

## ***Tyrannosaurus rex* it is not a Prehistoric Animal: Roaring in a Semantic Prehistoric Jungle**

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### ABSTRACT

The word "prehistory" has been used for a long time to indicate all extinct organisms of the past, with dinosaurs occupying a center stage stimulating the imagination of a very large audience. Such erroneous use of the term prehistory is widespread even today, a word and concept originally referred to the period of human history which preceded writing, i.e. prior to documented history and embracing a time interval from about 2.6 million years ago to 4000 BC. Keeping in mind the crucial milestone of 'deep time' concept in geology the division of the extensive Earth history into only two sections of respectively 4.5429 billion years and 4000 years in our opinion is a misleading oversimplification. Over the past few centuries much effort has gone into the development of a hyper-detailed chronostratigraphic scale, substantiated by absolute dating, detailed biostratigraphy, and documentation of biological evolution. All this generation of knowledge, conducted by thousands of researchers over many years, is completely lost when, in a simplistic way the anthropocentric dichotomy is accepted.

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### Introduction

*"<<We have been privileged to overhear a prehistoric tragedy, the sort of drama which occurred among the reeds upon the border of some Jurassic lagoon, when the greater dragon pinned the lesser among the slime,>> said Challenger, with more solemnity than I had ever heard in his voice."*

*(The lost world, Arthur Conan Doyle, 1912)*

As expressed in the words of Arthur Conan Doyle's famous 1912 novel "*The lost world*", for a long time the term "prehistory" has been used to refer to all extinct organisms of the past. Amongst the 'prehistoric' organisms, dinosaurs have occupied center stage, iconic animals capable of attracting and stimulating the imagination of a very large audience (Romano et al., 2016; Romano & Farlow, 2018). However far from being related to the past of science dissemination, this erroneous use of the term prehistory is widespread even today, as can be easily determined by a simple check on online search engine.

A quick check on online search engines proves easily that several magazines, sites and journals dealing with dissemination of scientific knowledge, some very

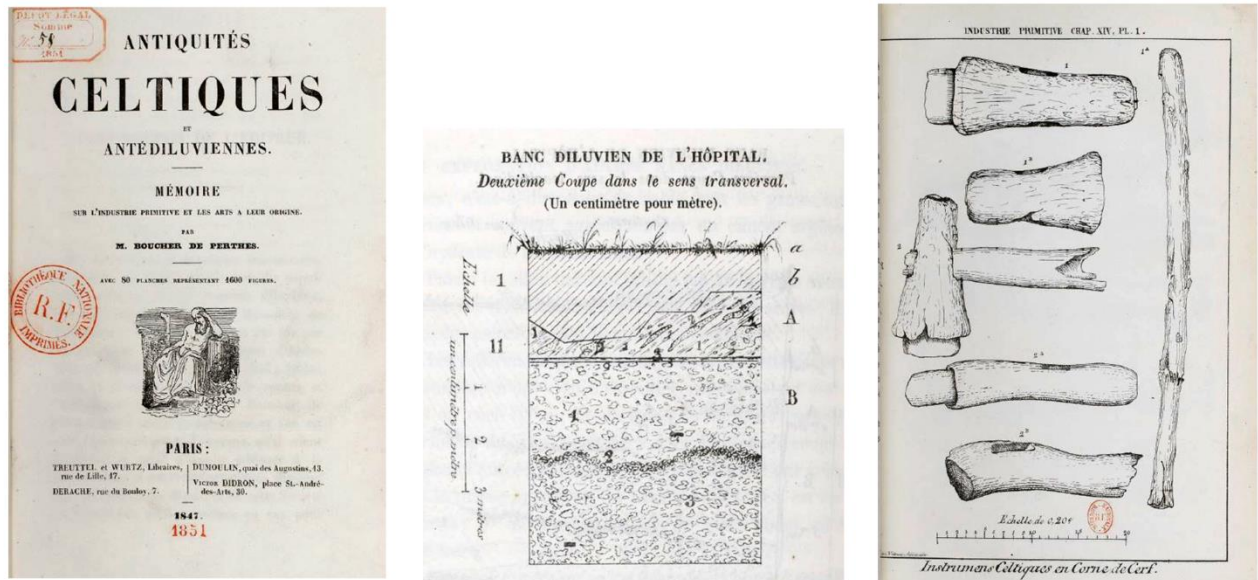
authoritative and influential, habitually use the term 'prehistoric' to refer to all extinct organisms from the geological past, thus completely misrepresenting the original definition of the term. In fact, as indicated in the original definition of the term and concept, and as found in authoritative dictionaries such as the Italian Zingarelli, the term prehistory originally referred to the period of human history which preceded writing, i.e. prior to documented history and embracing a time interval from about 2.6 million years ago to 4000 BC.

In this contribution we briefly discuss the original meaning of the terms 'prehistory' and 'prehistoric' and its widespread incorrect and misleading use.

### Origin of the term ‘prehistoric’

The origin of the terms ‘prehistory’ and ‘prehistoric’ has long been debated in recent decades (e.g. Chippindale, 1988; Clermont & Smith, 1990; Rowley-Conwy, 2006; Vai, 2019). Traditionally, the first appearance of the word ‘prehistoric’ has been attributed to Daniel Wilson in a work published in 1851. However, according to Clermont & Smith (1990)

the earliest use of the term in any language was by Gustave d’Eichthal in the 1843. According to the authors, between 1863 and 1865, awareness increased that the term ‘prehistoric’ or ‘pre-historic’ could have been of fundamental importance, and the second International Congress held in Paris in 1867 (then called *Congres International d’Anthropologie et d’Archéologie Prehistoriques*) officially recognized the term (Clermont & Smith, 1990).

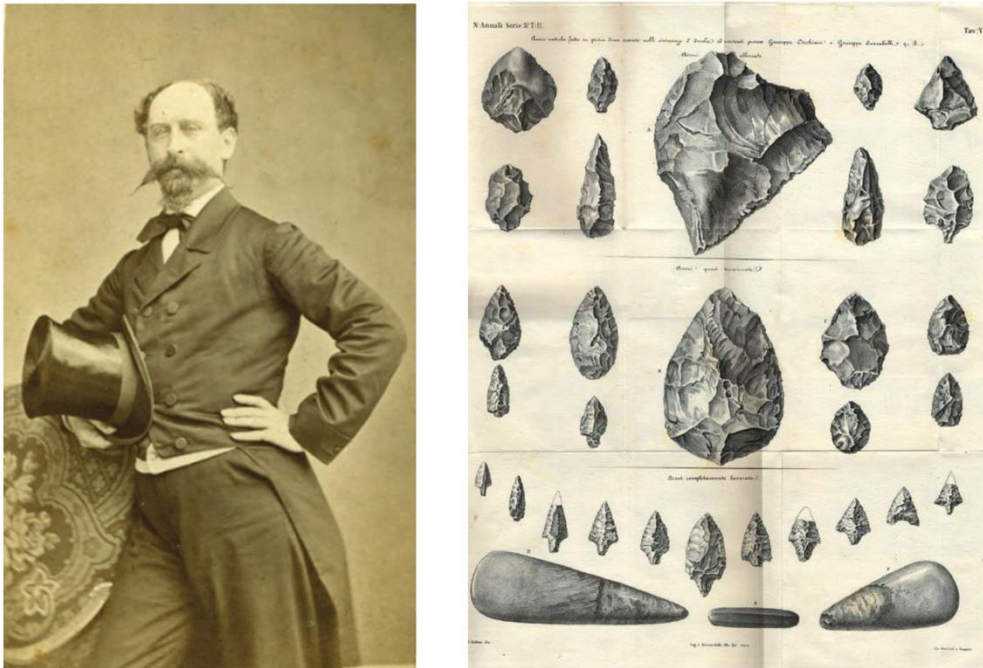


**Figure 1.** The seminal volume *Antiquités celtiques et antédiluviennes* (Celtic and prediluvian antiquities) by Jacques Boucher de Crèvecœur de Perthes published in 1849. Frontispiece (left); stratigraphic column of ‘Diluvian’ deposits at ‘L’Hôpital’ (center); ‘primitive’ Celtic industries (right).

More recently Rowley-Conwy (2006) stressed that Scandinavian terms equivalent to ‘prehistoric’ and ‘prehistorian’, namely ‘forhistorisk’ and ‘förhistorisk’ were used even earlier, with their first appearance in print in 1834. The author concludes that Danish, Swedish and Norwegian archaeologists independently developed the concept of prehistory much earlier with the first written usage in 1834, by Christian Molbech, and by 1850 the terms ‘forhistorisk’ and ‘förhistorisk’ had been used at least 100 times. However, according to Vai (2019) the Nordic authors considered the term ‘prehistoric’ not in a proper chronological sense but more on a typological one (a still historian approach); differently, the term ‘antéhistorique’ in Europe was characterized since its first appearance by a clear chronologic meaning and implication (Vai, 2019).

Recently, Vai (2019) demonstrated that the origin of prehistoric archaeology in Europe resulted as a multi-vocal result of activity, conducted almost simultaneously by three independent groups in the

mid-nineteenth century: i) the Abbeville school in France, pioneered by Boucher de Perthes; ii) the Copenhagen school in Denmark with the central figure of Worsaae (which introduced the famous tripartition stone, bronze, and iron ages across the past 3000 years); iii) the Imola school in Italy led by Giuseppe Scarabelli, crucial for introducing into prehistoric archeology a field approach. based on mapping, general geology, petrology and detailed stratigraphy (Vai, 2019). In this framework, crucial publications are represented by the almost coeval (Vai, 2014) volumes *Antiquités celtiques et antédiluviennes* (Celtic and prediluvian antiquities) by Jacques Boucher de Crèvecœur de Perthes (Fig. 1) published in 1849, *The Primeval Antiquities of Denmark* by Jens Jacob Asmussen Worsaae published in 1849 and *Intorno alle armi antiche di pietra dura che sono state raccolte nell’Imolese* (About the ancient weapons of hard stone collected in the Imolese area), by the Italian Giuseppe Scarabelli (Fig. 2) published a year later in 1850.



**Figure 2.** Photo of Giuseppe Scarabelli main character of the Imola school of prehistoric archaeology in Italy (left); plate V of Scarabelli's original work published in 1850 illustrating stone weapons collected from the stratified deposits outcropping at the Imola hills (right).

Regardless of the first appearance of the term, conceptually the word prehistory referred to human history before the first written records, with a refined conception of the prehistoric period already in the first half of the nineteenth century, as demonstrated by the famous three-tiered chronological sequence of Stone, Bronze, and Iron Ages proposed in the 1830s by the Danish archaeologist Christian Jürgensen Thomsen (Goodrum, 2016). In the foundation of the discipline of prehistoric archaeology by Boucher de Perthes in 1849, the analyzed material was represented by remains of mammals no longer present in France found in river gravels at Somme valley, associated with chert tools referable to 'primitive peoples' (see Vai, 2019). Despite the original definition and current use in the scientific literature, the term prehistory over time has been used with much broader meaning, which includes the entire history of the planet before the appearance of written documents.

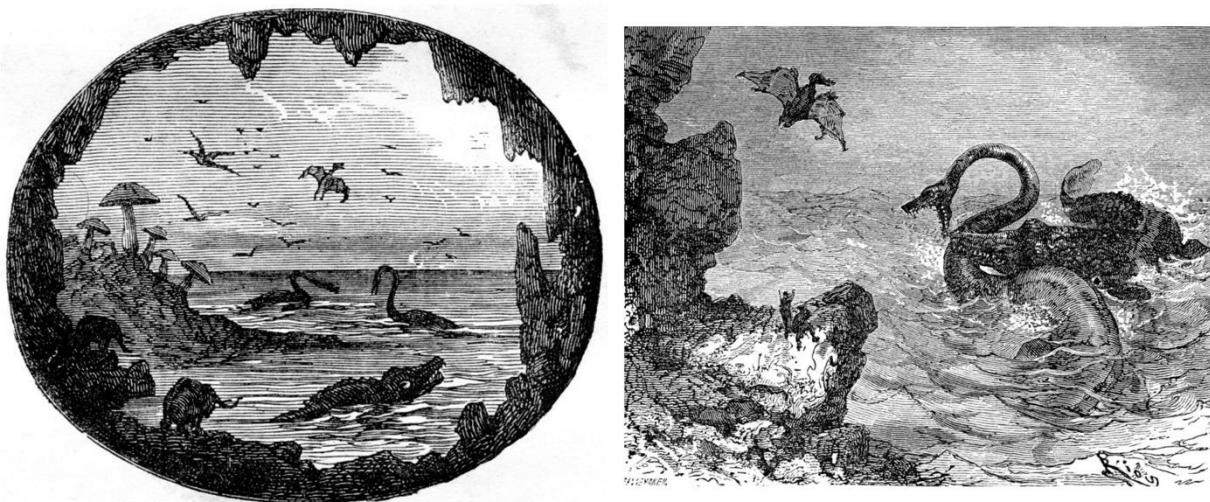
Contributing to this confusion, especially amongst the general public, is the earliest dissemination of paleontological topics, with the word prehistory improperly used in famous novels such as the previously mentioned *"The Lost World"* by Doyle (1912) (Fig. 3) and *"Voyage au centre de la Terre"* (Journey to the Center of the Earth) by Jules Verne published in 1864 (Fig. 4), as demonstrated by the following well-known passage:

*On that spot, some three square miles in extent, was accumulated the whole history of animal life scarcely one creature upon the comparatively modern soil of the upper and inhabited world had not there existed. Nevertheless, we were drawn forward by an all-absorbing and impatient curiosity. Our feet crushed with a dry and crackling sound the remains of those prehistoric fossils, for which the museums of great cities quarrel, even when they obtain only rare and curious morsels. A thousand such naturalists as Cuvier would not have sufficed to recompose the skeletons of the organic beings which lay in this magnificent osseous collection."* (original text: "Là, sur trois milles carrés, peut-être, s'accumulait toute la vie de l'histoire animale, à peine écrite dans les terrains trop récents du monde habité. Cependant une impatiente curiosité nous entraînait. Nos pieds écrasaient avec un bruit sec les restes de ces animaux antéhistoriques, et ces fossiles dont les muséums des grandes cités se disputent les rares et intéressants débris. L'existence de mille Cuvier n'aurait pas suffi à recomposer les squelettes des êtres organiques couchés dans ce magnifique ossuaire.).





**Figure 3.** “Prehistoric” animal described by Arthur Conan Doyle in his famous novel *The lost world* published in 1912 and illustrated New-Zealand-born artist Harry Rountree (1878-1950). Worth of note is the human figure depicted along with a dinosaur.



**Figure 4.** “Prehistoric” animal described by the French novelist Jules Verne in his fortunate “*Voyage au centre de la Terre*” (*Journey to the Center of the Earth*) published in 1864 and illustrated by the French illustrator Édouard Riou (1833–1900).

As reported above, interestingly with respect to the English translation the original French version still reports the old terms ‘*antéhistoriques*’ by Tournal (1833), replaced nominally with ‘prehistoric’ by Wilson (1851) (see Vai, 2019). Also noteworthy is the improper use of the term ‘*creature*’ to indicate organisms that are the fruit of evolution, however a semantic and conceptual problem unfortunately very widespread even today (Romano & Cifelli, 2015).

### Discussion

Word equivocation is a common problem, especially with regards to terms in disciplines with a long history

and influence on a broad audience (e.g. Romano, 2015, 2016; Romano & Cifelli, 2016). One of the central achievements of geology since the nineteenth century is the crucial concept of ‘deep time’ (lucky expression coined originally by John McPhee, see Gould, 1987), i.e. the extension of our planet’s origin back into the abyss of time which, for centuries, had been considered to be only 4000 years old according to the biblical account. Indeed, among the major contributions of science to the downsizing of human thought, in addition to the discovery that Earth is not the center of the universe, the Darwinian and Freudian revolutions, Gould (1987) properly also includes the central

concept of deep time. A true revolution, which from the comforting conception of a relatively young Earth governed almost from the beginning by human will, has passed to the conception of an almost incomprehensible vastness of time, where mankind does not occupy but the last 'milliseconds' (Gould, 1987).

Bearing this in mind, and considering the wonder of the evolution of life through a number of different geological periods, the division of the extensive history of Earth into only two sections of respectively 4.5429 billion years and 4000 years is in our opinion a misleading oversimplification.

Over the past few centuries much effort has gone into the development of a hyper-detailed chronostratigraphic scale comprising 102 stages, 12 Systems and 10 Erathems, substantiated by absolute dating, detailed biostratigraphy, and documentation of biological evolution. All this generation of knowledge, conducted by thousands of researchers over many years, is completely lost when, in a simplistic way such anthropocentric dichotomy is accepted. This divides Earth's history into 'before' and 'after' the appearance of writing by one of the last species to have evolved in the huge bush of life (*sensu* Gould, 1989).

To "Old fashioned" chronology belong terms like "antediluvian", which sometimes can be read as a synonym of "prehistoric", and that is clearly related to a cultural framework where Bible was the only reference in Western World. Words can have their own life, sometimes with evocative and metaphoric meanings, but their use is very important, especially when scientific topics are discussed in a popular context. Modern media are an extraordinary tool to spread information, and the use of scientific terms needs great accuracy. This is even more true and crucial if the dissemination is operated by experts in the field. Opening science to the general public is obviously a difficult task, because it is necessary to communicate in a simple way concepts that are often complex or perhaps rich in technical aspects. However, this need should not justify the erroneous use of terminology which, once spread to the general public, could have an overall more negative than positive effect. A large slice of the public will have access to science and scientific discoveries only through popularization programs in the media, therefore being rigorous in the message that is transmitted (starting of course from the terminology that represents the building blocks of language) must represent an absolute priority. In several cases, unfortunately, the communication did not follow this rigorous *modus operandi*, and some classical terms have assumed an incorrect traditional meaning which over time is difficult to eradicate. The Jurassic period became very popular in 1993 after the Spielberg's movie was released, and Jurassic became synonym of "prehistoric" in its broader antique and old-fashioned meaning.

Responsible and reliable dissemination of science is essential to raise awareness amongst the general public of the importance (also political and social) of the various scientific disciplines (consider for instance the current debate on climate change). This involves the translation from a technical language to a popular one. In the process distortion and oversimplification can occur, but must be avoided. Especially in the case when the dissemination is done by insiders of the discipline, the effort is to make it easy to understand the great complexity of nature and, in our specific case, to communicate and appreciate the revolutionary concept of geological deep time. A concept that according to Gould (1987) "*is so alien that we can really only comprehend it as metaphor. And so we do in all our pedagogy*". Thus, making a simple metaphor, if to go back in time to Julius Caesar we have to move a single centimeter on our desk, to reach the last tyrannosaurus we should walk 3.3 Km. To reach the appearance of the first recognized life forms we should walk at least from one end of the island of Corsica to the other.

However, it is important to point out that there were prehistoric species that, according to original the definition of the term, coexisted with humans before the first appearance of writing. This applies to, for instance, saber-toothed tigers and mammoths as well as the bones of other animals found associated with prehistoric human settlements. Dinosaurs, ichthyosaurs and pterodactyls obviously do not fall into this definition, and when disseminating information to the public, effort should be made to use and explain terms such as Triassic, Jurassic and Cretaceous, which are in any case familiar words even to the lay-audience.

In the medical field for instance, since the time of Nicolas Steno in the seventeenth century, everyone knows that the heart is not the seat of the soul (Pantaloni et al., 2016), yet in 2020 there is still a large portion of the population who believe that humans and dinosaurs lived together and fought against each other! The incorrect use of the term prehistory is one of the main reasons for this misunderstanding and should therefore be avoided when not appropriate.

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