Review of: "Ancient DNA Clarifies the Identity and Geographic Origin of the Holotype of the Genus Ctenomys"

Bruce D. Patterson[1]

1 Independent researcher

Potential competing interests: No potential competing interests to declare.

Maestri and company have done a marvelous job in sleuthing the geographic origins of*Ctenomys brasiliensis*, an enigmatic species central (by its seniority) to the application of specific epithets in one of the world's most speciose genera of mammals. As a curator, I was intrigued to learn of the protocol followed by the *Muséum national* in approving and archiving records of their study, and I regard that as an important development for handling type specimens in facing the dual missions of natural history museums to both protect collections for the future and to promote their utilization in science today.

My only criticisms of this paper are rather pedestrian and stem from the evolving practice and standards of zoological nomenclature. According to the Code online:

- Art. 61.1: Each nominal taxon in the family, genus or species groups has actually or potentially a name-bearing type. The fixation of the name-bearing type of a nominal taxon provides the objective standard of reference for the application of the name it bears.
- Art. 67.1: The name-bearing type of a nominal genus or subgenus is a nominal species called the "type species" [Art. 42.3].
    - **Recommendation 67A. Terminology.** Only the term "type species" or a strictly equivalent term in another language should be used in referring to the name-bearing type of a nominal genus or subgenus. To avoid ambiguity, the term "genotype," which has widespread use in a different sense in genetics, should not be used instead of "type species."
- Art. 72.1: [governing types in the species group]**Use of the term "type" relating to specimens**
    - The term "type" forms part of many compound terms used by taxonomists to distinguish between particular kinds of specimens, only some of which are name-bearing types. For the purposes of the Code, three categories of specimens are regulated, namely
    - 72.1.1. type series: all the specimens on which the author established a nominal species-group taxon (with the exception of those excluded [Art. 72.4.1]); in the absence of holotype designation, or the designation of syntypes, or the subsequent designation of a lectotype, all are syntypes and collectively they constitute the name-bearing type;
    - 72.1.2. name-bearing types: specimens with a name-bearing function, whether fixed originally (holotype [Art. 73.1] or syntypes [Art. 73.2]) or fixed subsequently (lectotype [Art. 74] or neotype [Art. 75]);
    - 72.1.3. other specimens: those without a name-bearing function (paratypes [Art. 72.4.5], paralectotypes [Arts. 73.2.2,

74.1.3]; see Glossary for definitions).

- Art. 73.2: **Syntypes**
  - Syntypes are specimens of a type series that collectively constitute the name-bearing type. They may have been expressly designated as syntypes (see Article 73.2.1 for acceptable terms); for a nominal species-group taxon established before 2000 [Art. 72.3] all the specimens of the type series are automatically syntypes if neither a holotype [Art. 72.1] nor a lectotype [Art. 74] has been fixed. When a nominal species-group taxon has syntypes, all have equal status in nomenclature as components of the name-bearing type.
- Art. 74.1. **Designation of a lectotype**
  - A lectotype may be designated from syntypes to become the unique bearer of the name of a nominal species-group taxon and the standard for its application (except in the case of hapantotypes [Art. 73.3]).
  - 74.1.1. The valid designation of a lectotype fixes the status of the specimen as the sole name-bearing type of that nominal taxon; no later designation of a lectotype has any validity.

At the time de Blainville described *Ctenomys brasiliensis*, scientists had not recognized the value of designating a single specimen as the type of a species group taxon (i.e., a holotype), and often descriptions were based on multiple specimens. The following lines from de Blainville's (1826) description make me believe he based the description on two specimens.

- "L'espèce de Rongeur dont il va être question dans cette Note, a été envoyée à M. Florent- Prevost, des parties intérieures du Brésil de la province de Las Minas, sous le nom portugais de Rotto qui moro embaxo doxano, qui veut dire Rat des champs. Il en a recu deux individus à peu près semblables, malheureusement tous deux seulement en peau, mais dans un assez bon état de conservation"
- "Les molaires sont egalement à peu près semblables aux deux mâchoires , au nombre de quatre ; décroissantes de la première à la dernière, subitement beaucoup plus petite que les autres"

These statements make me believe that de Blainville based his description on two specimens, which would constitute a type series, and in the absence of additional specification by the original author, syntypes. Maestri et al. apparently concur with this interpretation and state (in the legend to Fig. 1), "Cet individu est un de ceux qui ont servi de type à la description de Blainville."

Apparently, only a single specimen remains from this series received in 1826, the one designated "Holotype" by Rode in his type catalog. But the Code states that any subsequent specification by another author of a name-bearing specimen would make that specimen a lectotype or neotype, not a holotype.

Thus, while this analysis of tuco-tucos itself is ingenious and convincingly answers a very long-standing question regarding tuco-tucos with complementary molecular and morphological analyses and superb sampling, I think the title is imprecise and confusing. The genus *Ctenomys* does not have a holotype; no genus does. The genus has a type species,

in this case *Ctenomys brasiliensis* de Blainville, 1826. On closer inspection, *C. brasiliensis* seems to lack a holotype, with the specimen sampled for this study better regarded as a lectotype. I have not delved into the nomenclatural implications of Rode's identification of this specimen (did he in effect fix the lectotype in his type catalog?). But I think the authors should do so and "fix" the specification of MNHN 1988-271 as the lectotype as it seems to constitute the sole remaining type member of the type series.

I found only one misspelling of a scientific name: "ctenomids" in the text of 2.2. Phylogenetic Analysis.

I was unable to add my primary affiliation owing to automated selection by the interface; it is Field Museum of Natural History, Chicago, United States.