

How Can Taphonomy Be Defined in the XXI Century?

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Taphonomy, as a branch of learning and a research area, has undergone a tremendous growth in the past few decades. It has extended its application from palaeontology to other disciplines, it has broadened its referential scope and has incorporated humans as taphonomic agents. This has affected the way taphonomy is perceived by its practitioners and requires a modification of its definition, following a process that is common in most evolving natural science disciplines.

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Introduction

In a recent paper published in *Journal of Taphonomy*, it was argued that taphonomists have a clear conception of what taphonomy is

and that archaeologists frequently mistake its meaning with what could be called natural site formation processes (Lyman, 2010). Such an appropriate distinction was presented as if all taphonomists concur with the definition

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of taphonomy, which is doubtful given the diverse provenience of each of them. Lyman (2010) argued that taphonomy is what was defined by Efremov in the 1940's; that is, the study of the transitions of life forms from the biosphere to the lithosphere. However, this definition, although initially logical, presents a series of small but important problems related to the following topics: the evolutionary character of ideas/concepts, subjected to the developmental and mutational character of any scientific discipline, the "Foucaultian" concept of Academia (e.g., in this case, who decides what is "taphonomy" and what is not?) and, the selection of an original definition (how was "taphonomy" and the set of problems it relates to originally defined?) and how it fits to the current praxis of the discipline.

Given that *Journal of Taphonomy* is an official venue for publishing taphonomic research, it is appropriate to expand Lyman's timely discussion on the topic in order to widen conceptual frameworks, since some of our readers (and contributors) may have felt excluded by Lyman's assertion of what taphonomy is, and for the sake of showing that not all taphonomists agree that the way in which taphonomy should be understood and practiced in the XXI century must be constrained by Efremov's original definition of the discipline.

The evolutionary nature of scientific concepts

Science is constantly evolving and morphing to accommodate problem formulation, testing and resolution. Scientific procedures involve a network of inter-related hypotheses with testable premises aimed at solving large problems of knowledge. This systemic articulation of hypotheses (referred to as theories) constitutes the body of knowledge within which problems at the root of research

arise. These problems lead to new hypotheses with testable consequences, which after testing can be evaluated providing corroboration or rejection, and a subsequent increased body of knowledge. This is what is referred to epistemically as the method of lineal (evolutionary) progression of knowledge (Popper, 1972), successive approximation of knowledge (Bunge, 1998) or truthlikeness (Niiniluoto, 1987, 2002). It is, therefore, natural in the development of scientific disciplines to document that the meanings of certain concepts undergo implementations in parallel to the expansion of the knowledge of the field to which they are associated.

For example, the meaning of genetic mutation has changed since it was originally defined as biology developed through the 20th century as a discipline. De Vries (1901, 1903, 1905) defined genetic mutation as a sudden change due to modification of hereditary material. According to him, one means of change lies in the sudden and spontaneous production of new forms from the old stock. The other method is the gradual accumulation of those always present and ever fluctuating variations which are indicated by the common assertion that no two individuals of a given species are exactly alike. The first changes are what de Vries called "mutations," the second are designated as "individual variations". Therefore, de Vries' original theory of mutation assumed that new species and varieties were produced from existing forms by sudden leaps. In his two-volume publication *The Mutation Theory* (1901-1903) he postulated that the evolution of species might occur more frequently with such large-scale changes than by gradualism. Ironically, today this exclusively saltationist concept of mutation has been abandoned and mutation is most commonly defined as discrete modifications in the genome.

Ideas and terms not only evolve but can also be borrowed from other disciplines. For instance, the term “palimpsest”, so widely used in taphonomy, was borrowed from the study of ancient texts. The term literally means “again-scraped” and refers to a parchment that has been written upon at least twice. Taphonomy not only borrowed the term but fitted it in such a way that although it lost its original meaning, it preserved its essence; that is, more than two processes occurring on the same materials or overlapping on the same spot. Given that taphonomists modified the original literal meaning of the term, does that mean that it should be abandoned by practitioners of our field?

So, how does all this apply to the concept of taphonomy? In its original definition, following a Darwinian inception, taphonomic research aimed at targeting the natural incompleteness of the palaeontological record; this incompleteness understood as only partially representative of palaeobiological communities, because the palaeontological record is by essence complete (cf. Fernández-López, 2000), that is, as a record of what is preserved it is complete by itself. Taphonomy was incepted in order to counteract the bias of the palaeontological records so as to be properly understood from a palaeoecological and evolutionary perspective. Efremov (1940) emphasized this especially: taphonomy was born to address the issue of how remains of living organisms transition from the biosphere into the lithosphere not because of some simple interest in this process, but because it was mandatory to fully grasp the palaeobiological meaning of fossils and the information lost in the process of the transition from the living to the fossil worlds. Efremov insisted on the imperfect connection between thanatocoenoses and ancient faunas or biocoenoses. As

Lyman (2010) correctly describes, later on taphonomists largely exchanged the negative association of the study of biases in the fossil record for the more optimistic perception that taphonomy contributed information that elucidated the processes that preserved the fossil record (Behrensmeyer & Kidwell, 1985; Fernández-López, 2000). However, frequently this is only useful as far as it provides necessary information on how the distortion in the preservation of all the potential information occurred. Both perceptions are the two sides of the same conceptual coin. Despite apparent efforts to the contrary (see Lyman, 2010), Behrensmeyer *et al.* (2000:103) most recent interpretation of what taphonomy is (“it seeks to understand processes [that have influenced organic remains] so that data from the fossil record can be evaluated correctly and applied to palaeobiological and palaeoecological questions.”) does not differ in essence from Efremov’s (1940) definition and original vision of the discipline. Although interested in analyzing the transition of organic remains from the biosphere to the lithosphere, the emphasis of taphonomic research was placed (still is) on understanding how palaeobiological and palaeoecological information has been modified during that transition, so that strong linkages between taphocoenoses and palaeobiocoenoses can be established (Fernández-López, 2006).

Since taphonomy was incepted to understand the transformation of biocoenoses into taphocoenoses and how information is lost and gained in the process, one could argue whether the term might also be usefully applied to the reveal the transformed information contained in the archaeological record. Just as palaeontologists need to understand particular palaeobiological entities or communities of the past, archaeologists need to understand one specific palaeobiological group (humans) and

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its relation to other palaeo-communities. If palaeontologists study the palaeontological records through their subsequent biostratigraphic and diagenetic modifications, archaeologists are entitled to wonder if they can study the pre- and post-depositional nature of archaeological assemblages in the same way. Addressing how the original information in their assemblages is modified and lost (Fernández-López, 2006) is the core of taphonomic research for both types of researchers. Given that the problems in both fields are so similar and that most of the methodological approaches to address them are also common, one could make a case for both approaches being defined as taphonomic even though the archaeological record includes other non-organic (cultural) elements not found in the fossil record of palaeobiological entities.

Lyman (2010) argues that in the latter case the definition “site formation processes” is more appropriate because it does not distort the original meaning of the term “taphonomy” as applied to living organisms alone. However, there are two arguments to defend the case that “site formation process” is synonymous with the term “taphonomy”. Efremov (1940) noticed with concern that the study of palaeontological sites (localities) was of utmost interest in taphonomy since sites conditioned the type of animal remains preserved. He subsumed (at least tacitly) within the same concept of taphonomy what we call now site formation processes and taphonomy *sensu stricto*, when he also subsumed under the scope of taphonomy the study of all the geological processes involved in faunal transportation and accumulation (wash-out), the geological facies of the contexts and the biostratigraphy of remains within each of them and the relation between denudation and sedimentation.

Although, as palaeontologist, Efremov focused on “terrestrial animal remains”, he acknowledged that the application of taphonomy should not be limited to his area of speciality, and included in his work examples of the utility of undertaking similar taphonomic approaches to the study of past floras or marine faunas. Nowhere in his work did Efremov (1949, 92) insist that taphonomy should be limited to organic subjects alone. He specifically mentioned that even if it could be applied to other items, taphonomy was more aptly developed for terrestrial animals because “for these such [*biasing*] processes have a greater significance” (emphasis in brackets added) and because thanatocoenoses in terrestrial animals could not be directly linked to biocoenoses, assuming that in non-terrestrial organisms this link could be more straightforward.

Therefore, if Efremov placed special emphasis on terrestrial animals it was only because he was, himself, a continental palaeontologist. As a matter of fact, the final definition of taphonomy with which he finished his landmark article was to consider taphonomy literally as what its etymologically means: the science of the laws of embedding. He did not specify embedding of animal remains but embedding *per se*. Within this broad definition, the non-organic materials of archaeological (and palaeontological) sites might also be studied taphonomically.

To justify this position, we note that taphonomy in archaeology is not some upstart sub-discipline. Archaeology has long contributed in a very meaningful way to the ever-widening of the scope of taphonomy. From the 1980s onwards, it was the taphonomic work of researchers dealing with archaeological questions, among others, that helped broaden the frameworks of reference

for understanding natural bone concentrations in determined biomes (e.g., African savannas), the ecology of scavenging, the reflection of human cultural practices on bones (e.g., butchering patterns, butchering behaviors as reflected in cut and percussion marks), carnivore modifications of bones, human-carnivore interaction types, bone breakage and use, etc. We suggest that there are currently at least as many or even more archaeologists conducting taphonomic research than are palaeontologists (at least in certain European academic circles). We believe this largely archaeologist-led move widening taphonomy's content and enriching its concept in the past 70 years diminishes the call of Lyman to return to an strictly circumscribed understanding of the discipline.

We argue that one of the definitions of taphonomy as originally posited by Efremov (1940) (the transition of organisms or animal remains from the biosphere into the lithosphere) reflects more than three decades of previous taphonomic work within palaeontology prior to Efremov's definition. Using the same definition today would be inconsistent with the way taphonomy has been practiced in the past few decades. Taphonomy today is much more than the study of the transition of organisms from the biosphere to the lithosphere; it is the study of the dynamic processes of modification of the original properties of *all* the components (including those that are missing) of any palaeontological, archaeological or forensic assemblage, comprising its constituent materials and its context. This necessary broadening of the original definition comes with the realization that fossils (remains or traces of palaeobiological organisms) are much less informative of the transition between biosphere and lithosphere alone than when considered systemically with

other contextual non-organic elements whose depositional history has also to be known. Efremov knew this to the point in which he never understood taphonomy (conceptualized strictly as the depositional history of organic remains) independent from the contexts in which such a process takes place with all the information that they contain. He went as far as to create a subdiscipline (litholeimonomy: law of sedimentary preservation) to study their contextual information within the differential preservation of sediments according to their environmental settings (Efremov, 1953). Taphonomists in the past 50 years have integrated some of the precepts of litholeimonomy into taphonomy in their praxis. Taphonomy should not be limited to the study of the physical remains of organisms but should also encompass anything extending their somatic nature and leaving information about their behavior. In this sense, not only it is not necessary for an organism to die to in order to generate fossil information (*contra* Lyman, 2010:3; see for instance the shedding of deciduous teeth or antler) but also physical organic evidence such as trails and negative imprints of organic structures (ichnites) can be considered as taphonomic (as in Efremov 1953). Understanding this conception of taphonomy, archaeological items are a somatic extension of human organisms and are subjected to similar processes of burial, modification and preservation as are organic remains.

Forensic taphonomists have long understood this extended appreciation of taphonomy. Forensic taphonomy has been defined as a subfield of forensic anthropology, which examines how taphonomic processes have altered evidence that is the subject of a medico-legal investigation (Nawrocki, 1995, 1996). The discipline, as understood by forensic colleagues, differentiates between

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biotaphonomy and geotaphonomy. The former includes environmental, cultural and anthropological factors; and the latter embodies forensic information of geological origin, such as marks on the wall of the burial, disturbance of the soil, and modification of the soil pH, drainage and erosion patterns (Haglund & Sorg, 1997). Irrespective of whether orthodox palaeontologist-taphonomists agree or not on this definition and division, it clearly shows the consensus with which forensic taphonomists work, which is interestingly similar to that of an important part of the archaeological researchers criticised by Lyman (2010). Taphonomy in both cases is conceived holistically as the study of the “embedding” (to use Efremov’s expression) of originally informative sets of elements or assemblages to reconstruct a targeted behavior (a cause of death in forensics or a functional meaning of a site for archaeology), which may have been distorted by postdepositional processes. This includes the interpretation or reconstruction not just of ancient organisms but also of related physical and chemical elements which are important for deciphering the behavior of the original depositional agent(s) and event(s). This is what Whitlam (1982:146) refers to when he argues that “taphonomy, strictly defined, refers to the laws of burial and embedding” and is an “earth science,” and on those bases he suggests that “archaeological taphonomy focuses on the study of the transition (in all its details) of artefacts from abandonment by the subject population until their archaeological recovery.” The period spanning the “abandonment by the subject population until their archaeological recovery” comprises what we taphonomist more appropriately refer to as biostratinomy (although not entirely, since modification carried out prior to abandonment should also be included) and diagenesis.

Pros and cons of “taphonomy” versus “site formation processes”

The study of site formation processes has been defined as taphonomic by some archaeologists even when considering the non-organic components of archaeological sites. We concur with Lyman (2010) that several archaeologists (especially some of those he criticises as examples of incorrect users of the term taphonomy) link taphonomic processes to anything that is either naturally or non-human originated. This is incorrect. Humans are just another taphonomic agent. Discerning human from non-human taphonomic processes is what archaeological taphonomy should be about.

However, we are not sure that Lyman’s (2010) distinction of taphonomic (as affecting past living organisms) *versus* site formation processes (as affecting non-organic materials) is useful in the praxis of taphonomy in the XXI century. Playing the Devil’s advocate, the justifications that Lyman uses can be counter-argued. For example, Lyman insists that taphonomy “was originally meant to signify the transition of organic remains from the biosphere to the lithosphere, not the transition of, say, lithic artefacts from the systemic context to the archaeological context”. As summarized above, this interpretation of taphonomy is traceable to the fact Efremov was a palaeontologist (not an archaeologist) concerned about palaeobiology in geological stages prior to the evolution of hominins. More specifically, Efremov’s original definition did not say “organic remains” but “animal remains,” also emphasizing his professional orientation. However, Efremov himself admitted that the term could be applied to other objects of research such as marine fauna and even plants (see *supra*) (hence the use of

“living organisms”). Lyman’s restrictive interpretation of taphonomy might be supported if Efremov had produced a single definition of what taphonomy is. However, his landmark publication has two definitions: a concrete one of direct application to palaeontology (the study of the transition [in all its details] of animal remains from the biosphere into the lithosphere, i.e., the study of a process in the upshot of which the organisms pass out of the different parts of the biosphere and, being fossilized, become part of the lithosphere) and a general one (the science of the laws of embedding). Although clearly thinking of animal remains, it should be emphasized that nowhere did Efremov specify that the term should be applied exclusively to such type of remains. He coined the term to address how information morphs from the biosphere to the lithosphere, focusing it on his specific palaeontological interests, by way of illustration. At the time of the creation of the definition, only palaeontologists were practising taphonomy. Later on, other fields of research uncovered similar problems based on the incompleteness and metamorphic nature of the historical assemblages they dealt with and hence, the incorporation of the term taphonomy to their praxis. This incorporation was not innocent; it required an expansion of taphonomy’s original meaning.

Lyman argues that originally “the term [taphonomy] was not meant to denote ‘distortion’ [of organic remains] but rather the transition, whether distorting or not”. We do not entirely agree. In most of Efremov’s text the emphasis is placed on the incompleteness of the palaeontological records and how the information they contain is only partially representative (for Efremov hardly ever representative enough) of ancient contexts and biocoenoses. Thanatocoenoses, according to Efremov

(1940:82), are causal groups not formed at the place where biocoenoses once lived but at “alien vital surroundings. The areas occupied by these faunas when alive are generally regions of wash-out. The fossilized remains of land organisms are found on very small disconnected areas, so that the incompleteness of the geological chronicle for the land faunas is very much greater than for that of the sea... For [land forms] the theoretical deduction is not great, because the actual material is very incomplete”. This *distortion* between biocoenoses and thanatocoenoses is at the core of why Efremov justified the emergence of taphonomy and his perception of its much greater utility when applied to terrestrial faunas versus marine ones. Had the transition from biosphere into lithosphere been the target of taphonomic research for the sake of studying the process itself, Efremov would have considered its application to plants and marine faunas as appropriate as for terrestrial faunas where biasing preservation processes were deemed more relevant, instead of arguing that for terrestrial faunas taphonomy “had a greater significance” because of its most incomplete nature.

We would insist that taphonomy tries to extract as much information as possible for any historical record that has been “embedded” or deposited on the ground (for forensic taphonomy frequently the record is strictly biostratigraphic). The processes involved in the modification of such a record are only interesting as far as they provide an explanation of the modification, welcoming any additional information; but the latter is not the target of comprehensive taphonomic research. This additional information becomes more relevant only when it forms part of the main research questions. For instance, can we use biotically-altered bones of dinosaurs to understand what type of predator (or

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scavenger) modified them? Lyman (2010) is right when he argues that “what is important is *if* that incompleteness creates a bias, and recognizing that *bias* is relative to a variable that must be measured in order to answer a research question”.

Inorganic components of palaeontological, archaeological and forensic records also form part of the biosphere (it should be remembered that the term “biosphere” has a geological origin as defined by Eduard Suess in 1875) and their preservation (or lack thereof) into the lithosphere through “embedding” should prompt the interest of taphonomists. Therefore, including these inorganic components into a broader concept of taphonomy probably is not too violent to the original concept. Further, there are ambiguous areas where the organic and the inorganic intersect. For instance, can the study of how plant siliceous phytoliths are preserved or biased in the geological record, be defined as taphonomic? Phytoliths are inorganic, but are also fundamental components of plants.

Lyman (2010) argues that for any item to qualify as archaeological it has to show some signature of having been manipulated by humans. However, this qualification is frequently *post hoc*. Analysis of purported human-manipulated remains commonly precedes its identification as human-manipulated. Frequently such interpretation can only be made *after* taphonomic and other archaeological analyses were carried out. Palaeolithic archaeological sites are mostly palimpsests. The non-human component of those sites is as relevant to archaeologists as the human one because it contributes to understand site formation, helps to sieve the contribution of humans from those of other potential agents and adds valuable information about site context and functionality diachronically. An example of this is

reflected in the re-evaluation of some of the Olduvai Gorge (Tanzania) early Pleistocene sites, variably characterised and interpreted as hominin living-floors or carnivore kills, with a series of intermediate models in between, and the varied nature of their formation only recently understood through taphonomic analysis (Dominguez-Rodrigo *et al.*, 2007).

Last, Lyman points out that the most fundamental difference between taphonomy and archaeological record processes is “that natural formation processes tend to be of research interest in and off themselves with respect to biotic remains (gnawing marks indicating predation and perhaps predator identity) but are typically conceived as noise or biasing with respect to cultural remains”. This difference is more subtle than it seems, since it is frequently also documented in palaeontological taphonomy. Most taphonomic research still, to-this-day, focuses on the information loss introduced by other natural processes (Fernández-López, 2006). Only specifically targeted research questions find the additional information introduced by certain taphonomic processes as informatively useful. For example, when predation is not relevant to the research question(s), the presence of gnawing marks is considered as proof of peridepositional or post-depositional disturbance. When predation is targeted within the scope of the research question(s), then same taphonomic data are considered as relevant. This is so irrespective of the broader field involved: palaeontology or archaeology. It should be remembered that only when hominin-carnivore interactions became relevant to the debate of hunting versus scavenging in early hominin meat-eating hypotheses did archaeologists place special emphasis on gnawing marks on fossil bones and their

behavioral meaning, to an extent still not surpassed by palaeontological taphonomic research.

An evolutionary perspective of taphonomy such as that produced by Fernández-López (2006) considers taphoclasts composed of taphons (i.e., taphonomic groups of common [para]taxonomic origin) in which the organic and inorganic intertwine. This perception of taphonomy impacts strongly certain academic circles and aims at integrating palaeobiological remains into their contexts, in which many taphons produced on a completely inorganic substrate are highly informative of the history of events of the organism along its production.

In the past few years, several meetings have been held where diverse approaches to taphonomy have been discussed and in most of these meetings a broader concept of taphonomy than that advocated by Lyman (2010) has been supported. For instance, see a small list of these meetings and scientific networks to name a few:

- 2005. RTP “Taphonomie” (Toulouse, France). Scientific network under the supervision of one of the Journal of Taphonomy board members (J.P. Brugal) focused on taphonomic research, which is defined as follows: *La Taphonomie (du grec ‘taphos’, tombeau, et ‘nomos’ lois) s’attache à l’étude des lois de l’enfouissement. Son développement, ces dernières années, est manifeste dans les domaines bio-géologiques et met en évidence les rapports étroits liant des données biologiques, géologiques et anthropiques et les implications et connexions essentielles avec les paléoenvironnements (climat) et la paléthonographie (culture). Un point central concerne la conservation*

différentielle, soit le degré d’altération des objets d’études en fonction de leurs caractéristiques physico-chimiques et mécaniques, qui conditionnent leur résistance aux différents agents de dégradation et modifications, <http://www.cnrs.fr/inshs/recherche/RTP-taphonomie/presentation.htm> 2005. Taphos 05 (Barcelona, Spain). This taphonomic meeting included modification of chemical elements, and ichno-taphonomic history of carbonate concretions among more taphonomically traditional presentations (Barcelona, Spain).

- 2007. Multidisciplinary approaches to taphonomy (Aix-en-Provence, France). Here, among some of the debated issues was the definition of the term taphonomy, which was overwhelmingly defined within the broader concept presented in this paper, embodying organic and inorganic elements of the fossil record and anthropogenic processes affecting (and being affected by) both types of materials.

- 2008. Taphos 08 (Granada, Spain). It included within the topics the relation between taphonomy and archaeology, taphonomy of charcoal, geochemical analyses in taphonomy, megabiases and taphonomy and ecology (Granada, Spain) (see special issue 7 [2-3] of *Journal of Taphonomy*, 2009).

- 2008. Taphonomie des résidus organiques brûlés et des structures de combustion en milieu archéologique (Valbonne, Cépam, France).

- 2008. Geoarchaeology and taphonomy (Aix-en-Provence, France). Focused on the taphonomy of soil micromorphology and other geoarchaeological issues (see *Quaternary International*, number 214, 2010).

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When so many researchers dealing with site formation processes, some of them with decades of experience in conducting taphonomic research, use a broader concept of taphonomy than that originally proposed by Efremov for palaeontology, that can be taken as a healthy sign that the concept has evolved in parallel with the praxis of the discipline.

Conclusions

Over the past several decades, scientists have considered scientific fields as constituted by several components: philosophical approach, formal background (set of logical and mathematical theories used), specific background (set of theories, hypotheses and data derived from other disciplines), body of knowledge developed within the discipline, objects of reference, problems related to the objects of reference, targets and goals in research within the discipline and methodology used to address these targets (Bunge, 1998; Fernández-López, 2000) (Table 1). The object of study is, thus, only one of those components. Lyman (2010) uses it as the exclusive criterion to determine what taphonomy is and what is not (although it is not clear in his text why taphonomists should care about the difference). A combination of all these components or elements can be successfully used to provide an archaeological definition of what taphonomy is (Table 1).

A few years ago, some of us were enthusiastic supporters of purportedly impartial elements of the academic machinery destined to guarantee its objective nature and its allegiance to the basic principles of scientific knowledge. Some of these elements, such as peer reviewing and grant-funding are crucial for the publication and research of novel

ideas. Several philosophers of science, such as Kuhn and Feyerabend, who have expressed conflicting and, in some cases highly inaccurate descriptions on how science is practiced (see Bunge 1998, 2006), have also emphasized an obvious consideration - which is that science does not operate in a vacuum but is strongly dependent on social contexts and constraints. For Kuhn, scientists frequently react as members of a sect, because Academia, pretty much like every single compartment of a society, is highly dependent on power. Popper's (1972) naive idea of a linear progression of knowledge determined by the mere development of science seems to other philosophers to be out of touch with reality (see Kuhn, 1962). Others, like Lakatos (1978) blend science and the social dynamics of scientists showing that, although scientific knowledge can progress irrespective of the inner circles of academic power, due merely to accumulating heuristics, it is the latter that ultimately decides the pace of such progression.

Academic power permeates every single cell of research both in natural as well in social sciences (undoubtedly, more in the latter). A look at the most influential scientific journals shows that they highly connected to economically and politically powerful countries. A deeper look into who publish in these journals will also show a bias towards native fellows from these countries. Many disciplines produce what is commonly referred to as "academic clubs". Members of these "clubs" occupy prominent positions either in funding agencies or in editorial boards of important journals. Each of these club members has been intellectually shaped by a set of academic traditions that have a national/cultural character and researchers applying for funding or submitting papers on research framed within a different

Table 1. Elements for an archaeological definition of taphonomy.

Philosophical background	Systemic framing on how human behavioural manifestations generate a material record susceptible of being interpreted. Each part of this record is potentially integrated into a more complex structure. The concrete objects generated by these behaviours do not remain static and their configurations can be modified through the evolution nature of the depositional and taphonomic contexts. The philosophical background defended here is systemic and evolutionary, as the one described in Fernández-López (2000). The best epistemic approach to frame data and their interpretations is scientific realism (Bunge, 1998).
Formal background	Logic and mathematic, formal control of data should guide description and interpretation of the behavioural/depositional information of the archaeological records.
Specific background	The crucial specific background of Taphonomy is Paleobiology (Fernández-López, 2000), and prehistoric humans, as paleobiological entities should be studied following the same criteria as applied to the biosystems (i.e., biological entities plus their external environments).
Body of knowledge	Taphonomy applied to archaeological records produced by prehistoric humans embodies the same set of sub-disciplines as Taphonomy applied to other taphosystems (every taphonomic entity and its external environment made up a taphosystem, cf. Fernández-López, 2000). The demarcation criterion to differentiate Taphonomy from Paleobiology is the “biogenic production”, from which paleobiological entities generate taphonomic entities. In the specific case of Taphonomy applied to Archaeology, human paleobiological entities produce concrete taphonomic entities (the archaeological records), which are susceptible of transformation and evolutionary modification. Biostratinomy and fossil-diagenesis of these archaeological records are studied with the aid of modern referential frameworks.
Objects of reference	Taphonomy targets the analysis of taphonomic entities and taphosystems. Taphonomic entities are defined as <i>all</i> the remains produced by paleobiological entities and their traces (inorganic components, ichnites, modification of other indirect signs [e.g., tooth-marking in absence of any remains of the agent responsible]). In the case of the archaeological record, these taphonomic entities are those produced by human behaviour subjected to taphonomic modifications.
Problems related to the objects of reference	Paleobiology and Archaeology can be independently conceptualized. The former reconstructs the biotic and abiotic processes that create the archaeological records. The latter reconstructs the anthropogenic behaviours that these records have preserved, frequently (but not exclusively) interacting with the former.
Targets and goals	Interpreting taphonomic entities produced by humans, the relations among these entities and with their respective external environments, in order to reconstruct anthropogenic behaviours.
Methodology	The use of the scientific method, which assumes the acceptance of the uniformitarian principles of experimentation.

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academic tradition are more frequently rejected than those derived by the system itself. Academic power matters much; for “historical” sciences like archaeology, geology or palaeontology, where the direct empirical support of interpretations is rather limited, academic power plays a major role. This has led some observers of Academia (mainly philosophers, sociologists and cultural anthropologists) to move along the other extreme of the pendulum and state that all in Academia is a power discourse, as claimed by post-modern schools of thought (such as constructivists and hermeneutics), with a complete disdain for the basic principles of how science operates (see Bunge, 2006).

If we introduce this digressive element in the present debate is because as our awareness for the pervasive role played by power in Academia has grown over the years so has our weariness of sharp boundaries that are delineated by individuals instead of by broader consensus involving collectives in any given field. Scientists should be argumentative over empirically-supported interpretations. That is the essence of science. Definitions are not part of this type of exchange. They belong to a different sphere, the one describing how the members of a discipline view the way this operates. This is a communal endeavour. Lyman’s (2010) paper has timely opened a debate on something that is not trivial, which is how we (taphonomic professionals with all our diverse backgrounds) view taphonomy. Lyman argued that most of the people publishing in *Journal of Taphonomy* know what taphonomy is. We would like to expand this argument by saying that maybe this is not exactly the case. The divergence of opinions may reflect diversity of ways of conceiving what taphonomy is nowadays.

Taphonomy might be viewed as the transition of living organisms into a geological mode of occurrence alone, using a closed concept of Efremov’s original definition or all the elements (organic or not) that once integrated the context of a single item or assemblage (fossil or not) during its transition into the lithosphere, if clinging to Efremov’s broader definition of taphonomy as the science of the laws of embedding.

Considering the reflections in this work may contribute to opening a refreshing window in this communal effort of widening the conceptual framework of what taphonomy is 70 years after it was originally defined.

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