

## Article

# On the Authorship, Availability, and Improper Use of *Sus scrofa ferus* for Referring to Wild Pigs

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**Abstract:** The wild boar, *Sus scrofa*, is one of the most successful large mammals in terms of geographic distribution. Along with its domestic descendant, the pig, they are extremely important animals for conservation, economy, human sustenance, and well-being. Naming wild and domestic pigs in a way that allows them to be distinguished effectively and unambiguously is crucial for a number of studies in archaeozoology, biomedicine, genetics, epidemiology, paleontology, and wildlife management. *Sus scrofa ferus*, or less commonly, *Sus ferus*, is often used to refer to wild populations, frequently in opposition to *S. scrofa domesticus*, or *S. domesticus* in reference to domestic pigs. Here, it is argued that *S. scrofa ferus* is available for nomenclatural purposes but should not be regarded as valid from a taxonomic perspective. Authors should refer wild populations to valid subspecies, e.g., *S. scrofa scrofa*, or to *S. scrofa ssp.*, when information on the subspecific status is not available or relevant for the research questions under consideration. This remark is not a mere nomenclatural clarification, because the potential identification of differences between wild boar taxa is often hidden behind a simplistic dichotomy between wild and domestic forms.

**Keywords:** nomenclature; taxonomy; Suidae; Artiodactyla; Mammalia; domestication; wild boar; *nomen protectum*; *nomen oblitum*; reversal of precedence



**Citation:** Iannucci, A. On the Authorship, Availability, and Improper Use of *Sus scrofa ferus* for Referring to Wild Pigs. *Taxonomy* **2022**, *2*, 91–98. <https://doi.org/10.3390/taxonomy2010007>

Academic Editor: Edgar Lehr

Received: 31 December 2021

Accepted: 3 February 2022

Published: 7 February 2022

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## 1. Introduction

Suids (Suidae, Artiodactyla, Mammalia), or simply pigs, comprise about twenty extant species [1,2]. The wild boar, *Sus scrofa* Linnaeus, 1758 [3], stands out as the most widely distributed wild pig, natively present in most of Eurasia and North Africa and introduced in all continents apart from Antarctica [4]. Wild boars are characterized by an extremely high reproductive rate in comparison to other artiodactyls of similar body mass, which exacerbates their impact on conservation and the economy, as well as explaining their evolutionary success [5–7].

The domestic pig, derived from the wild boar, is also an enormously important animal for human subsistence and welfare, being the only domesticated omnivore among major livestock species [8]. This relationship goes back several millennia, meaning that the correct identification of pig remains (wild or domestic) is a crucial archeozoological question [9,10].

Naming wild and domestic pigs in a way that allows them to be distinguished effectively and unambiguously is crucial for addressing several research questions. There is a widespread approach in referring to wild boar populations as *Sus scrofa ferus* or less frequently as *Sus ferus*, as opposed to domestic pigs, named *S. scrofa domesticus* or *S. domesticus*. Here, it is argued that *S. scrofa ferus* is available for nomenclatural purposes but should not be regarded as valid from a taxonomic perspective, also clarifying the authorship of the taxon and providing a concise review of the development of this concept.

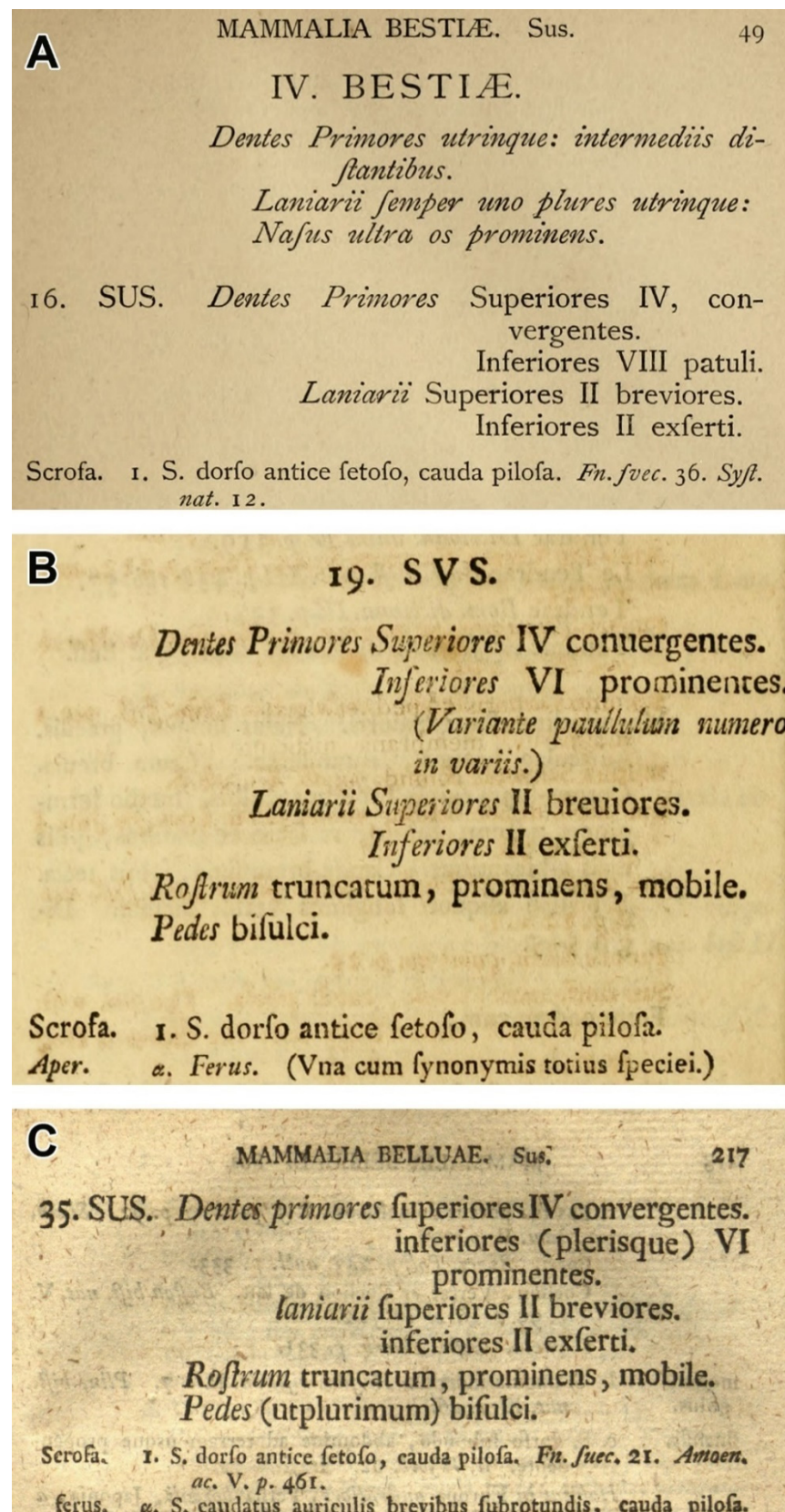
## 2. The Problem of Naming Domestic Species

Scientific names based on domestic animals fall within the scope of the International Code of Zoological Nomenclature (hereafter, the Code [11]), but they are not accompanied by particular recommendations. Many wild ancestral species and their domestic relatives share the same Latin name, but in some cases, wild and domestic forms are denoted by traditionally separated epithets [12]. Basically, some domestic animals differ substantially from their wild progenitors to the extent that is often desirable and hence common practice to refer to them with distinct names, but in the absence of specific guidelines in the Code, a variety of approaches have been proposed.

This has long engendered nomenclatural instability [12–15]. Different proposals for naming domestic animals included, among others, referring to them solely by using vernacular names, as a consequence of the application for excluding names based on domestic animals from zoological nomenclature [13]; the adoption of an infrasubspecific distinction of domestic species, mediated by the word “forma” (f.), e.g., *Canis lupus* f. *familiaris* for referring to the dog [16,17]; the apposition of “familiaris” after the species name, e.g., *C. lupus* “familiaris” [18,19]; using a single Latin word in capitals and italics, such as *CANIS* or *SUS* [20]. Eventually, a relatively recent ruling of the International Commission on Zoological Nomenclature (ICZN) conserved the widespread usage of 17 specific names based on wild species, which were coined at the same time or later than those available for their domestic counterparts [21]. This ruling does not regulate whether to include a wild ancestor and its domestic descendant in the same species or to separate them into different species and/or subspecies—nor should it, in compliance with the principle of taxonomic freedom endorsed by the Code—but it is indeed advisable to adopt separate names for domestic animals [12].

## 3. The Case of *Sus scrofa ferus*

Whilst in most cases names available for domestic animals predate or are a contemporary of those used for their wild relatives, *S. scrofa* was considered an exception, with *S. domesticus* Erxleben, 1777 [22], only named later [12]. The epithet *ferus* means “wild”, and it has been often employed for designating wild forms of domestic animals, for instance, *Equus ferus* Boddaert, 1785 [23], in place of *Equus caballus* Linnaeus, 1758. Referring to the wild boar as “*ferus*” has a long history, as it is, for instance, present in Pliny the Elder’s *Naturalis Historia* [24]. However, discussing the nomenclatural availability and taxonomic validity of *S. scrofa ferus* is not a straightforward task. *Sus scrofa ferus* was first used as a valid taxon (as requested in Art. 11.5 of the Code for being considered available) in the first part of the thirteenth edition of the *Systema Naturae*, curated by Gmelin and published in 1788, ten years after Linnaeus’ death. (Figure 1) [25]. In those few cases where the authorship of *S. scrofa ferus* is credited, it is indeed attributed to Gmelin, 1788 [26,27].

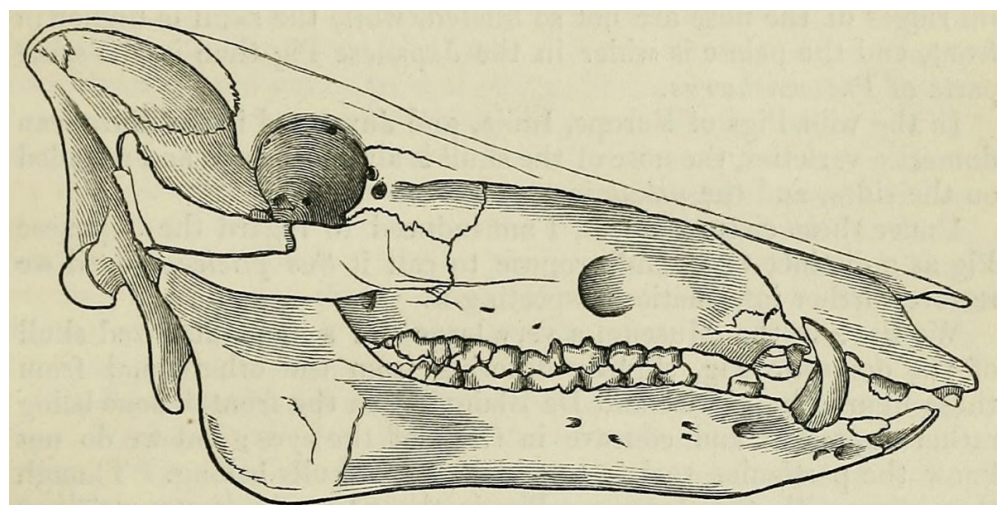


**Figure 1.** Extract of Linnaeus' description of *Sus* in the tenth edition of the *Systema Naturae* (A), extract of Erxleben's description of *Sus* in the *Systema Regni Animalis* (B), and extract of Gmelin's description of *Sus* in the thirteenth edition of the *Systema Naturae* (C).

However, according to Art. 11.6.1, if a name published as a junior synonym had been treated before 1961 as an available name and either adopted as the name of a taxon or treated as a senior homonym, it is thus made available but dates from its first publication as a synonym [11]. This case applies here, because Erxleben [22] had already published *S. scrofa ferus* within the synonymy of its newly named *S. scrofa aper*. Therefore, Gmelin's validation of the taxon satisfies the provisions of Art. 11.6.1 for making *S. scrofa ferus* Erxleben, 1777, available (see also Art. 50.7 for remarks on the authorship).

In any case, it could be argued that *S. scrofa aper* has priority over *S. scrofa ferus*. Even though this is undeniable, it is also true that *S. aper* or *S. scrofa aper* never gained widespread usage. This is perhaps because “*aper*”—which in Latin basically means “wild boar”—was also applied to many different suid taxa (especially but not only in pre-Linnean taxonomy, see, e.g., the synonymy lists in Gmelin [25]). For example, as a genus in *Aper aethiopicus* Pallas, 1766 [28], in which instance the name was suppressed under the plenary powers by the ICZN, for the purposes of the principle of priority but not for those of the principle of homonymy [29]. The same epithet can of course be used at different taxonomic ranks without this being in violation of the principle of homonymy, but the case of the desert warthog testifies to another example of a seldom used “*aper*”, which was eventually replaced by another name (i.e., *Phacochoerus*). It is possible that Gmelin's choice of replacing *S. scrofa aper* with *S. scrofa ferus* was partly due to the intention to provide a name of a less equivocal application, despite being in violation of the principle of priority as currently recognized.

Nevertheless, the provisions of the principle of priority are moderated in cases where a strict adherence to it would be detrimental for stability. A quick search on Google Scholar for “*Sus scrofa ferus*” yielded more than 1180 results (on 22 January 2022), but no recent mention for “*Sus scrofa aper*”, providing an indication of the widespread usage of *S. scrofa ferus* as a valid taxon. In a more formal way and with specific reference to Art. 23.9 of the Code, which regulates the admissible cases for reversal of priority, I observe that: (1) to the best of my knowledge, *S. aper* or *S. scrofa aper* have seldom been used and never after 1899 (Art. 23.9.1.1), if not merely under the conditions of Art. 23.9.6; (2) *S. scrofa ferus* has been widely adopted, including its usage as a presumed valid name in at least 25 works, published by at least 10 authors in the last 50 years and encompassing a span of not less than 10 years (e.g., Figure 2, [30–63]) (Art. 23.9.1.2). Therefore, the necessary conditions listed under Art. 23.9 for maintaining prevailing usage of *S. scrofa ferus* instead of *S. scrofa aper* by reversal of precedence without a formal ruling of the ICZN are met [11]. Following this nomenclatural act, *S. scrofa ferus* becomes a *nomen protectum*, while *S. scrofa aper* is now a *nomen oblitum*.



**Figure 2.** Depiction of a wild boar skull labelled *Sus scrofa ferus*. Modified from Gray [32].

#### 4. Discussion

After Gmelin's adoption of *S. scrofa ferus* for denoting the wild boar in the thirteenth edition of the *Systema Naturae* [25], the usage of the name became widespread [30–33]. However, although *S. scrofa ferus* Erxleben, 1777, is available for nomenclatural purposes, it should not be regarded as valid from a taxonomic perspective, as treating the wild boar as a single entity is a reductive and arguably undesirable approach in many fields of research [1,4]. *Sus scrofa* is a widely distributed species with several recognized subspecies, and there are proposals to raise many of them to full species [1,4]. While the validation of these proposals needs further efforts, and the delimitation of boundaries between recognized taxa is challenging, avoiding referring to wild boars simply as *S. scrofa ferus* would likely facilitate gathering further data and knowledge on the differences within the species.

Indeed, changing the scale of analysis often provides new insights into long-standing issues. For instance, it has long been hypothesized that the wild boar underwent a dimensional change from large- to small-sized forms during the Pleistocene, eventually reaching the size of extant populations [64–67]. Testing this observation necessitates geographically constrained settings, because the extant populations vary markedly in size, encompassing the entire fossil record of the taxon [68,69]. When this has been properly taken into account, resulting analyses have revealed more complex evolutionary scenarios than the simple dimensional trend suggested by previous research conducted at a coarser geographic scale [7,70].

*Sus scrofa* was not included in the previously mentioned application to the ICZN for preserving the usage of several names adopted for wild progenitors whose establishment postdate or is a contemporary of that of their domestic derivatives [21], as it was considered that *S. scrofa* Linnaeus, 1758, for the wild boar predates *S. domesticus* Erxleben, 1777 [12]. However, Linnaeus' concept of *S. scrofa* encompassed both wild and domestic pigs [3], and separate names that are available according to the Code were both established by Erxleben [22]. For maintaining prevailing usage and ensuring consistency and stability, it is argued here to continue referring to the wild boar as *S. scrofa* and the domestic pig as *S. domesticus*. Authors should maintain the taxonomic freedom to decide whether to include the domestic pig in the wild species concept (e.g., *S. scrofa domesticus*), while using *S. scrofa ferus* should be avoided. Following this approach, *S. scrofa ferus* falls in synonymy with the nominotypical *S. scrofa scrofa* [26]. Authors should refer wild populations to valid subspecies—e.g., *S. scrofa scrofa*—or to *S. scrofa* ssp., when information on the subspecific status is not available or relevant for the research questions under consideration.

Nevertheless, it could be argued that referring to the domestic pig as a single taxonomic entity is inconsistent as well. In fact, the domestication of the pig occurred independently at least twice, in the Near East and East Asia [71–76]. As a result, *S. domesticus* as commonly conceived is polyphyletic, implying that the descendants of the two domestication processes should be placed in different taxa. On the other hand, an effective allocation to one group or the other would often be difficult, generating confusion instead of promoting clarity and stability. Therefore, at least for the moment it is advisable to continue pragmatically to refer the domestic pig to a single taxon. Moreover, although the case for an independent domestication of the pig is the most supported by zooarchaeological and genetic evidence [73,76], it is likely that other domestic mammals have multiple origins as well [77].

Finally, even the use of vernacular names is a source of great ambiguity. For instance, “wild pigs” is often used in a systematic sense to refer to all wild species of Suidae, but also to domestic pigs returned to a wild state [2]. Pigs are extremely important animals to humans, which partly explains why there are many ways to refer to them (e.g., (wild) boar, hog, and swine). These terms are today used sometimes interchangeably or in other cases with a particular meaning, partly but not only depending on the common practice of different research fields. A cohesive nomenclatural solution would thus require a collective

effort. For the time being, in studies, documents, and reports in which confusion may arise, it would be appropriate to include a concise explanation of the nomenclature adopted.

**Funding:** This research received no external funding.

**Data Availability Statement:** Not applicable.

**Acknowledgments:** I would like to thank L. Zou for the invitation to prepare this work. This paper benefitted from the comments and suggestions of three anonymous reviewers, for which I am grateful. I thankfully acknowledge the use of the free repositories Biodiversity Heritage Library (<http://www.biodiversitylibrary.org/>, accessed on 1 February 2022) and Internet Archive (<http://archive.org/>, accessed on 1 February 2022).

**Conflicts of Interest:** The author declares no conflict of interest.

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