

**People's Democratic Republic of Algeria**  
**Ministry of Higher Education and Scientific Research**  
**Mentouri University- Constantine**  
**Department of Foreign Languages**

**TRANSLATION OF ENGLISH GENETICS**  
**TERMS INTO ARABIC**

Dissertation Submitted to the Department of Foreign Languages in Partial  
Fulfillment of the Requirements for the Degree of Master in Applied  
Language

Submitted By:

Atidal Belaoura

Supervised By:

Dr. Haoues Ahmed Sid

Examined By:

Dr. Beghoul Youcef

2009-2010

## Dedications

**I dedicate this work**

*To my beloved parents who gave me every opportunity to achieve my dreams*

*To my siblings Nassima, Linda, Wassila, Nadjat Zahia and Amar who spared no effort to help*

*To my friends Asma, Razika, Souad, Hiba, Hasna, Raouia, Soumia, Ibtissem, Abir and Chahinez*

*To Manar, khouloud, Asia and Khalid*

## **Acknowledgements**

Praise be to Allah who gave me the strength to complete this dissertation to the end.

I would like to express my sincere thanks to my supervisor, Dr Ahmed Sid. I greatly thank him for the time he devoted to improve every aspect of the study, for reading several drafts of this dissertation, for his help, patience and kindness. I am so much indebted to him for giving me the opportunity to work with him.

My deep thanks should be expressed to all my teachers. If it were not for each and every one of them, I would not be where I am today. They lit my path, and for that I am very grateful.

Special thanks are to Dr Youcef Beghoul for accepting the examination of my dissertation and for the time he devoted to read it and correcting the mistakes.

## **List of Abbreviations**

**SL:** Source Language

**SM:** Source Message

**TL:** Target Language

**ST:** Source Text

**TT:** Target Text

## **Abstract**

The current work aims at investigating the reality of English Arabic scientific translation. Scientific translation is chosen because it is an important area of knowledge and an important means to acquire modern sciences especially as science and technology have been developing quickly. Moreover, scientific terms have been translated into many languages including Arabic in order to make scientific knowledge acquisition easier and to facilitate understanding the new inventions and technologies. In this research, English genetics terms and their Arabic equivalents suggested in different books and bilingual dictionaries are studied for the sake of answering the research questions. The analysis has shown that the instability of Arabic scientific terminology is due to adopting inadequate translation procedures.

## List of Tables and Figures

<b>Table 1:</b> Examples of Transcribed Terms.....	22
<b>Table 2:</b> Examples of Naturalized Terms.....	23
<b>Table 3:</b> Examples of Translated Terms.....	23
<b>Table 4:</b> Examples of Derived Terms.....	24
<b>Table 5:</b> Examples of Arabic Neologisms.....	25
<b>Table 6:</b> Examples of Translation Couplet.....	25
<b>Table 7:</b> Examples of Blended Terms.....	26
<b>Table 8:</b> Examples of Paraphrasing.....	26
<b>Table 9:</b> Examples of Componentially Analyzed Arabic Equivalents.....	27
<b>Table 10:</b> Examples of Abbreviations Written out.....	28
<b>Table 11:</b> An Example of a Term that Has an Arabised and a Decoded Equivalent.....	28
<b>Table 12:</b> The Term Suitability with Regard to its Use.....	34
<b>Table 13:</b> The Term Suitability with Regard to its Letters.....	35
<b>Table14:</b> The Term Suitability with Regard to the Fields Use.....	35
<b>Table15:</b> The Term Suitability with Regard to the Possible Derived Terms.....	36
<b>Table16:</b> Procedure, Number and Frequency of Translation Procedures Followed in the Books Used in the Study.....	53
<b>Figure1:</b> Terminology .....	21
<b>Figur2:</b> Frequencies of the Used Translation Procedures.....	54

## Contents

Dedication.....	1
Acknowledgements.....	2
List of abbreviations .....	3
Abstract .....	4
List of Tables and Figures.....	5
Table of Contents .....	6
General Introduction.....	8
Chapter 1: Translation and Terminology	
Introduction.....	11
1.1. Terminology.....	11
1.1.1. Term Creation.....	11
1.1.2. Scientific Term.....	13
1.2. Translation.....	13
1.2.1. Equivalence in Translation.....	15
1.2.2. Translation Accuracy.....	17
1.3. Synonymy.....	18
1.3.1. Synonymy in English.....	19
1.3.2. Synonymy in Arabic.....	19
1.4. Translation of Scientific Terms.....	20
1.4.1. Terminology and Translation.....	20
1.4.2. Scientific Terminology and Translation Procedures.....	21
1.4.3. Translation of Affixes.....	27
1.4.4. Translation of Abbreviations and Acronyms.....	27
1.5. The Instability of Arabic Scientific Terminology.....	28

1.5.1. Causes of Synonymy.....	28
1.5.1.1. Linguistic Factors .....	28
1.5.1.2. Administrative Factors.....	29
1.5.1.3. Geographical and Political Factors.....	29
1.5.2. Types of Synonymy.....	29
1.6. Standardization and Unification.....	30
1.6.1. Benefits of Standardization.....	30
1.6.2. Difficulties of Standardization.....	31
Conclusion.....	32
Chapter 2: Analysis of Genetics Terms	
Introduction.....	33
2.1. Study Procedures.....	33
2.2. Glossary of Genetics Terms.....	29
2.3. Qualitative Analysis.....	36
2.4. Quantitative Analysis.....	53
Conclusion.....	55
General Conclusion.....	56
Bibliography.....	58



## **General Introduction**

### **Statement of the Problem**

Translation aims at providing equivalent units between the SL and the TL. Achieving this aim is not always easy, however. In the language pair English-Arabic, the difficulty of equivalence clearly appears when dealing with scientific terminology as Arabic equivalents do not always exist.

The development of science and technology has resulted in linguistic gaps between English and Arabic. This has led Arab terminologists and translators to try to create an Arabic terminology that can express the up-to-date technologies and inventions. Yet, translators and different language academies and institutions that are in charge of creating the Arabic terminology have adopted different methods and procedures to coin the Arabic equivalents. The different procedures have resulted in the multiplicity of equivalents for the foreign term and the difficulty of having a standard Arabic terminology.

### **Aims of the Study**

This study aims at investigating the treatment of Arabic scientific terms through identifying and analyzing some procedures followed by Arab terminologists and translators when dealing with such terms. It also attempts to shed light on the different causes that lead to the difficulty, if not impossibility, of having a standard Arabic scientific terminology.

## **Research Questions**

Science accuracy requires an accurate terminology. The Arabic scientific terminology, however, suffers chaos and multiplicity of synonyms. The problem this research investigates is the Arabic scientific terminology and the problem of its instability. The precise questions this study would ask are:

1. To what extent does the Arabic equivalent have the ability to reflect the English term as well as the concept it expresses?
2. What procedures are used commonly by Arab translators, and how frequently do they use each procedure?

## **Hypothesis**

Arabic terminology suffers multiplicity of synonyms provided for the English term. In this research, we hypothesize that poor background of scientific knowledge has led to the instability of Arabic scientific terminology which is due to following inadequate translation procedures.

## **Structure of the Study**

This research is mainly divided into two chapters; one is a review of literature and the other is practical. In the first chapter, the different issues related to scientific terminology translation are discussed. This includes terminology, translation equivalence and accuracy, procedures used in generating Arabic terms, and the causes that lead to the difficulty of unification and standardization. The second chapter is a qualitative and quantitative analysis of fifteen genetics terms selected randomly. In this empirical chapter, the English genetics terms and their Arabic

equivalents are analyzed through providing both a linguistic and a conceptual definition of the English term. Then, a comparison between the Arabic equivalents and the English term and its Arabic translations is made.

### **Research Tools**

To investigate the stated hypothesis, English genetics terms, selected randomly, and their Arabic equivalents suggested in different books and English-Arabic scientific dictionaries will be analyzed qualitatively and quantitatively. Qualitatively, the terms will be studied through analyzing each Arabic synonym. Quantitatively, the procedures used to generate each foreign term will be counted to show how frequently each procedure is used.

# **Chapter One**

## **Translation and Terminology**

### **Introduction**

The rapid expansion of science and technology has resulted in the generation of thousands of new English scientific terms. Translation of these terms into Arabic has, therefore, become an important field for translators and terminologists to investigate. Scientific translation imposes understanding the major points concerning both terminology and translation. This chapter sheds light on the relationship between these two notions; how they co-work and what differences do exist between them. Furthermore, it attempts to identify and analyze the different translation procedures used when dealing with Arabic terminology generation. Rather, the causes of synonymy in Arabic scientific terminology and the difficulties of its standardization and unification are discussed.

### **1.1. Terminology**

Terminology is the science that studies terms and shows how they are related to the concepts they express. Terminologists are usually interested in the creation, classification and standardization of terms. Rather, they specify the characteristics that allow a term to express a given concept.

#### **1.1.1. Term Creation**

The scientific development requires creating terms that can express the new concepts and inventions. Besides, term creation requires a full understanding of what

the concept is and what it aims at referring to. Sager (2001: 252) distinguishes two main ways of how to create the needed terms. He considers primary and secondary term formation. The former usually occurs when a new created concept has to be named, i.e., when there is no linguistic precedent. In this case terminologists distinguish between (1) "provisionally named terms usually associated with stipulative definitions as they occur in scientific position papers or theses", and (2) "the definitive establishment of new term-concept pair"(ibid). According to Sager, terminologists have to provide the second type with a complete definition "which links the new term to existing ones in a given knowledge structure" (ibid). Concerning the secondary term formation, Sager (ibid) says that it occurs as a result of (1) "the revision of a given terminology within the language for example in order to produce a standard document", or (2) the" transmission of knowledge from one linguistic community to another, and hence new terms have to be created in the target language".

The International Standardization Organization (ISO) has for many years been the responsible for the creation of terms. Sager (ibid: 254-255) summarizes the conditions the ISO puts to create any new term as follows:

- Terms have to reflect some key features of the concepts they are linked to in order to facilitate the precise reference. At the same time, they should be as economical as possible.
- Terms should be lexically systematic and should conform to the phonological rules of the language.
- Terms should conform to the general rules of word-formation of the language.
- The meaning of the term should be recognizable independently of any specific context.

### **1.1.2. Scientific Term**

Terms are the basic units of any science. They specify it and distinguish it from other fields of knowledge. Terms are the door that allows researchers to understand any science and overcome its difficulties. Unlike words that usually refer to general concepts, terms refer to a special form of reference, "namely that they refer to discrete conceptual entities, properties, activities or relations which constitute the knowledge space of a particular subject field and therefore constitute a sub-system of knowledge" Sager (ibid: 261 ). Swanepoel (1989: 258) states that a term is "a linguistic unit composed of one or more words, which univocally designates a specific concept in a particular field".

In science, terms are of big importance. They represent concepts and distinguish them from each other. Every concept, then, has to be given a special term that can reflect its characteristics and functions. Scientific terms are not usually established randomly but are restricted to some conditions. They have to:

- Express no more than one object,
- be precise; be transparent and unambiguous
- and be appropriate; how far the term represents its concept.

### **1.2. Translation**

Translation has been given many definitions as it does not mean the same for all theorists. In its strict sense, translation is the transmission of a message from the SL into the TL. This transmission is not always easy as languages have different systems and rules. Hence, translators should know what is to be translated and how this can be done. Their different views towards the message to be translated and the way it is transmitted have resulted in providing different definitions to translation.

Munday (2001: 4) says that the term translation has several meanings. It can refer to the "general subject field", the product or the process. He (ibid) defines the process of translation as the "act of producing the translation". Likewise, Aziz and Lataiwish (1999) refer to it as the activity that most people practice daily. They state that the process of translation appears in many forms. It may be expressing a message into a simpler one in the same language; this is what Jakobson (1959) calls intralingual translation, transferring expressions from the SL into the TL (interlingual translation), or translating verbal signs into non-verbal signs (intersemiotic translation). Likely, Munday (ibid) refers to the product as the "text that has been translated" i.e., it is the result of the translation process. However, as translation is mainly concerned with transmitting messages from the SL into the TL, scholars give both the process and the product a big importance. This is clearly shown through the definitions provided in their writings.

Bell (1991: 5) defines translation as "the expression in another language (or TL) of what has been expressed in another, SL, preserving the same semantic and stylistic equivalence." In other words, the translation product should have the same meaning as the ST's keeping at the same time the semantic and stylistic features of the TT. In turn, Catford (1965:20) defines it as "the replacement of a textual material in the SL by an equivalent textual material in the TL." For him, translation is the process that results in two equivalent texts but he does not refer to any sort of equivalence. Likewise, Barnwell (1986:8) states that translation is "re-telling, as exactly as possible, the meaning of the original message in a way that is natural in the language into which the translation is being made." For him, translation should result in a TL message that is equivalent to that in the SL. Rather; he insists that the message should be treated according to the TL rules and norms. For Reiss,

(2000:160) translation is understood as "a bilingual mediated process communication" whose final product is a TL text which is "functionally" equivalent to the SL one. In other words, translation is the activity that occurs in regard to both languages, the SL and TL. Its product is a text in a language with an equivalent function of a text in another language.

### **1.2.1. Equivalence in Translation**

Most of the definitions provided above, despite differences between them, stress that the translation's main objective is to produce a text in the TL that is equivalent to that in the SL. Equivalence is a basic concept in translation. It is understood as "accuracy, adequacy, correctness, correspondence, fidelity, identity; it is a variable notion of how the translation is connected to the foreign text" (Venuti, 2000:5). However, as languages have usually different rules and systems, ideas and problems of equivalence between the original and the translated versions arise. Equivalence has for a long time been a debate among linguists as they agree on what its concern is but not how it can be achieved.

Nida (1964) distinguishes between dynamic and formal varieties of equivalence. Formal correspondence focuses on form and content" whereas dynamic equivalence relies on what Nida calls "the principle of equivalent effect" where the relationship between the target receptor and the message should be the same as that which exists between the original receptor and the same message (ibid: 159). Rather, he insists that the TM has to "tailor" the T reader's linguistic requirements and cultural expectations. This is what he refers to as naturalness. He (ibid) further states that the main role of dynamic equivalence is to get "the closest natural equivalent to the source-language message."



Likewise, Jakobson (1959: 114) introduces the notion of “equivalence in difference”. He states that “there is ordinarily no full equivalence between code-units” (ibid). For him, translating a message from the SL into the TL involves “substituting messages in one language not for separate code-units but for entire messages in some other languages.” He justifies his view by saying that code units are different as they belong to two different language systems which are by nature different from one another. For him, differences are clearly found at the gender level, aspect level, and semantic fields' level.

Equivalence has been treated differently by Newmark who introduces semantic and communicative translation. He (1981: 39) states that

Communicative translation attempts to produce on its readers an effect as close as possible to that obtained on the readers of the original . Semantic translation attempts to render, as closely as the semantic and syntactic structures of the second language allow, the exact contextual meaning of the original.

Communicative translation resembles to some extent what Nida calls dynamic equivalence as both of them focus on the effect of the ST on the target reader, while semantic translation is like formal equivalence.

House (1977) is in favor of semantic and pragmatic equivalence. His theory is based on the idea that ST and TT should match one another in function. He distinguishes two types of translation which are overt and covert translation. In overt translation the TT audience is not directly addressed whereas in covert translation the translator aims to produce a text which is functionally equivalent to the ST.

### **1.2.2. Translation Accuracy**

Translators' main task consists in mediating between different sources of knowledge and facilitating human contact. For this reason to be achieved, translation

should be as accurate as possible. However, as no two languages are similar, despite some similarities between some of them, translation accuracy is considered to be a topic of both importance and difficulty. Dealing with scientific, religious, cultural and other sensitive fields of knowledge makes it necessary for translators to think and rethink several times of what they are supposed to translate, who their target audiences are and how the S message should mirror the T's. Viluksela (2004: 4) suggests four basic characteristics of an accurate translation which are faithfulness, fluency, suitability and clarity.

First, the translated version should be written in a "faithful manner". Faithfulness does not mean that the translator has to translate each word. However, while transmitting a SL message into the TL, ideas and intents of the original writer are what have to be translated. As the SM writer's style is not of much importance especially when dealing with scientific writings, it is then up to the translator to write in the way he prefers regardless of how the original writer does. Second, in order to preserve the translation accuracy, the final product should be "fluent" and easy to read. Further, it should be grammatically and lexically correct and appropriate, and terminologies should be "well-localized". Third, a correct grammar and vocabulary does not necessarily mean that the translation is precise and accurate. What really matters is the "suitability" of the message for the target audience, and to what extent it can clarify ambiguity and vagueness of the original. Fourth, the translated message should be as clear as possible. If the translator cannot guess the original writer's meaning, he should then contact him to clarify.

### 1.3. Synonymy

Despite its importance as a basic linguistic phenomenon that influenced the structure of the lexicon, attention has not been paid to the notion of synonymy in the fields of lexicography, psychology, or computational linguistics (Edmonds and Hirst, 2002). Whatever the reason, whether be philosophical, practical or of expedience, linguists in the past two decades had thought of synonymy as a "non-problem" (ibid: 106). Synonymy was regarded as either words with identical meaning and hence easy to deal with or as different words with different meanings (ibid). Later, studies have shown that synonymy is one of the most problematic issues in linguistics. Rather, it causes a heated debate among linguists. Purists have given several definitions to synonymy and distinguished different types. Some scholars believe in its existence whereas others argue that no two words can share the same connotation, denotation or can substitute one another in any context.

Technically, synonymy occurs when two words share the same meaning and can substitute one another in any context. For example, Lyons (1968: 446) states that synonymous items are "those having the same meaning". Likewise, Cruse (1986: 88) says that "a lexical expression  $\alpha$  is a synonym of a lexical expression  $\beta$  if every declarative sentence [... $\alpha$ ...] that contains  $\alpha$  has the same truth conditions as [... $\beta$ ...], the sentence where  $\alpha$  is replaced by  $\beta$ ". Webster's New Dictionary (1984:24-25) states that

A synonym, in this dictionary, will always mean one of two or more words in the English language which have the same or nearly the same essential meaning (...). Synonyms, therefore, are only such words as may be defined wholly, or almost wholly, in the same terms. Usually they are distinguished from one another by an added implication or connotation, or they may differ in their idiomatic use or in their application.

The notion of synonymy has for long been a controversial issue among both Arab and English linguists.

### **1.3.1. Synonymy in English**

Linguists have distinguished many types of synonymy in English. Lyons (1981) makes a distinction between complete, and absolute synonymy. He (ibid: 148) states that

...lexemes can be said to be completely synonyms (in a certain range of contexts) if and only if they have the same descriptive, expressive and social meaning (in the range of contexts in questions). They may be described as absolutely synonyms if and only if they have the same distribution and are completely synonymous in all their meanings and in all their contexts of occurrence.

Lyons, like many other linguists, believes in the non-existence of absolute synonymy. Cruse (ibid: 270), for example, says that "natural languages abhor absolute synonyms just as nature abhors vacuum". Concerning complete synonymy, Lyons (ibid) says that it rarely occurs but certainly exists. Rather, Palmer (1981: 89) differentiates between synonyms in five ways. First, some synonyms belong to different dialects. Second, some words are used with different styles according to the degree of formality; colloquial or formal. Third, some words, with the same cognitive meaning, differ in their emotive or evaluative meanings. Fourth, some words may differ in their collocational occurrence. Fifth, the meaning of some words may overlap.

### **1.3.2. Synonymy in Arabic**

Synonymy in Arabic is an old semantic phenomenon. It is widespread as it is an important part in making writing, either prose or poetry, style better and smoother. It is known as two words from one word class referring to one object. As

in English, synonymy in Arabic causes a controversial debate among scholars. Some of them believe in its existence whereas others reject the idea. Gully

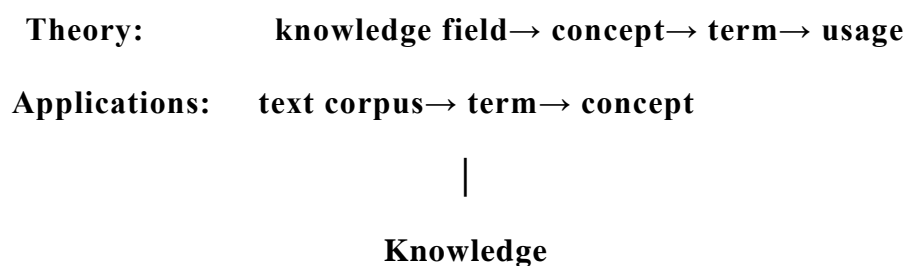
(1995: 193) says that the Arab linguist Ibn Hishem is among those who support the idea of synonymy existence. Gully (ibid) refers to a quotation by Ibn Hishem in which he says “particles could be replaced by another in certain contexts without any effect on the meaning”. Supporters of synonymy, Gully (ibid) says, see that it enriched the language and give the reader more “options” to express the same idea.

Other linguists say that there is no synonymy in Arabic. They argue that every word has a different meaning from the other. They justify their point of view by saying that even if words can substitute one another in a given context, this would be impossible in another.

#### **1.4. Translation of Scientific Terms**

##### **1.4.1. Translation and Terminology**

Translation and terminology focus on two different areas of study. Sager (2001: 259) notes that translation is an applied linguistic activity whose function is the manipulation of texts whereas terminology is the discipline which includes both theoretical and applied linguistics and the texts are one of the different source materials of its many applications. Sager (ibid) states that "terminological theory proceeds from abstract cognitive units called concepts to the identification of appropriate linguistic expressions or terms". The dual approach of terminology is illustrated in Figure1 below:



**Figure 1: Terminology (Sager, 2001)**

Translation and terminology, despite the differences between them, co-work; the translator relies on the terminology theory to do his translation. Sager (ibid: 158) justifies the importance for a translator to comprehend the basis of terminology theory. First, the theory of terminology distinguishes the behavior of terms from the behavior of words and proper names, "with respect both to the knowledge and understanding and to the use of such terms in special or sub-languages" (ibid). Second, the theory tries to shed light on the differences between term and word formation and provides a methodology for finding translation equivalents.

#### **1.4.2. Scientific Terminology and Translation Procedures**

Most researches indexed in science and technology are introduced to the Arab World through English. This may be a non-problematic issue for specialists and bilinguals whose second language is English. Science, however; is not a monopoly for a group of people as it is a knowledge field that affects most people's dailies. Then, translators have to find ways that can help the reader comprehend science and come across its essential issues. As terms are the key of any science, translators give the scientific terminology a big importance. Different procedures and methods are

followed to coin the Arabic equivalents. Among them are those stated by Ghazala (1995) and Newmark (1988). They are:

#### 1.4.2.1. Transcription

"It is the literal spelling of the English term in Arabic letters" Ghazala (1995:163). Transcription means that the foreign English word will be inserted in the Arabic language as it is pronounced in the foreign language. This method does not serve Arabic as it just borrows foreign terms and inserts them as they are spelled in SL. They, therefore, sound strange and in most cases do not conform the Arabic phonology rules. Transcription, however, results in terms that are known for most people as science has mostly been introduced through foreign languages. Examples are:

English Term	Arabic Transcribed Term	English Term	Arabic Transcribed Term
Virus	فيروس	Codon	كودون
Bacteria	بكتريا	Gene	جين

**Table 1: Examples of Transcribed Terms**

#### 1.4.2.2. Naturalization

It is "to adapt the English term to Arabic letters and grammar, by changing one or two of its letters into Arabic ones, and having singular, plural, masculine, feminine, or verb forms of it" (ibid 165). Naturalization, despite its weaknesses, is better than transcription as it is nearer to Arabic but still far from Arabic phonology.

<b>English Term</b>	<b>Naturalized Arabic Equivalent</b>	<b>English Term</b>	<b>Naturalized Arabic Equivalent</b>
Technology (N.)	تكنولوجيا	Technologist (N.)	تكنولوجي
Technologies (N/ Plu.)	تكنولوجيات	Technologically (Adv.)	تكنولوجيا

**Table 2: Examples of Naturalized Terms**

#### 1.4.2.3. Translation

It is the "transmission of English scientific terms into Arabic using words that exist in Arabic language" (Ghazala, 167). Many theorists are in favor of this method, but it does not always work as Arabic equivalents do not always exist. Translation means that the translator has reached a high degree of knowledge of both SL and TL that enables him/her to generate an Arabic equivalent.

<b>English Term</b>	<b>Translated Term</b>	<b>English Term</b>	<b>Translated Term</b>
Car	سيارة	Radiation	إشعاع
Computer	حسوب	Vibrations	اهتزاز

**Table3: Examples of Translated Terms**

#### 1.4.2.4. Coinage

It is "the suggestion of new terms that have not been used or found in Arabic before" (ibid: 168). The new Arabic words are coined in three main ways:



#### 1.4.2.4.1. Revival

According to Ghazala (1995: 169), revival is “the use of an old and dead word with a new meaning”. An example is the word قطار which at first referred to a line of camels and, later, it is used as an equivalent for train. However, some terms proposed by scholars failed to become accepted in Arabic, examples are الجماز (a swift-footed ass or camel) proposed for tramcar, and ارزیز (the sound of rain and thunder) proposed for telephone (Emery: 1982).

#### 1.4.2.4.2. Derivation

Ghazala (ibid: 170) says that derivation "is based on measurement", i.e., using native lexical roots and patterns. Abd Alaziz (1990: 291) states that فعل and فعال usually refer to diseases, أفعل to form adjectives and مفعال to machine.

English Term	Arabic Derived Term	English Term	Arabic derived term
Tetanos	(فعال) كزاز	Lentigo	نمش (فعل)
Hepatitis	(أفعل) أهدب	Paralysed	(مفعول) مفلوج

**Table 4: Examples of Derived Terms**

#### 1.4.2.4.3. Neologism

Neologisms are new meanings for established words; they form the major number of Arabic technical terms. For Ghazala (ibid: 170), this translation procedure "is the best and most successful way." In most cases, neologisms are literal translations of the parts the foreign word.

English Term	Arabic Neologism	English Term	Arabic Neologism
Genetics	علم الوراثة	Metaphysics	ما وراء الطبيعة
Data Processing	معالجة المعلومات	Printer	آلة طباعة

**Table 5: Examples of Arabic Neologisms**

#### 1.4.2.5. Translation Couplet

It is the combination of two different procedures to treat a single problem (Newmark: 1988). It is usually followed when a translation procedure is not sufficient by itself.

English Term	Arabic Equivalent	Procedures Used to Deal with the Term
Genotype	تركيب جيني	Naturalization+Transcription
Gas gangrene	موات غازي	Derivation+ Translation

**Table 7: Examples of Translation Couplets**

#### 1.4.2.6. Blending

It is used when two or more words come together to form one word which has the meaning of both words. This is done by omitting the final letters or syllables from the first word and the initial ones from the second word.

English Term	Arabic Blended Term	Original Words that Were Blended
Biochemical	حيوكيمبائية	حيوية+كيميائية
Aerobic	حيهوائي	حيوي+هوائي

**Table 8: Examples of Blended Terms**

#### 1.4.2.7. Paraphrasing

It is to express something written or said with different words to make it easier to understand. This method is adopted when other procedures fail to provide a clear equivalent that corresponds to the meaning of the TL term. The TL phrases may include ordinary words which describe and explain the foreign term.

English Term	Arabic Paraphrased Equivalent
(animals loose) coordination	(تفقد الحيوانات) الانسجام الوظيفي للعجلات

**Table 8: Examples of paraphrasing**

#### 1.4.2.4.8. Componential Analysis

This method is used when there is a lack of one-to-one equivalent of the SL term in the TL. It means that a term is divided into its linguistic parts (Newmark, 1988). It deals mostly with terms that include prefixes or suffixes. Then, the translator dealing with such terms should have enough knowledge concerning affixes translation.

English Term	Componentially Analyzed Arabic Equivalent	English Term	Componentially Analyzed Arabic equivalent
Antibody	مضاد جسمي	Anticodon	شفيرة مضادة
Genotype	شكل مورثي	phenotype	شكل مظهري

**Table9: Examples of Componentially Analyzed Arabic Equivalent**

### 1.4.3 Translation of Affixes

English affixes are divided into two types; prefixes and suffixes. According to Jones (2008), a prefix is an element added at the beginning of the word to change its meaning whereas a suffix is an element added at the end of a word to change its function. Affixes are an important criterion of English scientific terms. Translators dealing with such terms face difficulty to find the exact SL equivalent that can express their function because of the different meanings one affix may have. Abd Alaziz (1990: 197) suggests translations for some prefixes. For instance, “sub” is translated as تحت, “poly” as متعدد and “supra” as فوق. For suffixes translations, he suggests “tomy” for فتح، e.g. gastro-tomy is translated as فتح البطن, “algy” for ألم, e.g. gastro-algy is translated as ألم البطن, “itis” for إلتهاب, e.g. gastritis has as an equivalent إلتهاب المعدة.

### 1.4.4 Translation of Scientific Abbreviations and Acronyms

An abbreviation is the omission of letters from a word to shorten it. Abbreviations use is common in English scientific writing especially for long technical terms. In translation, Newmark (1988) says that when dealing with abbreviations, the translator should write them out in full in the TL .This means that

the abbreviation is decoded back into words, which would then be translated into the TL. Examples are:

Abbreviation	Decoded Term	The Arabic Equivalent
HIV	Human Immunodeficiency Virus	حمة نقص المناعة البشرية
ATP	Adenosine Triphosphate	مركب مستودع الطاقة

**Table 10: Examples of Abbreviations Written out**

In other words, when translating an English acronym into Arabic, the translator should provide a translation for the acronym after decoding it. Rather, a transcription of the acronym can be provided. In case the abbreviation is mentioned for the first time in the text, both methods are used.

Abbreviation	Decoded Tterm	Arabised Term	Translated Term
ATP	Adenosine triphosphate	ادينوسين ثلاثي الفوسفات	مركب مستودع الطاقة

**Table 11: An Example of a Term that Has an Arabised and a Decoded Equivalent**

## 1.5. The Instability of Scientific Terms

### 1.5.1. Causes of Synonymy

To translate a scientific term from one language into another is to find its correct and precise equivalent. Arabic terminology, however, lacks the accurate scientific equivalents and suffers the multiplicity of synonyms. This makes the task of acquiring the correct scientific knowledge complex. Synonymy in Arabic

scientific terminology is the result of many factors, linguistic and administrative (Sieny, 1987), and geographical and political (Emery, 1982).

#### **1.5.1.1. Linguistic Factors**

Multiplicity of synonyms may be related to the language itself. In Arabic, three main linguistic notions have led to synonymy. First, Arabic is known for its use of synonyms where each word may have more than a way to be expressed. Second, Arab translators have not yet set up correct and unified translation procedures to create the Arabic equivalents. Rather, they are not yet in total agreement of what procedures should be followed when dealing with scientific terms. Third, the Arab World is divided into two main groups regarding their second languages which are French and English. Thus some scholars depend on the French term whereas others on the English.

#### **1.5.1.2. Administrative Factors**

Among the administrative factors that lead to the instability of Arabic terminology is the absence of an official terminological body, and the absence of laws that give these bodies the power of standardization which is the case with most language academies. Another factor is the slow progress of official agencies in the production of Arabic terms for thousands of new concepts in different fields of knowledge, thus writers are forced to coin their own terms.

#### **1.5.1.3. Geographical and Political Factors**

Three different geographical and political factors may be mentioned here. The first one is the sheer size of the Arab World and the problems of communication

therein. The second reason is the concern of the Arab states to build up their own identities. The third one is the proliferation of institutions and language academies in the Arab World. The first language academy in the Arab World was established in Damascus in 1919. It was called *المجمع العلمي العربي* (the Arabic Scientific Academy). Later, several other academies were set up like those of Rabat, Amman, and Cairo. Each academy follows its specific methods and procedures in generating the scientific equivalents.

### **1.5.2. Types of Synonymy**

For Ullman (1973), eight types of synonyms can be considered. He makes a distinction between synonymous terms with regard to many factors. First, in terms of generality, a term may be more general than another. Second, in terms of intension, a term can be more intense than another. Third, with regard to the emotional effect on the reader or the speaker, a term can be more emotive than another. Fourth, a term may imply approbation or censure. Fifth, a term may be more professional than another. Sixth, a term may be more literary than another. Seventh, a term may be more colloquial than another. Eighth, a synonymous item may belong to child talk.

## **1.6. Standardization and Unification**

### **1.6.1. Benefits of Standardization**

According to Sager (2001: 258), standardization requires (1) the choice of a suitable term, and (2) fixing this term and its definition. If these requirements are taken into consideration, then standardization is achieved. Building a standardized terminology is a way to achieve an effective interaction among specialists, who, therefore, agreed to forego the personal interpretations. A unified terminology means

that a higher level of precision and accuracy is achieved and instances of misunderstanding are avoided. Standardization facilitates the task of translators, and hence the recipients of any translated message can recognize the knowledge assumed by the use of standardized terms and adjust their reading accordingly.

### **1.6.2. Difficulties of Standardization and Unification**

One of the most disturbing problems that the Arab user of terminology faces is the presence of different equivalents for the same foreign term. Arab terminologists have not yet established unified rules and methods to create the Arabic scientific term. Unified rules lead to a unified terminology; however, many difficulties prevent this task. Among the difficulties that face the unification of the Arabic terminology are:

#### **1.6.2.1. Multiplicity of Term Sources**

English and French are the main languages through which technology is introduced to the Arab world. English is the second language in the Middle East whereas French is spoken as the foreign language in the Maghreb states. The use of French and English as the second languages in two different parts of the Arab world results in the existence of two different sources of scientific terms. The multiplicity of term sources leads to two Arabic translations for the same concept. An example is nitrogen as an English term and azote as a French one. While translating these two terms into Arabic, we consequently get two different Arabic equivalents.



### **1.6.2.2. Diglossia in the SL**

American English and British English are two different varieties of English. They are different from each other not only in terms of pronunciation and spelling but also in their vocabulary. The differences between them result in two different sources of the English term which is then given two Arabic equivalents.

### **1.6.2.3. Synonymy in the SL**

One of the difficulties that hinders the standardization of Arabic scientific terminology is the existence of synonymy in the SL. English synonymous items are still a heated debate among linguists as a part of them do not believe in its existence. Thus, Arabic translators provide each synonym with a different equivalent.

## **Conclusion**

This chapter consists of an overview of some notions related to the instability of technical translation. It considers terminology, synonymy and translation. It deals mainly with the procedures followed in terms of translating the foreign scientific terminology into Arabic, in addition to the main causes that hinder the standardization and unification of Arabic terminology. Translation is the activity that aims at mediating between languages. However, as equivalents do not always exist, many procedures have been followed in order to generate the Arabic equivalents. The multiplicity of procedures results in a chaotic terminology suffering multiplicity of synonyms. The latter makes it difficult, say impossible, to have a standard terminology that cannot facilitate individuals communication and contact.

## Chapter Two

### Analysis of Genetics Terms

#### Introduction

In this chapter, a corpus of fifteen English genetics terms and their Arabic equivalents are studied. Genetics is chosen as a case of study because it is an important area of knowledge for both specialists and lay people. Rather, its terms suffer chaos and multiplicity of synonyms. In this empirical chapter, the selected terms will be analyzed quantitatively and qualitatively in order to treat the Arabic scientific terminology and answer the questions this research asks.

#### 2.1. Research Procedure

After selecting the English genetics terms randomly, the Arabic equivalents provided in different books and bilingual dictionaries are considered. The books are labeled as:

Book 1: محمد علي حاجي و عياد فرج مجيد، علم الوراثة، ليبيا، 1985

Book 2: عائدة وصفي عبد الهادي، أساسيات في علم الوراثة، سوريا، 1985

Book 3: مصطفى ناصف، الوراثة والإنسان "أساسيات علم الوراثة البشرية والطبية"، الكويت، 1986

Book 4: محي الدين عيسى، مبادئ علم الوراثة، سوريا، 1977

Book 5: مبادئ التشريح المقارن وعلم الوراثة، العراق، 1982

Book 6: مبادئ الوراثة ترجمة مجموعة من المترجمين المصريين، مصر

Book 7: محي الدين عيسى، مبادئ علم الوراثة، الجزائر، 1989

Book 8: The Dictionary: General and Scientific Dictionary of Language and Terms (2004). Lebanon: Research Studies Center

Book 9: The New Medical pharmaceutical Dictionary: Ali Mahmoud Oweida. Egypt

Book10: [www.emro.who.int/UMD](http://www.emro.who.int/UMD) المعجم الطبي الموحد

Then, the Arabic equivalents are analyzed through providing their conceptual definition, comparing each one to the other, and to the English one.

Al- Hamzaoui (2000: 177) suggests four main criteria to evaluate a term and know how suitable it is to represent a given concept. The four criteria are:

### 1. Frequency and Publicity of the Term

A term is evaluated according to the number of sources and books that use it. If this is done by at least five books, the term then is said to be suitable.

Number of Books Using the Term	Degree
Five Times	10
Four Times	8
Three Times	6
Twice	4
Once	2

**Table12: The Term Suitability with Regard to its Use**

### 2. Easiness to Be Handled

It refers to the number of letters that constitute a term. The less the letters that constitute a term, the more suitable it is.

<b>Number of Letters Constituting a Term</b>	<b>Degree</b>
Two Letters	10
Three Letters	8
Four Letters	6
Five Letters	4
Six Letters	2

**Table13: Term Suitability with Regard to its Letters**

### **3. Adequacy and Accordance**

It refers to the number of fields that use the term.

<b>Fields Using the Term</b>	<b>Degree</b>
One Field	10
Two Fields	8
Three Fields	6
Four Fields	4
Six Fields	2
More than Six Fields	1

**Table14: Term Suitability with Regard to the Fields Use**

### **Derivation**

The more terms and words can be derived from a given term, the more suitable it is.

<b>Derived Terms</b>	<b>Degree</b>	<b>Derived Terms</b>	<b>Degree</b>
Ten Terms	10	Five Terms	5
Nine Terms	9	Four Terms	4
Eight terms	8	Three Terms	3
Seven Terms	7	Two Terms	2
Six terms	6	One Term	1

**Table15: Term Suitability with Regard to the Possible Derived Terms**

Relying on these criteria, the Arabic translations are analyzed and evaluated.

### **Glossary of Scientific Terms Used in the Study**

Albinism	Allele	ATP
Chromosome	Cytoplasm	Codon
DNA	Eukaryote	Gamete
Gene	Genome	Genotype
Hormone	Karyotype	Phenotype

## **2.3. The Qualitative Analysis**

### **2.3.1. Gene**

**2.3.1.1. Conceptual Definition:** It is “a hereditary factor that constitutes a single unit of hereditary material; it corresponds to a segment of DNA that codes for the synthesis of a single polypeptide chain” (Passarge, 2007: 454)

**2.3.1.2. Linguistic Definition:** Gene is derived from the French word gene meaning “one that generates” (Webster’s Dictionary 2000:22)

### 2.3.1.3. Arabic Equivalent

1. جين (Book 2: 34, Book 3:176, Book 6:30, Book 8: 340, Book 10, Book 9: 983).
2. مورثة (Book 1: 467, Book 4: 87, Book 5: 229, Book 7: 257, Book 8: 340)

### 2.3.1.4. Analysis

“جين” is a loan word. It is coined into Arabic through transcription. The advantage of the term is that it is economic, i.e. short and easy to handle. Rather, it conforms to the phonological rules of Arabic, and does not sound strange. مورثة is the Arabic equivalent provided for gene. Translation is the procedure followed to coin this term. It is derived from the verb “ورث” which means “to inherit”. It then reflects the key features of the concept. What distinguishes these two terms is their ability to derive many patterns like جيني, جينية, جينات, مورثة, مورثتان..... Hence, according to the criteria suggested by Al- Hamzaoui, both terms are suitable especially as their use is approximately alike.

The transcribed term جين is used six times in the books mentioned above. What distinguishes those books is that they belong to the Middle East. Hence, it can be said that in the Mashrek, the procedure used to coin the Arabic equivalent is transcription. Likewise, the translated term مورثة is used five times in the books used in the study. These books belong to both the Maghreb (Algeria and Libya) and the Mashrek (Lebanon, Iraq and Syria).

### 2.3.2. Gamete

**2.3.2.1. Conceptual Definition:** Strasburger (1877: 454) defines a gamete as ‘‘ a haploid germ cell, either a spermatozoon (male) or an ovum (female). In mammals, males are heterogametic (xy) and females homogametic’’.

### 2.3.2.2. Arabic Equivalents

1. الجاميط (Book 6 : 92)
2. الخلايا الاحادية (Book 6 : 928)
3. عرس (Book 4 : 48, Book 5 : 224, Book 7 : 191)
4. الجاميٲ (Book 2 : 110, Book 3 : 176 )
5. مشيچ (Book 1 : 467, Book 8 : 337, Book 9 : 879)

### 2.3.2.3. Analysis

الجاميٲ and الجاميط are arabised terms. They are coined into Arabic through transcription. The difference between them is due to the difference between the letters ط and ث. Although they are transcribed terms, the plural and dual forms can be derived as جاميٲان, جاميٲات...العرس is a single term. The procedure used to generate it is derivation where the pattern فعل is considered. This Arabic equivalent is short, simple and easy to spell and remember as it consists of only three letters. Unlike the English term and the Arabic equivalents of gamete, الخلايا الأحادية is a compound term, and is derived through neologism. It covers one side of the concept it describes which is the unique cell that the gamete includes. Thus, it can be said that it does not provide the accurate and precise scientific meaning of the gamete. المشيچ is coined through derivation where the Arabic pattern فعيل is considered. It is derived from the Arabic verb "مشح" meaning to link or gather two things together. The four translations, despite differences between their semantic meanings, are used frequently in the books used in this study. Nevertheless, as عرس consists of only three letters, can derive plural and dual forms i.e., أعراس, عرسان, and is used three times, it is considered, according to Al Hamzaoui criteria, to be the most suitable equivalent for gamete.

The use of either the transcribed terms, i.e., جاميٹ or جاميط or the translated ones; الخليا الأحادية, العرس and المشيخ differs from one Arab region to the other. الجاميت and الجاميط are found in the books that are written by Mashrek authors whereas the translated terms are found in both the Mashrikian (Syrian, Egyptian, Iraqi and Lebanese) and Maghrebian (Algerian and Libyan).

### 2.3.3. Albinism

**2.3.3.1. Conceptual Definition:** Albinism “refers to a group of inherited abnormalities of melanin synthesis resulting in congenital hypigmentation. It involves the skin, hair and eyes” (Chen 2006: 36)

#### 2.3.3.2. Arabic Equivalents

1. غياب الصبغة (Book 6: 323)
2. مهق (Book 2: 116, Book 5: 258, Book 7: 397, Book 8: 47, Book 10)
3. إغراب (Book 2 : 116, Book 9 : 71)
4. اللون الأبيض الالبيني (Book 7: 397)
5. اللون الالينو (Book 7 : 397)

#### 2.3.3.3. Analysis

مهق is An arabic equivalent that is generated through derivation where the pattern فعل is considered. This Arabic term means something completely white, and hence it reflects one of the concept’ s main features which is the colour a person with albinism has. Likewise, The translated term اغراب means تشوه. It covers another side of the concept which is the abnormality of pigments of the person’s eyes, skin or hair. In turn, غياب الصبغة is a compound term that refers to the absence of colour in persons with albinism. اللون الأبيض الالبيني and اللون الالينو are coined through translation couplet as both translation and naturalisation are used. They refer to one of the



concept's main features which is the colour found in people with albinism. The five suggested translations cover different features of "albinism". Their use in the books used in this study is frequent. Among the six suggested translations, مهق seems to be the most suitable one as it consists of three letters, easy to handle and is used more than the others.

The Arabic translations of albinism, i.e., غياب الصبغة, مهق and إغراب are used in the books whose writers are Egyptians, Algerians, Syrians, Lebanese and Iraqi. The two terms coined through translation couplet, i.e., اللون الأبيض الالبيني and اللون الالينو, are used only in books written by the Algerian writer.

#### **2.3.4. Genotype**

**2.3.4.1. Conceptual Definition:** Shull (1998: 6) defines a genotype as "a race of organisms different from one another in its heredity qualities".

**2.3.4.2. Linguistic Definition:** Genotype is divided into the prefix "geno" and the root "type". "Geno" is derived from the word gene that is usually translated into Arabic as جين or مورثة, and type is model or image (Webster's New Dictionary 2000: 56).

#### **2.3.4.3. Arabic Equivalents**

1. تركيب جيني (Book 2 : 29, Book 3 : 174)
2. تركيب وراثي (Book 6 : 29)
3. طابع وراثي (Book 4 : 158, Book 5 : 229, Book 7 : 28)
4. نمط جيني (Book 2 : 23, Book 10)
5. طراز عرقي (Book 8 : 341)
6. طراز وراثي (Book 1 : 467)

#### 2.3.4.4. Analysis

Unlike the English term, the Arabic ones are compound. They consist of two words as a result of the literal translation of the parts that genotype consists of. تركيب جيني and نمط جيني are derived into Arabic through translation couplet as both transcription and translation are used whereas طراز وراثي, طراز عرقي, طابع وراثي and تركيب وراثي are generated through componential analysis. The differences between them are due to two factors. First, the root “type” is given four different translations which are طراز, نمط, طابع and تركيب. Second, the prefix "geno" is given three translations; one is transcribed as جيني; the others are translated as وراثي and عرقي. The books used in this study refer to طابع وراثي three times whereas the other Arabic equivalents are used either twice or once.

The translations provided for the English term differ from one book to the other. نمط جيني and تركيب جيني are the terms used in the Mashrek (Syria and Kuwait) whereas the Arabic terms are used in both the Maghreb (Algeria and Lybia) and the Mashrek (Syria, Iraq and Lebanon).

#### 2.3.5. Phenotype

**2.3.5.1. Conceptual Definition:** A phenotype is “the individual as he is found. His characteristics being determined by his environment as well as his hereditary endowment” (Rabinowitsh 1955:317)

**2.3.5.2. Linguistic Definition:** This term is divided into the prefix “pheno” which means “showing” (Webster’s Dictionary 2000: 42) and the root “type”.

### 2.3.5.3. Arabic Equivalents

1. الطابع الظاهر (Book 5 : 229)
2. شكل مذهري (Book 2 : 147, Book 3 : 179, Book 6 : 934, Book 7 : 32)
3. نمط ظاهري (Book 8 : 55, Book 10)
4. شكل ظاهري (Book 6 : 140)
5. طراز هيئة (Book 1 : 473)

### 2.3.5.4. Analysis

The Arabic equivalents are compound terms. They are generated through componential analysis as they are literal translations of the parts that constitute “phenotype”. They differ in translating the prefix “pheno” which is translated as ظاهر, مظهر and مذهري. Rather, the root “type” is given three translations; نمط, شكل and طابع. The Arabic equivalents reflect the key feature of the concept they describe which is the distinguishable character that appears in individuals. The use of the five translations is common in Arabic scientific discourse. However, according to the books used in the study, شكل مذهري is the most used one and hence may be the most suitable.

Translators of this English term, regardless their origins, whether be from the Maghreb or the Middle East, provide it with only translated equivalents.

### 2.3.6. Chromosome

**2.3.6.1. Conceptual Definition:** Rabinowitsh defines chromosomes as “elongated (often snake-shaped) bodies visible under the microscope in the nucleus of all cells and containing the determinants of heredity (...). One chromosome is peculiar in

that it occurs in two forms called X and Y; a progeny receiving the pair XX becomes a female and that receiving the pair XY, a male” (ibid)

**2.3.6.2. Linguistic Definition:** Chromosome is composed of the prefix “chrom” and the root “some”. “Chrom” is derived from Greek word “chroma” which means color or pigment (ibid: 11), “Some” is derived from the Greek word “soma” meaning body (ibid: 50)

### **2.3.6. 3. Arabic Equivalents**

1. كروموسوم (Book 2 : 33, Book 3 : 181, Book 6 : 116, Book 7 : 171)
2. صبغى (Book 1 : 462, Book 4 : 10, Book 5 : 237, Book 7 : 192, Book 10)
3. جسم ملون (Book 9: 441)
4. ناقل الوراثة (Book 4 : 48)

### **2.3.6. 4. Analysis**

كروموسوم is a loan word. It is coined into Arabic through transcription. It sounds strange and does not conform to the phonological rules of Arabic. صبغى is a translated term, and is derived from صبغة which means color. It is a short term that can be easily handled by Arabic speakers. Rather, dual and plural form can be derived, for example, صبغيات and صبغيان. Unlike the English term and its translations كروموسوم and صبغى, جسم ملون is a compound term which is derived through componential analysis as it is a literal translation of the term chromosome. It covers one side of the concept it describes which is the color it provides for the individual's eyes, skin...etc. Likewise, نواقل الوراثة is derived through neologism, and seems to be the most appropriate equivalent and the that can describe what the concept chromosome is. The four translations are used frequently in Arabic scientific

discourse but صبغى seems to be the most suitable one as it includes the main criteria suggested by Al- Hamzaoui which are the easiness, derivation and frequency.

The transcribed term كروموسوم is used in books whose authors are from Syria, Kuwait, Egypt and Algeria. The Arabic translations جسم ملون, صبغى and ناقل الوراثة are provided in books written by Lybian, Syrian, Iraqi, Algerian and Egyptian authors. There seems to be no accordance between translators of the same region or even of the same country concerning the procedures followed to create the Arabic equivalents.

## 2.37. Cytoplasm

**2.37.1. Conceptual Definition:** Nill (2002: 66) defines a cytoplasm as “the protoplasmic contents of the cell not including the nucleus.”

**2.37.2. Linguistic Definition:** This term is divided into the prefix “cyto” meaning cell (Webster’s Dictionary 2000: 14), and the root “plasm” which is derived from plasma (ibid: 44).

## 2.37.3. Arabic Equivalents

1. سيتوبلازم (Book 2 : 147, Book 5 : 45, Book 6 : 801)
2. المتكافلات (Book 6 : 793, Book 10)
3. جبلة (Book 3 : 178, Book9 : 659)
4. هيولى (Book 8 : 221)
5. جبلة خلوية (Book 1 : 443)
6. سايتوبلازم (Book 3 : 178)

#### 2.37.4. Analysis

سيتوبلازم and سايتوبلازم are transcribed terms. سيتوبلازم is written in Arabic letters as spelled in French whereas سايتوبلازم as in English. They sound strange and do not conform to the Arabic phonology rules. المتكافلات, جبلة and هيولى are translated terms. Al- Mounjid Dictionary (2000: 1501) refers to هيولى as the substance that something is made up of, and to المتكافلات as the creatures that live together. Their use in the books used in the study is equal. Yet, although سيتوبلازم is a loan word, it is the most frequently used term.

The translations provided for cytoplasm are divided into transcribed and translated terms. The books that use the former are distinguished for being from the Middle East (Syria, Kuwait, Iraq and Egypt). The latter is found in the Libyan book and the Kuwaiti, Egyptian and Lebanese ones.

#### 2.3.8. Eukaryote

**2.3.8.1. Conceptual Definition:** A eukaryote is “an organism or cell whose cells contain a true nucleis; all living matter except viruses, bacteria and blue-green algae.” (Meyers, 1995:985).

**2.3.8.2. Linguistic Definitions:** The English term is divided into the prefix “eu” which means true (ibid: 20), the root “kary” meaning "nucleis" of a cell (ibid: 29) and the suffix ote meaning inhabitant or native (ibid: 39).

#### 2.3.8.3. Arabic Translations

1. خلية حقيقية النواة (Book 4: 49, Book 7: 314)
2. حقيقية النوى (Book 4: 57)
3. الانوية (مميزة) حقيقية (Book 6: 928)
4. حقيقية النواة (Book 10)

#### 2.3.8.4. Analysis

The Arabic equivalents are coined through componential analysis as they are literal translations of the parts that constitute the “eukaryote”. The differences between them are due to differences between translations provided for the different parts of the English term. The prefix “eu” which means true is translated as حقيقي or مميز. “Ote” is translated as كائن or خلية whereas in some translations no equivalent is provided. “Kary” is translated as النواة, انويه or النوى. The five translations are found in the books used in this study. The Arabic equivalents are compound as no single term carrying a similar meaning as eukaryote is provided in Arabic language.

#### 2.3.9. Allele

**2.3.9.1. Conceptual Definition:** Meyers (ibid) defines alleles as “alternative forms of a given gene, inherited separately from each parent, differing in nucleotide base sequence and located in a specific position on each homologous chromosome, affecting the functioning of a single product (RNA and/or protein.” . Abd Alhadi (ibid: 139) says that the gene and its allele are facing each other on two chromosomes.

**2.3.9.2. Linguistic Definition:** Allele is derived from the Greek word “allelo” meaning alternative (Webster's New Dictionary 2000: 3).

#### 2.3.9.3. Arabic Equivalents

1. بديل (Book 2: 139)
2. بديلي (Book 1: 439)
3. المورثات المتقابلة (Book 5: 229, Book 7: 73)
4. الوحدات الوراثية (Book 5: 227)
5. أليل (Book 6: 923, Book 10)

#### 2.3.9.4. Analysis

The English term is provided with five Arabic translations. First, الليل is a transcribed term as it is inserted in Arabic as spelled in English. بديلي and بديل are translated terms. The former is a derived term whereas the latter is translated. They are what the English term means as they reflect the main function of an allele which is “alternation”. المورثات المتقابلة and الوحدات الوراثية are compound terms, and are derived through neologism. The first term covers one side of the concept meaning which is the “contrast” whereas the second refers to another side of the allele which is heredity. The use of the Arabic equivalents is frequent in the books used in this study. However, according to the criteria suggested by Al- Hamzaoui, أليل, بديل and المورثات المتقابلة seem to be the most appropriate translations. بديل is easy to handle, has the capability of derivation and reflects the main feature of the concept. Likewise, أليل and المورثات المتقابلة are used more frequently than the others. Nevertheless, as أليل is a loan word and المورثات المتقابلة is a compound term, بديل may be said to be the most suitable equivalent.

The Arabic translations are found in books of the Maghreb (Algeria and Libya) as well as those of the Middle East (Syria and Iraq). The transcribed term is used in the Egyptian book.

#### 2.3.10. Karyotype

**2.3.10.1. Conceptual Definition:** A karyotype refers to “ the arrangement of chromosomes in homologous pairs. They are arranged and numbered according to a convention (...). The karyotype is characteristic of each species” (Passarge 2007: 72)

**2.3.10.2. Linguistic Definition:** Karyotype is divided into the prefix “kary” and the root “type”. Kary means a nucleus of a cell (Webster’s New Dictionary 2000: 29).



### **2.3.10.3. Arabic Equivalents**

1. طراز نووي (Book 1: 467)
2. هيئة كروموسومية (Book 6: 931)
3. طابع نووي (Book 7: 405)
4. نمط نووي (Book 10)

### **2.3.10.4. Analysis**

The English term has four Arabic translations. All of them are compound terms as they are the result of a literal translation of karyotype. Differences between them exist, however. The first difference is due to the translations suggested for the root "type" which is translated as طراز, طابع, نمط and هيئة. The second difference is the result of the translations suggested for the prefix "kary" which is translated as نووي, or provided with a transcribed word كروموسومية. The four translations are used equally in the books used in this study. Yet, هيئة كروموسومية that is derived through translation couplet is found in this Egyptian book whereas those generated through componential analysis are used by the Maghrebian books.

### **2.3.11. Hormone**

**2.3.11.1. Conceptual Definition:** Hormones are defined as" signal molecules, products of glandular cells, which are secreted into the internal milieu, most frequently into the blood. Acting in, the chemical messengers coordinate activities of different parts of the body." (Baulieu and Kelly, 1990:3).

### **2.3.11.2. Arabic Equivalents**

1. هرمون (Book 1: 444, Book 2: 156, Book 3: 148, Book 5: 202, Book 6: 930, Book 10)

2. حاث (Book 1: 444).

### 2.3.11.3. Analysis

هرمون and حاث are the Arabic equivalents suggested for hormone. هرمون is a transcribed term as it is written in Arabic letters as spelled in English. حاث is a translated term. It has the capability of deriving the dual and plural form; حاثان, حاثون... Although this term is what the concept “hormone” means, it is rarely used in Arabic scientific texts. In the books used in this study, the loan word is found more frequently than the حاث.

Only the Lybian book uses the translated equivalent. The rest suggest the transcribed term.

### 2.3.12. Codon

**2.3.12.1. Conceptual Definition:** The codon is “the DNA or corresponding RNA sequence of three basepairs that codes for a particular amino acid or termination signal.” (Sinclair and Timothy, 1997:313).

### 2.3.12.2. Arabic Equivalents

1. شفرة (Book 1 : 448, Book 6 : 925)
2. كودون (Book 2 : 74, Book 7 : 399)

### 2.3.12.3. Analysis

The English term codon is translated into Arabic as شفرة and كودون. كودون is a loan word as it keeps the English spelling. شفرة is a translated term and is for being a simple term that is easily handled by Arabic speakers. The books used in this study

refer to the three translations equally. The Libyan and Egyptian books refer to the translated term whereas the Syrian and Algerian use the transcribed term.

### **2.3.13. ATP**

**2.3.13.1. Conceptual Definition:** Nill (2002: 5) refers to ATP as "the major carrier of chemical energy in the cells of all living things on this planet. It contains three phosphate/ oxygen molecules linked together. It serves as the universal medium of biological energy and exchange in all living cells."

### **2.3.13.2. Arabic Equivalents**

1. ادينوسين ثلاثي الفوسفات (Book 2: 143)
2. ادينوزين ثلاثي الفوسفات (Book 6: 934, Book 7: 397)
3. ثلاثي فوسفات الكلوسين (Book 1: 443)
4. مركب مستودع الطاقة (Book 10)

### **2.3.13.3. Analysis**

After decoding the acronym ATP, a translation of its parts is done. ادينوسين and ثلاثي الفوسفات are literal translations of these parts. The procedure followed in coining the two terms is translation couplet where both translation and transcription are used. The difference between them is due to the differences between the transcribed terms i.e., ادينوزين and ادينوسين. The former refers to the French spelling whereas the latter to the English one. مركب مستودع الطاقة is a translated term that refers to what ATP is.

### 2.3.14. Genome

**2.3.14.1. Conceptual Definition:** a genome refers to all genetic material in the chromosomes of a particular organism; its size is generally given as its total number of base pairs.

#### 2.3.14.2. Arabic Equivalent

1. جينوم (Book 6: 928, Book 10)
2. مجين (Book 7: 303, Book 10)
3. تمامة جينية (Book 8: 341)
4. جنيوم (Book 10)
5. كتلة الخلقة (Book 9: 895)

#### 2.3.14.3. Analysis

The English term is provided with four different Arabic translations. جينوم is a transcribed term that sounds strange for Arabic speakers. Moreover, it does not have the ability to derive any form of number or gender. جنيوم is derived from genome with slight differences in letters subsequence between them. مجين is a translated term that is easy to and spell by Arabic speakers. تمامة جينية is generated through translation couplet where both translation and naturalisation are adopted. مجين and جينوم are found equally in the books used in the study, but it can be said that the former is more suitable as it is Arabic whereas the latter is a loan word.

The Unified Medical Dictionary and the Egyptian book use the translated term, the Algerian book refers to the translated term and the Lebanese one uses the تمامة جينية which is derived through translation couplet.

### 2.3.15. DNA

**2.3.15.1. Conceptual Definition:** Is a molecule with double-helix (Gardner: 126). It contains the “primary genetic information in the form of a linear sequence of nucleotides in groups of threes” (Passarge 2007: 452).

#### 2.3.15.2. Arabic Equivalent

1. الحامض النووي الديوكسي الريبوزي (Book 3: 14, Book 6: 93)
2. الحامض النووي الرايبوزي منقوص الاكسجين (Book 1: 464, Book 2: 62)
3. الحمض النووي الربي منقوص الاكسجين (Book 5: 24, Book 7: 221)

#### 2.3.15.2. Analysis

DNA is an abbreviation for the English term Deoxyribonucleic Acid. The procedure followed in generating the three Arabic equivalents is translation coupled as both arabisation and translation are used. Differences between the suggested translations are due to the different translations suggested for the components of the English term. First, acid is translated into Arabic as الحامض (in Book 3, Book1, Book2 and Book 6) or الحمض (in Book5 and Book 7). Second, “ribo” is transcribed as ريبوي in Book 5 and Book7, and as رايبوزي in Book1 and Book 2. The three translations are used equally in the books used in this study. Book10 and book3 refer to the term as دنا whereas Book1 as ح م ن .

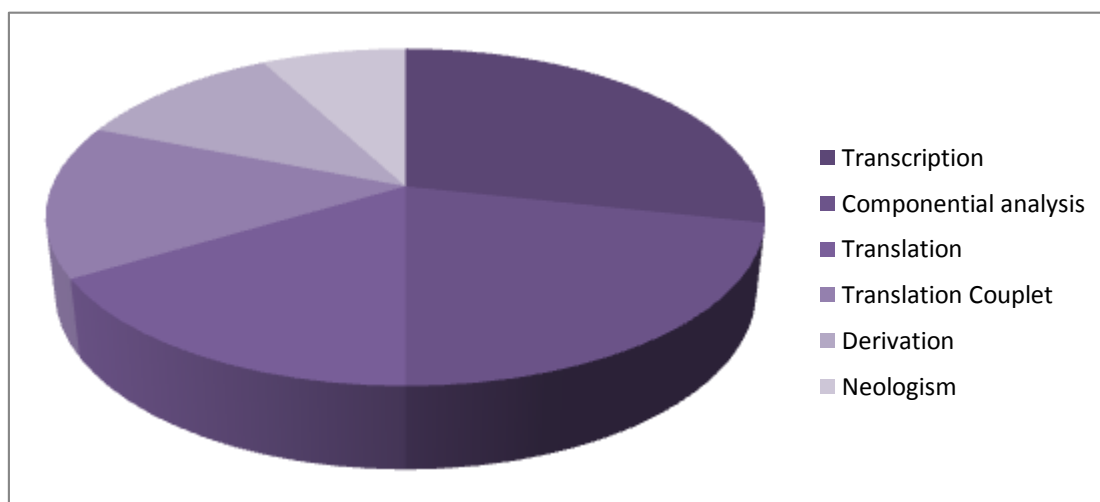
### 2.4. Quantitative Analysis

As one of the questions that this study aims to answer is “how frequently do Arab translators use each procedure?” the following part of the analysis is quantitative in nature. For the sake of clarity, the following procedures are adopted:

The number of occurrences of each procedure in the ten books used in the study is totally 116 procedures divided mainly into six main ones. They are translation, transcription, translation couplet, componential analysis, neologism and derivation. The data obtained are represented in a table, followed by a corresponding figure which shows the distribution of each procedure.

<b>Translation Procedure</b>	<b>The Number of Each Procedure Followed</b>	<b>Frequency</b>
Transcription	33	28.44%
Componential analysis	25	21.55%
Translation	19	16.37%
Translation Couplet	17	14.65%
Derivation	13	11.20%
Neologism	9	7.75%

**Table 15: Procedure, Number and Frequency of Translation Procedures Followed in the Books Used in the Study**



**Figure 2: Frequencies of the Used Translation Procedures**

Table15 and Figure2 show that transcription (28.44%) is the most used translation procedure, then comes componential analysis (21.55%), translation (16.37%), translation couplet (14.65%), derivation (11.20%), and neologism (7.75%). The results obtained from the study show that transcription is the most used translation procedure. This may be due to the lack of Arabic equivalents or as Arab translators rely on the foreign terms and do not try to generate the appropriate Arabic translations. Componential analysis relies mainly on translating the components of the English term, and hence results in Arabic terms that are in fact literal translations of the affixes and roots that constitute the English term. The use of this procedure maybe because of the lack of the SL exact equivalents so that translators just translate its parts literally. Translation is the next most used procedure. It is the most effective translation method as it results in Arabic terms, but it is used less than transcription and componential analysis.

## **Conclusion**

Translation and terminology are two fields that should work in parallel to keep the knowledge required from science and prevent any linguistic and scientific gaps between different linguistic communities. This study has shed light on aspects of English-Arabic scientific translation and has resulted in showing how chaotic the Arabic scientific terminology is. Chaos here refers to the multiplicity of Arabic synonyms provided for each English term where in some cases the English term may have more than six Arabic equivalents. This is due to the fact that each translator uses his/ her own procedures to create the Arabic equivalent which in most times covers one side of the concept it expresses. Rather, in several cases, the translator does just translate literally the components of the English term without caring of the meaning this translation may result in. Consequently, only a small proportion of the Arabic equivalents can be said to be appropriate for the concept and the English

term. In most cases, the transcribed term seems to be the appropriate equivalent as it does not change the original meaning of the English term. In addition, the qualitative part of the research shows that transcription, translation, translation couplet, componential analysis, derivation and neologism are the most frequent procedures used by Arab translators. Yet, the quantitative one shows that transcription is the most used one.



## **General Conclusion**

This research work is set out to investigate the reality of the phenomenon of English-Arabic scientific translation shedding light on the procedures followed by different Arab translators to coin the Arabic equivalents. The thesis includes a theoretical part which is devoted to the review of the literature, and a practical one which is a qualitative and quantitative analysis of Arabic genetics terms.

The qualitative part of the study shows clearly the instability of Arabic scientific terminology where the English term may have more than six equivalents. This is due to the procedures followed when dealing with scientific terms which differ from one translator to the other. The instability is not necessarily related to the region of the translator, but it expresses individual interpretations of the foreign term. The quantitative part shows that transcription is the most used procedure when creating the TL equivalent.

Based on the results obtained from the study of genetics terms, three main suggestions seem to be appropriate. The first one concerns the procedures followed in creating the Arabic terminology. Translators and language academies follow their own procedures without caring of unifying the adopted methods. This results in a chaotic terminology where each term is given more than one equivalent. Hence, Arab translators and terminologists have to co-work in order to establish standards of term creation and limit individual procedures. The second suggestion is concerned with the use of the Arabic term. Translators and terminologists have to use the Arabic translations more than using the transcribed ones as their frequent use will make the Arab reader familiar with them. This task can be mainly achieved through reviving the linguistic and scientific heritage of the ancient Arab scholars. Third, once the Arab translators and terminologists decide to forego the personal interpretations of

the foreign term and decide to establish a unified scientific terminology, the Arabic term has to be easy to spell and remember in order to be easily saved in individual's linguistic repertoire.

## Bibliography

- A Dictionary of prefixes, suffixes and combining forms from Webster's 3rd new international dictionary. (2000)
- Aziz, Yowell Y. & Muftah s. Lataiwish (1999). *Principles of translation*. Lybia: Dar Annahda Alarabiya.
- Barnwell, K. (1986). *Bible translation: An introductory course in translation principles*. Summer Institute of Linguistics.
- Bassnet, S. (1991). *Translation studies*. London and New York: Routledge.
- Bell, Roger T. (1993). *Translation and translating: Theory and practice*. Longman: London and New York.
- Baulieu, E.E. & P.A. Kelly (ed.). (1990). *Hormones: from molecules to disease*. New York and London: Chapman and Hall.
- Catford, John C. (1965). *A linguistic theory of translation: An essay on applied linguistics*, London: Oxford University Press.
- Chen, H. (2006). *Atlas of genetic diagnosis and counseling*. New Jersey: Humana Press
- Cruse, D. A. (1986). *Lexical semantics*. Cambridge: Cambridge University Press.
- Edmonds, O. P. and Hirst, G. (2002). "Near-synonymy and lexical choice". *Computational linguistics*, Vol.28, N2.

- Emery, P.G. (1982). "Towards the creation of a unified scientific terminology". In *translating and computing: Term banks for tomorrow's world*. Barbara Snell (Ed). London: Aslib.
- Ghazala, H. (1995). *Translation as problems and solutions*. Elga Production
- Gully, A. (1995). *Grammar and semantics in medieval Arabic: A Study of Ibn Hishem's "Mughni Al- Labib"*. Richmond, Curzon Press.
- House, J. (1977). *A Model for translation quality assessment*. Tubingen: Gunter Narr.
- Jakobson, R. (1959). *On Linguistic aspects of translation*, in R. A. Brower (ed.) *On Translation*, Cambridge, MA: Harvard University Press.
- Jones, D.J. (2008). *Comprehensive medical terminology* (ed. 3). Thomson: Delmar Learning.
- Lyons, J. (1968). Lyons, John. 1968. *Introduction to theoretical linguistics*. Cambridge, England: Cambridge University.
- (1981). *Language and linguistics*. New York: Cambridge University Press.
- Meriem Webster's dictionary of synonyms*. (1984). Springfield: Massachusetts: Meriam-Webster.
- Munday, J. (2001). *Introducing translation studies: Theories and applications*. Routledge.
- Newmark, P. (1981). *Approaches to translation*. Oxford: Pergamon Press LTD.
- Nida, E. A. (1964) *Towards a Science of Translating*, Leiden: E. J. Brill.

- Nill, K. R. (2002). *Glossary of biotechnology terms*. USA: CRC Press.
- Palmer, F. (1986). *Semantics*. Cambridge: Cambridge University Press.
- Passarge, E. (2007). *Color Atlas of genetics*. Germany: Thieme.
- Newmark, P. (1988). *A Textbook of translation*. London and New York: Prentice Hall International (UK) Ltd.
- Reiss, K. *Translation Criticism: Potential limitations, categories and criteria for translation quality assessment*, tr. Eroll F. Rhodes. Mancshester: ST Jerome Publishing.
- Sager, G. (2001). Terminology. In Baker, M (ed). *Routledge Encyclopedia of Translation Studies*. London and New York: Routledge. 251-260.
- \_Shull, G.H. (1988). *Genetic definitions in the new standard dictionary*. The American Naturalist .
- Sieny, M.E. (1987). “Pan Arab and international cooperation in technical terminology”. In *Translating and computer*. Corpora Picken (ed). London: Aslib.
- Stansfield, W.D. & Robert C. Kong (1997). *A Dictionary of genetics* (ed.5). Oxford University Press.
- Swanepoel, P.H. (1989). Only study guide for LEKPER-Q. Pretoria: University of South Africa.
- Ullman, S. (1973). *Meaning and style*. Oxford.
- Venuti, L. (ed.) (2000): *The Translation studies reader*. London and New York: Routledge.

-Viluksela, P. (2004). Writing: Translation and localisation of SELEAC content.

Finland: EVITech.

-التعريب في القديم و الحديث. دار الفكر العربي. القاهرة (2000). محسن عبد العزيز

-محمد رشاد الحمزاوي. رؤية عربية لتوحيد المصطلح العلمي و تقييسه (2000). مجلة مجمع القاهرة

العدد90. مؤسسة دار الشعب للطباعة و الصحافة و النشر. القاهرة