, thereby making themselves the admiration of those who do not understand those arts and the scorn of those who do; I hope that my labours will have the contrary fate, and arrest the judgment

PHOTOGRAPHED FROM

VOL. IV. JAMES SPEDDING'S EDITION OF LORD BACON'S WORKS 1857

**LORD BACON'S OWN EXAMPLE OF  
BI-LITERAL CIPHER**

Spedding's Editions, 1857

*Manere te volo donec venero.*

*Ego omni officio ac potius pietate erga te caeteris satisfacio omnibus : Mihi ipse nunquam satisfucio. Tanta est enim magnitudo tuorum erga me meritorum, ut quoniam tu, nisi perfecta re, de me non conquiēsti ; ego, quia non idem in tua causa efficio, vitam mihi esse acerbam putem. In causa hæc sunt : Ammonius regis legatus aperte pecunia nos oppugnat : res agitur per eosdem creditores per quos cum tu aderas agebatur : regis causa si qui sunt qui velint, qui pauci sunt, omnes ad Pompeium rem deferri volunt : senatus religionis calumniam, non religione sed malevolentia, et illius regiae largitionis invidia comprobat, &c.*

*Do not go till I come.*

*In all duty or rather piety towards you I satisfy every body except myself. Myself I never satisfy. For so great are the services which you have rendered me, that seeing you did not rest in your endeavours on my behalf till the thing was done, I feel as if life had lost all its sweetness, because I cannot do us much in this cause of yours. The occasions are these : Ammonius the King's ambassador openly besieges us with money : the business is carried on through the same creditors who were employed in it when you were here, &c.*

*Example of an Alphabet in two forms.*

a	b	a	b	a	b	a	b	a	b	a	b
A	A	a	a	B	B	b	b	C	C	c	c
D	D	d	d	E	E	e	e	F	F	f	f
G	G	g	g	H	H	h	h	I	I	i	i
K	K	k	k	L	L	l	l	M	M	m	m
N	N	n	n	O	O	o	o	P	P	p	p
Q	Q	q	q	R	R	r	r	S	S	s	s
T	T	t	t	U	U	u	u	V	V	v	v
W	W	w	w	X	X	x	x	Y	Y	y	y
				Z	Z	z	z				

**LORD BACON'S OWN EXAMPLE OF  
BI-LITERAL CIPHER**

**Spedding's Editions 1857**

Maner etevo lodon ecven ero

Egoom nioff icioa cpoti uspie tatee rgate caete rissa  
tisfa cioom nibus Mihii psenu nquam satis facio Tanta  
esten immag nitud otuor umerg ameme ritor umutq uonia  
mtuni siper fecta redem enonc onqui estie goqui anoni  
demin tuaca usaef ficio vitam mihie sseac erbam putem  
Incau sahae csunt Ammon iusre gisle gatus apert epecu  
niano soppu gnatr esagi turpe reosd emcre ditor esper  
quosc umtua deras ageba turre gisca usasi quisu ntqui  
velin tquip aucis untom nesad Pompe iumre mdefe rrivo  
lunts enatu sreli gioni scalu mniam nonre ligio neses  
malev olent iaeti llius regia elarg ition isinv idiac  
ompro bat&c

Donot gotil lIcom e

Inall dutyo rrath erpie tytow ardsy ouJsa tisfy every  
bodye xcept mysel fMyse lIIne versa tisfy Forso great  
areth eserv icesw hichy ouhav erend eredm ethat seein  
gyoud idnot resti nyour endea vours onmyb ehalf tillt  
hethi ngwas doneI feela sifi fehad losta llits sweet  
nessb ecaus eIcan notdo asmuc hinth iscau seofy oursT  
heoce asion saret heseA mmoni usthe Kings ambas sador  
openl ybesi egesu swith monëy thebu sines sisca rried  
onthr ought hesam ecred itors howe reemp loyed initw  
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There are thousands to point out to you, one by one,  
The dangers that wait to assail you.  
But just buckle in with a bit of a grin,  
Then take off your coat and go to it—  
Just start in to sing as you tackle the thing  
That "cannot be done"—and you'll do it.

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