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2024-09
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On the importance of using standardized anatomical terminology in palaeoanthropology: The missing StW 431 pubic body

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Received 5 December 2023. Accepted 5 July 2024

In 1987, a partial right pubic bone, StW 431ef, was unearthed with hominin skeletal remains at Sterkfontein Cave, South Africa. It preserved the lateral portion of the superior pubic ramus, yet has been described in the literature as a 'pubic body'. We confirmed that no medial pubic fragments were discovered with this fossil and sought to explain why it has been described this way. International anatomical terminology guidelines differ in how they define pubic body for humans *vs* other animals. Veterinary guidelines call the portion near the acetabulum the pubic body, like in StW431ef, while human guidelines refer to it as the medial portion of the bone. We suggest that as a hominin, the StW 431ef pubis should be described based on the human standards, and is thus the lateral portion of a superior pubic ramus. This case illustrates the importance of palaeoanthropologists agreeing on which international standard to follow to ensure clarity and accuracy across disciplines and over time.

Keywords: Sterkfontein, hip bone, innominate, os coxae, hominin, anatomical standards.

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In 1987, researchers discovered a partial right pubic bone associated with a hominin skeleton from Sterkfontein Cave, Gauteng province, South Africa (Tobias 1987; Toussaint *et al*. 2003). The pubic fragment was numbered and re-numbered over the years, first as StW 436f, then StW 431f, before finally being known as StW 431ef (Tobias 1987; Häusler 2001; Häusler & Ruff 2020).

StW 431ef preserved the lateral portion of the superior pubic ramus and is currently glued to associated ilium fragments (Fig. 1A). While it was originally catalogued as a '[right] innominate, portion of pubis' (Tobias 1987), it was later described as a 'pubic body' or 'corpus ossis pubis' (Häusler 2001; Häusler & Ruff 2020).

Yet, no pubic body is preserved on this fossil today. A photograph from the original publication confirmed that the fossil did not preserve a pubic body in the past, either (Fig. 1B). Why, then, does the preserved anatomy of the fossil not align with the description in the literature?

We suggest that the confusion may be due to differing standards for anatomical terminology. There are separate internationally accepted standards for anatomical terminology for humans and other animals. Variation in how these resources define 'pubic body' seem to be at the root of the confusion over what anatomy is preserved in StW 431ef.

The human international standards for anatomical terminology, originally *Nomina Anatomica* followed later by *Terminologia Anatomica*, have historically designated the pubic body as the medial portion of the pubis that includes the pubic tubercle, pubic crest, and symphyseal surface (Fig. 2: pubic body (NA & TA) in pink; International Anatomical Nomenclature Committee 1955, 1961, 1966, 1983, 1989; Federative Committee on Anatomical Terminology 1998; Federative International Programme for Anatomical Terminology 2019). However, the fourth edition of *Nomina Anatomica* briefly redefined pubic body to refer to all parts of the pubis, including the entire superior pubic ramus (International Anatomical Nomenclature Committee 1977). No reason was given for this change, or why the subsequent edition reverted to the previous definition.

In contrast, the non-human animal international standards for anatomical terminology, *Nomina Anatomica Veterinaria*, have always defined the pubic body as the portion of bone closest to the acetabulum and not the portion that includes the symphyseal surface (Fig. 2: pubic body (NAV) in blue; International Committee on Veterinary Gross Anatomical Nomenclature 1968, 1973, 1983, 1994, 2005, 2012, 2017; see Sisson *et al*. 1975). This definition aligns with how the term has been used to describe StW 431ef.

Anatomist Tibor Donáth (1969) authored a reference book on human anatomical terminology in which he defined pubic body as the lateral portion of the pubis that includes the iliopectineal eminence and not the more medial pubic tubercle. While his work was never considered the international standard for humans, it may have influenced the palaeoanthropological literature.

We were unable to confirm why a difference in anatomi-

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***Palaeontologia africana* 58: 94–96 — ISSN 2410-4418 [*Palaeontol. afr.*] Online only**
Permanently archived on the 5th of December 2024 at the University of the Witwatersrand, Johannesburg, South Africa.
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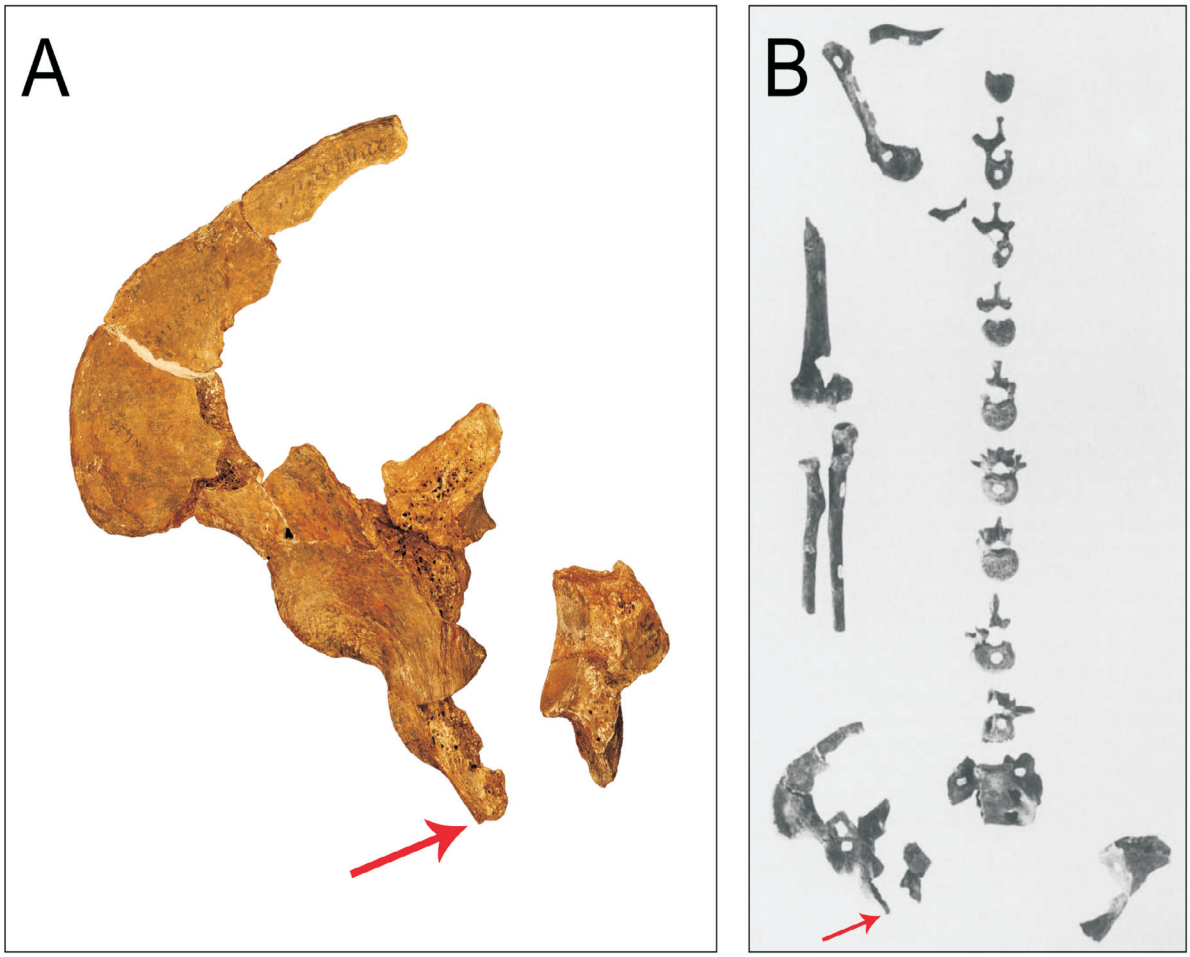


Figure 1. Current and original photographs of the StW 431 right os coxae in superomedial view. Red arrows indicate the medial-most extent of the StW 431ef pubis fragment. **A**, photograph of the right hip bone elements taken by C.V. in 2024 to illustrate the current preservation of this fossil; **B**, the first published photograph of the StW 431 skeleton (Tobias 1992), including the right os coxae, reprinted with permission from the Royal Society of South Africa.

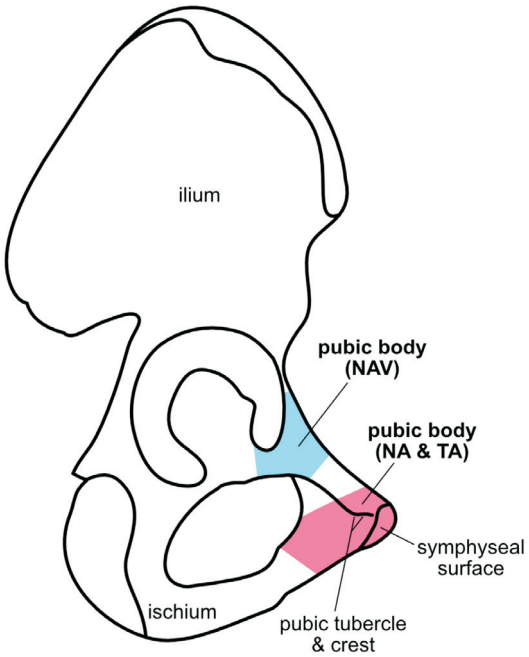


Figure 2. Illustration of a right human hip bone, oriented in an oblique anterolateral view. Blue, the pubic body according to the non-human international standards, *Nomina Anatomica Veterinaria* (NAV). Pink, the pubic body according to the current and previous human international standards, *Terminologia Anatomica* and *Nomina Anatomica* (TA & NA). The pubic tubercle, pubic crest, and symphyseal surface that are defined as being on the pubic body in the human guidelines are labelled.

cal terminology standards exists between species. In some bones, the body is the portion that develops from the primary ossification centre. However, in the pubis, the primary ossification centre is the middle of the superior pubic ramus, which then ossifies in medial and lateral directions during growth (Scheuer & Black 2004). Thus, the naming of the pubic body is not related to development. We speculate that anatomists have referred to the largest portion of the bone as the body, which would be somewhat subjective and likely to differ between species. Whatever the reason for the terminological discrepancy, the fact remains that in the human international standard, the pubic body refers to the medial portion of the bone.

As a hominin, the StW 431 pelvis was adapted for bipedal locomotion and shared a bauplan with humans. Because of this similar morphology, the hominin pelvis is more clearly described using human terminology. Both today and when StW 431ef was discovered, the human standards defined the pubic body as the medial portion of the bone, a portion that was never preserved in StW 431ef. It is important for palaeoanthropologists to use standardized terminology and follow international naming conventions to avoid confusion across languages and time (see Tuttle 1988). We therefore conclude that from this point forward, the StW 431ef fragment should be described as a partial superior pubic ramus, not a pubic body.

We thank Jonah Choiniere for serving as editor of this manuscript and for his and Zach Cofran's constructive comments as reviewers of the manuscript. We also thank those who helped us access the cited historical literature, notably Kathleen Bitterman, Jeff Kushkowski, the Des Moines University (DMU) Department of Anatomy, and the DMU Library. We greatly appreciate the Evolutionary Studies Access Advisory Panel at the University of the Witwatersrand for granting us permission to study the relevant fossil. Funding for this project was provided by A.T. Still University and Des Moines University, and permission to use historical photographs was provided by the Royal Society of South Africa.

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REFERENCES

DONÁTH, T. 1969. *Anatomical Dictionary: with Nomenclatures and Explanatory Notes*. Oxford, Pergamon Press.

FEDERATIVE COMMITTEE ON ANATOMICAL TERMINOLOGY. 1998. *Terminologia anatomica*. Thieme, Stuttgart.

FEDERATIVE INTERNATIONAL PROGRAMME FOR ANATOMICAL TERMINOLOGY. 2019. *Terminologia anatomica*.

HÄUSLER, M. 2001. *New insights into the locomotion of* Australopithecus africanus*: implications of the partial skeleton Stw 431* (*Sterkfontein*, *South Africa*). Unpublished doctoral dissertation, University of Zurich.

HÄUSLER, M. & RUFF, C.B. 2020. Pelvis. **In**: Zipfel, B., Richmond, B.G. & Ward, C.V. (eds), *Hominin Postcranial Remains from Sterkfontein*, *South Africa*, *1936–1995*. 187–209. Oxford, Oxford University Press.

INTERNATIONAL ANATOMICAL NOMENCLATURE COMMITTEE. 1955. *Nomina anatomica*. Spottiswoode, London, Ballantyne & Co.

INTERNATIONAL ANATOMICAL NOMENCLATURE COMMITTEE. 1961. *Nomina anatomica*. Amsterdam, Excerpta Medica Foundation.

INTERNATIONAL ANATOMICAL NOMENCLATURE COMMITTEE. 1966. *Nomina anatomica*. Amsterdam, Excerpta Medica Foundation.

INTERNATIONAL ANATOMICAL NOMENCLATURE COMMITTEE. 1977. *Nomina anatomica*. Amsterdam, Excerpta Medica Foundation.

INTERNATIONAL ANATOMICAL NOMENCLATURE COMMITTEE. 1983. *Nomina anatomica*. Baltimore, Williams & Wilkins.

INTERNATIONAL ANATOMICAL NOMENCLATURE COMMITTEE. 1989. *Nomina anatomica*. Edinburgh, Churchill Livingstone.

INTERNATIONAL COMMITTEE ON VETERINARY GROSS ANATOMICAL NOMENCLATURE. 1968. *Nomina anatomica veterinaria*. Ithaca, World Association of Veterinary Anatomists.

INTERNATIONAL COMMITTEE ON VETERINARY GROSS ANATOMICAL NOMENCLATURE. 1973. *Nomina anatomica veterinaria*. Ithaca, World Association of Veterinary Anatomists.

INTERNATIONAL COMMITTEE ON VETERINARY GROSS ANATOMICAL NOMENCLATURE. 1983. *Nomina anatomica veterinaria*. Ithaca, World Association of Veterinary Anatomists.

INTERNATIONAL COMMITTEE ON VETERINARY GROSS ANATOMICAL NOMENCLATURE. 1994. *Nomina anatomica veterinaria*. Zürich, World Association of Veterinary Anatomists.

INTERNATIONAL COMMITTEE ON VETERINARY GROSS ANATOMICAL NOMENCLATURE. 2005. *Nomina anatomica veterinaria*. Hannover, World Association of Veterinary Anatomists.

INTERNATIONAL COMMITTEE ON VETERINARY GROSS ANATOMICAL NOMENCLATURE. 2012. *Nomina anatomica veterinaria*. Hannover, World Association of Veterinary Anatomists.

INTERNATIONAL COMMITTEE ON VETERINARY GROSS ANATOMICAL NOMENCLATURE. 2017. *Nomina anatomica veterinaria*. Hannover, World Association of Veterinary Anatomists.

SCHEUER, L. & BLACK, S.M. 2004. *The Juvenile Skeleton*. London, San Diego, Elsevier Academic Press.

SISSON, S., GROSSMAN, J.D. & GETTY, R. 1975. *Sisson and Grossman's The Anatomy of the Domestic Animals*. Philadelphia, Saunders.

TOBIAS, P.V. 1987. Sterkfontein excavation catalogue for 1987 field season [Unpublished notes].

TOBIAS, P.V. 1992. New researches at Sterkfontein and Taung with a note on Piltdown and its relevance to the history of palaeo-anthropology. *Transactions of the Royal Society of South Africa* **48**, 1–14.

TOUSSAINT, M., MACHO, G.A., TOBIAS, P.V., PARTRIDGE, T.C. & HUGHES, A.R. 2003. The third partial skeleton of a late Pliocene hominin (Stw 431) from Sterkfontein, South Africa. *South African Journal of Science* **9**, 215–223.

TUTTLE, R.H. 1988. The hipbone and *Nomina anatomica*. *American Journal of Physical Anthropology* **77**, 133–134.