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AN ANALYSIS OF THE TREATMENT OF EVOLUTION IN MOROCCAN SECONDARY TEXTBOOKS

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Abstract: For almost of scientists, the concept of Evolution occupies a central position in Biology. A few years ago, the topic of evolution was introduced in secondary programs. The teaching of this topic still controversial and causes many resistances in Morocco. In this study, Biology textbooks were analyzed using the methods of content analysis. Results show that this topic is treated in the end of school programs and in most cases the teaching approach is characterized by superficial handling of key ideas. The treatment of Evolution is too confusing and abstract, there are a few mistakes and misconceptions, the visuals are sometimes inadequate. Only equine evolution is studied. There is lack of reference to the Human evolution in the syllabus as well in all textbooks analyzed.

Keywords: Evolution, textbooks, natural selection, content analysis.

Introduction

Evolution is certainly the theory that causes many controversies and is the most rejected. Mechanisms underlying the evolution are generally not well known, little taught, and poorly disseminated. Often caricatured, the principle of natural selection is sometimes rejected for ideological reasons. Students bring a diverse array of ideas about natural events to their science classes, and many of these ideas are often at variance with the scientifically accepted views. Numerous studies have identified multiple biological evolution-related misconceptions held by select groups of students. Because scientific literacy in the field of biology necessitates a basic understanding of evolution concepts and theory, students' possession of biological evolution-related misconceptions is problematic (Yates & Marek 2015). In Morocco, a few years ago, the topic of evolution was introduced in secondary programs. The teaching of this topic still controversial and causes many resistances. A study have shown that a large majority of teachers and future teachers Moroccan reject the theory of evolution and have erroneous conceptions of various concepts related to evolution (Quessada et al 2007). The textbook is located at the intersection of different spheres of production, authentication and dissemination of knowledge, it reflects the work of choice of knowledge and conceptualization of knowledge. It is a tool used both by students and by teachers so it has an important role in teaching and learning. This paper aims to study how Evolution is dealt in textbooks.

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Methods

We have analyzed textbooks of scientific second year of baccalaureat (level 12). This level constitutes the only level where Evolution is treated to scientific students in secondary education (Table 1). The analyzed textbooks are some of the commonly used textbooks and all correspond to Life and Earth sciences' programs currently applied in Morocco. The textbook analysis had dealt on text and images.

Results and Analysis

In the textbook of the second year of Baccalaureat (level 12), a set of 47 pages of 295 in total, are devoted to the study of genetic variation and population genetics. Darwin's name is not cited. This part of the program is very close to the French program of 1994 also dealt extensively population genetics (Quessada & Clement 2008). In the last two chapters, only the evolution of the horse is treated (Fig 1). It is based on the study of some paleontological data as well as the characteristic phenomena of equine evolution. Human evolution is not at all addressed. It is interesting to connect this party to an existing program in France in 1958 (Quessada & Clement 2008) where only one aspect of the evolution of living beings was present with the study of a paleontological fact of evolution is limited to equine lineage. No reference to the molecular data that supports the theory of evolution.

This new content of Moroccan textbooks reflects both the strong desire to teach modern science, but with limits leading to reduce the share of human evolution while developing conventional less controversial examples, such as the equine evolution.

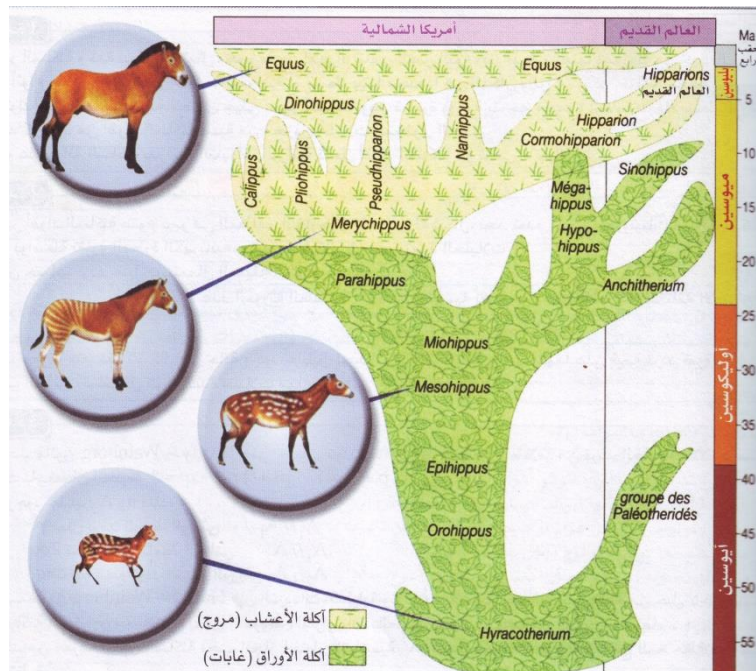


Figure 1 : Schema of evolution of horse as presented in textbook

Though evolution is an overarching theme that ties together biological knowledge, it is usually presented to students and taught in such a way that makes it seem like an isolated topic that has little relevance to other biology content. A separation of content does not imply that instructors are not teaching evolutionary concepts in molecular courses, but simply that students may have difficulty seeing how molecular ideas concerning evolution relate to non-molecular ideas. Evolution oftentimes has its own chapter or section in a textbook, although a true understanding of evolution suggests that evolutionary ideas should be incorporated into every aspect of a biology curriculum (Nehm et al., 2009).

Microevolution are presented as evolution of allelic frequency under the effect of evolutionary factors (Mutation, Natural selection, migration and genetic drift). These evolutionary factors are dealt separately suggesting that if one of them is involved, the others do not act on the change of allele frequencies.

The process of speciation is a separate issue and is dealt without link with microevolution.

The division between microevolution and macroevolution arbitrarily separates evolution into short-term (microevolutionary) and long-term (macroevolutionary) processes. This separation of micro and macroevolution

topics could create comprehension difficulties among students concerning the evolution theory and thus its rejection.

Five essential concepts that are necessary for a comprehension of macroevolution: deep time, phylogenetics, speciation, fossils, and the nature of science (Nadelson and Southerland, 2010). Although macroevolutionary ideas are indeed challenging for students, the literature also shows that most students actually fall short of a complete understanding of microevolution as well.

Without an underlying understanding of microevolution, an understanding of macroevolution is not possible. To understand natural selection, a student must have an understanding of each component that comprises the process. Understanding just differential survival and heredity is not enough, and the research literature indicates that is the kind of incomplete understanding that is typically shown by students (Ferrari and Chi, 1998; Nehm and Reilly, 2007).

The analyzes also show that there is lack of reference to the historical dimension. During the didactic transposition, lack of historical perspective, the lack of reference to scientists up to a total depersonalization conversely contributes to dogmatize the speech, to present a static science. The whole purpose of science education, with adjustments and problematization of the explanatory model into force is lost. On the contrary, by contextualizing the progress of knowledge in this area that we can better help students to differentiate what holds of science and what holds of religion, myth and beliefs (Quessada & Clement 2008) .

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