**Re-assessment of the Oligocene genera *Prosotherium* and *Propachyrucos* (Hegetotheriidae, Notoungulata)**

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Comptes Rendus Palevol

**Supplemental Appendix 1.1.** List of the specimens studied and compared in this work and main references for each species.

**Abbreviations**: **ACM,** Amherst College Museum of Natural History, Massachusetts, U.S.A.; **AMNH**, American Museum of Natural History, New York, U.S.A.; **MACN A**, Museo Argentino de Ciencias Naturales, ‘Bernardino Rivadavia’, Ameghino Collection, Buenos Aires, Argentina; **MCNAM-PV**, Museo de Ciencias Naturales y Antropológicas ‘J. C. Moyano’, Vertebrate Palaeontolgy; **MNHN-DV**, Museo Nacional de Historia Natural, Palaeontology Division, Montevideo, Uruguay; **MLP**, Museo de La Plata, La Plata, Argentina; **MPEF-PV**, Museo Paleontológico Egidio Feruglio, Vertebrate Palaeontology, Trelew, Argentina.

*Hegetotherium mirabile*: MACN A 631–632 HOLOTYPE; MACN A 1734–1744; 1745 (Holotype of *H. convexum*); MACN A 1746–1747; 3322–3335; 3336–3337 (Holotype of *H. anceps*); MACN A 3338–3343; 3347–3348 (Holotype of *H. costatum*); MACN A 3370 (Holotype of *H. minum*); MACN A 3371–3384; 3388; 9894–9930; 9934–9941; 9943; 9947–9956; 11178 (Syntype of *Selatherium pachymorphum*); MACN A 11179; 11181; 11198; MACN CH 2016; MLP 12-1805–12-1806; 12-2019; 12-2105–12-2107; 12-2648–12-2649; 12-2655; 12-2740; 12-2774; 12-2784; 12-2802; 12-2824; 12-2842; 12-2887b; 12-2888a; 12-2914a (Holotype of *H. andinum*); MLP 90-XII-24-35; 90-XII-24-37a; 92-V-10-119e (Ameghino, 1887a, 1889, 1891a, 1891b, 1891c, 1894; Sinclair, 1909; Seoane and Cerdeño, 2019).

*Hemihegetotherium, achataleptum*: MACN PV 8491 HOLOTYPE; MACN PV 8156 (Holotype of *Hm. robustum*); MACN PV 8197 (Holotype of *Hm. gracile*); MACN PV 8198 (Holotype of *Hm. affine*); MLP 57-X-10-95 (Holotype of *Hm. lazai*) (Rovereto, 1914; Cerdeño and Montalvo, 2002; Croft and Anaya, 2006; Vera, 2019).

*Hemihegetotherium tantillum* (Vera, 2019).

*Hemihegetotherium torresi*: MLP 27-VIII-1-1 HOLOTYPE; MLP 55-IV-28-6; 55-IV-28-8; 60-VI-18-1–60-VI-18-2; 76-VI-12-25 (Cabrera and Kraglievich, 1931; Cerdeño and Montalvo, 2002; Croft and Anaya, 2006; Vera, 2019)

*Hemihegetotherium trilobus* (Croft and Anaya, 2006).

*Medistylus dorsatus*: MACN A 52-488 HOLOTYPE; MLP 93-XI-21-19; MPEF-PV 693 (Reguero et al., 2007).

*Pachyrukhos moyani*: MACN A 259–262; 272–276; 277 (Syntypes of *Pa. teres*); MACN A 278 (Holotype of *Pa. naevius*); MACN A 279–296; 297 (Syntypes of *Pa. teres*); MACN A 319–321; 322–324 (syntypes of *Pa. trivius*); MACN A 326–327 (Syntypes of *Pa. absis*); MACN A 328–335; 1257–1260; 3304–3307; 3308 (Syntypes of *Pa. teres*); MACN A 3309–3312; 3313; 9957–9960; MLP 12-1922–12-1924; 12-1930; 12-1932–12-1934; 12-1959; 12-1964; 12-1966–12-1968; 12-1971; 12-1985–12-1987; 12-1989–12-1991; 12-1996; 12-2000; 12-2002; 12-2007; 12-2013; 12-2015–12-2018; 12-2020–12-2021 12-2036; 12-2042; 12-2044; 12-2075; 12-2077–12-2078; 12-2086–12-2087; 12-2103; 12-2108; 12-2110–12-2115; 12-2117–12-2118; 12-2120–12-2121; 12-2123–12-2125; 12-2127; 12-2136–12-2138; 12-2141–12-2142; 12-2145–12-2146; 12-2148–12-2149; 12-2151–12-2152; 12-2156; 12-2158; 12-2163–12-2164; 12-2166; 12-2735; 12-2738; 12-2749; 12-2830; 12-2852; 63-XII-20-17; 74-II-1-5–74-II-1-6; 77-V-4-3; 91-IX-2-180a, c; 91-IX-2-181; 91-IX-4-27i, k; 92-V-10-103; 92-V-10-115a; 92-V-10-117a, m, q, u, x, aa–ac; 92-V-10-119c, s, z, ag, aj, an, av; 92-XI-18-28; 92-XI-18-30a–b (Ameghino, 1885, 1887b, 1889; Sinclair, 1909; Seoane and Cerdeño, 2019).

*Pachyrukhos politus*: MACN A 52-438 LECTOTYPE; MACN A 52-439 PARALECTOTYPE; MACN A 52-440–441; MLP 82-V-2-107; 85-VII-3-28 (Ameghino, 1902; Seoane and Cerdeño, 2019).

*Paedotherium bonaerense*: MACN A 1184 HOLOTYPE; MACN A 1674–1975 (Holotype of *Pd. ictus*) (Cerdeño and Bond, 1998; Ercoli et al., 2018; Vera and Ercoli, 2018).

*Paedotherium minor*: MLP 29–IX-1-116 HOLOTYPE (Cerdeño and Bond, 1998; Ercoli et al., 2018; Vera and Ercoli, 2018).

*Paedotherium typicum*: MLP 12-1782 LECTOTYPE; MLP 1783–12-1788 (Cerdeño and Bond, 1998; Ercoli et al., 2018; Vera and Ercoli, 2018).

*Prohegetotherium sculptum*: MACN A 52-443 LECTOTYPE, MACN A 52-444 PARALECTOTYPE (Ameghino, 1897; Kramarz and Bond, 2017).

*Propachyrucos smithwoodwardi*: MACN A 52-451 HOLOTYPE (= MACN A 12454) (Ameghino 1897).

*Propachyrucos aequilatus*: MACN A 52-454 HOLOTYPE (Ameghino, 1901; Loomis, 1914; Simpson, 1945; Chaffee, 1952; Reguero, 1999).

*Propachyrucos ameghinorum* (Simpson, 1945; Chaffee, 1952; Reguero, 1999).

*Propachyrucos crassus*: MACN A 52-448 LECTOTYPE; MACN A 52-449–52-450 PARALECTOTYPES (Ameghino, 1897; Loomis, 1914; Simpson, 1945; Reguero, 1999; Reguero and Cerdeño, 2005; Kramarz and Bond, 2017).

*Propachyrucos depressus*: MLP 12-2915a HOLOTYPE (Roth, 1899).

*Propachyrucos medianus*: MLP 12-3160 HOLOTYPE (Roth, 1899).

*Propachyrucos robustus*: MLP 12-3161 HOLOTYPE (Roth, 1899).

*Propachyrucos schiaffinoi*: MNHN-DV 186 (photographs) (Kraglievich, 1932; Simpson, 1945; Reguero, 1999; Reguero and Cerdeño, 2005; Cerdeño and Reguero, 2015).

*Propachyrucos simpsoni*: AMNH 29604 (cast) HOLOTYPE (Chaffee, 1952; Reguero, 1999).

*Propachyrucos smithwoodwardi*: MACN A 52-451 HOLOTYPE; MACN A 52-452–52-453 (Ameghino, 1897; Loomis, 1914; Simpson, 1945; Chaffee, 1952; Reguero, 1999; Cerdeño and Reguero, 2015; Kramarz and Bond, 2017; Seoane *et al*., 2017; Seoane and Cerdeño, 2019).

*Propachyrucos* cf. *Pr. smithwoodwardi*: MCNAM-PV 3960, 3962, 3964, 4189, 4190, 4223, 4642, 4654, 4711, 4793, 4805 (Cerdeño and Reguero, 2015).

*Propachyrucos* sp.: MLP 12-2889a, 59-II-26-91, 61-IV-11-139–152, 61-IV-11-163–166, 61-IV-11-186–192, 61-IV-11-207, 61-IV-11-316–317 (Roth, 1899 in collection label).

*Prosotherium garzoni*: ACM 3052, 3083, 3187, 3258, 3263, 3265, 3730–3731; AMNH 14154 (cast); AMNH 29608 (right maxillary fragment with P1–M3 and associated right mandibular fragment with m1–2 and part of the m3, following Reguero’s [1999, plate 11, fig. d] interpretation, in contrast to Chaffee’s [1952]—m2–3—); MACN A 52-455 LECTOTYPE; MACN A 52-456 PARALECTOTYPE; MACN A 52-457–52-461; MACN A 52-463: Reguero (1999) mentioned that Patterson (1952) considered the mandibular fragment MACN A 52-463 as *Propachyrucos crassus* based on an Ameghino’s handwritten label, but the former included this specimen in *Prohegetotherium sculptum*; however, following Kramarz and Bond’s (2017) interpretation of *P. sculptum*, there is no specimen of this species nor of *Propachyrucos crassus* to compare. Based on the size and morphology of the lobes, we consider MACN A 52-463 as *P. garzoni* (Ameghino, 1897; Loomis, 1914; Simpson, 1945; Chaffee, 1952; Reguero, 1999; Reguero *et al*., 2007; Cerdeño and Reguero, 2015; Kramarz and Bond, 2017; Seoane *et al*., 2017). Many other specimens in the ACM and AMNH have been assigned to *P. garzoni* in Loomis (1914), Chaffee (1952) and Reguero (1999), as ACM 3080, 3081, 3750; AMNH 29556.

*Prosotherium quartum*: MACN A 52-462 LECTOTYPE, but labelled as MACN A 52-467, which corresponds to *P. triangulidens* (see text) (Ameghino, 1901; Loomis, 1914; Reguero, 1999).

*Prosotherium robustum*: MACN A 52-465 HOLOTYPE; MACN A 52-468 (Ameghino, 1897; Loomis, 1914; Reguero, 1999).

*Prosotherium triangulidens*: MACN A 52-464 HOLOTYPE; MACN A 52-466–52-467 (Ameghino, 1897; Loomis, 1914; Reguero, 1999).

*Prosotherium* sp.: MACN A 52-469; MLP 79-XII-18-38, 93-XI-21-54g; MPEF-PV 5753–5755, 5761.

*Tremacyllus impressus*: MACN A 1377 LECTOTYPE, MACN A 1672–1673, 1668–1669; 11171 (Holotype of *T. chapalmalensis*) (Cerdeño and Bond, 1998; Ercoli et al., 2018; Vera and Ercoli, 2018).

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**Supplemental Appendix 1.2.** Specimens used in the statistical analyses. Each table corresponds to one statistical analysis. Specimens with \* are duplicate data, necessary to perform the analysis.

Figures in bold are significant differences.

|  |  |  |
| --- | --- | --- |
| Taxon | Specimen | Length p2 |
| *Pr. smithwoodwardi* | MACN A 52-451 | 3.1 |
| MACN A 52-453 | 3.3 |
| ‘*Pr. ameghinorum*’ | AMNH 29574 | 5 |
| AMNH 29574\* | 4.9 |
| AMNH 29574\* | 5.1 |
| ‘*Pr. simpsoni*’ | AMNH 29604 l | 4.2 |
| AMNH 29604 r | 4.3 |
| *P. garzoni* | ACM 3731 l | 4.8 |
| ACM 3731 r | 4.9 |
| MACN A 52-456 | 4.5 |
| MACN A 52-459 | 4.7 |
| MACN A 52-461 l | 4.1 |
| MPEF 5753 l | 4.9 |
| MPEF 5753 r | 4.7 |
| MPEF 5754 | 4.7 |
| MPEF 5755 | 4.7 |

 Sum of squares df Mean square F p (same)

Between groups: 4.50438 3 1.50146 34.32 3.62E-06

Within groups: 0.525 12 0.04375 Permutation p (n=99999)

Total: 5.02938 15 0.00019

Levene´s test for homogeneity of variance, from means p (same): 0.6422

Levene´s test, from medians p (same): 0.8208

Tukey’s multiple comparison test

Tukey’s Q below the diagonal, p(same) above the diagonal

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *Pr. smithwoodwardi* | ‘*Pr. ameghinorum*’ | ‘*Pr. simpsoni*’ | *P. garzoni* |
| *Pr. smithwoodwardi* |  | **3.531E-06** | **0.001471** | **5.969E-06** |
| ‘*Pr. ameghinorum*’ | 13.33 |  | **0.009365** | 0.132 |
| ‘*Pr. simpsoni*’ | 7.099 | 5.555 |  | 0.102 |
| *P. garzoni* | 12.69 | 3.381 | 3.604 |  |

|  |  |  |
| --- | --- | --- |
| Taxon | Specimen | Length p3 |
| *Pr. smithwoodwardi* | MACN A 52-451 | 3.7 |
| MACN A 52-452 | 3.6 |
| ‘*Pr. ameghinorum*’ | AMNH 29574 | 4.9 |
| AMNH 29574\* | 4.8 |
| AMNH 29574\* | 5.0 |
| ‘*Pr. simpsoni*’ | AMNH 29604 l | 4.6 |
| AMNH 29604 r | 4.5 |
| *P. garzoni* | ACM 3731 l | 5.4 |
| ACM 3731 r | 5.5 |
| MACN A 52-456 | 4.6 |
| MACN A 52-459 | 5.3 |
| MACN A 52-461 | 4.8 |
| AMNH 14154 | 4.5 |
| MPEF 5753 r | 4.5 |
| MPEF 5754 | 4.9 |
| MPEF 5755 | 4.9 |
| MPEF 5761 | 5.0 |
| MPEF 5761 | 4.9 |
| MPEF 5761 | 5.1 |

 Sum of squares df Mean square F p (same)

Between groups: 3.04421 3 1.01474 12.28 0.000256

Within groups: 1.24 15 0.0826667 Permutation p (n=99999)

Total: 4.28421 18 0.00284

Levene´s test for homogeneity of variance, from means p (same): 0.1357

Levene´s test, from medians p (same): 0.218

Tukey’s multiple comparison test

Tukey’s Q below the diagonal, p(same) above the diagonal

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *Pr. smithwoodwardi* | ‘*Pr. ameghinorum*’ | ‘*Pr. simpsoni*’ | *P. garzoni* |
| *Pr. smithwoodwardi* |  | **0.001285** | **0.0312** | **0.0001484** |
| ‘*Pr. ameghinorum*’ | 6.735 |  | 0.5571 | 0.9929 |
| ‘*Pr. simpsoni*’ | 4.427 | 1.886 |  | 0.3019 |
| *P. garzoni* | 8.372 | 0.381 | 2.576 |  |

|  |  |  |
| --- | --- | --- |
| Taxon | Specimen | Length p4 |
| *Pr. smithwoodwardi* | MACN A 52-451 | 3.9 |
| MACN A 52-452 | 3.7 |
| ‘*Pr. ameghinorum*’ | AMNH 29574 | 4.9 |
| AMNH 29574\* | 4.8 |
| AMNH 29574\* | 5.0 |
| ‘*Pr. aequilatus*’ | MACN A 52-454 | 4.8 |
| MACN A 52-454\* | 4.9 |
| MACN A 52-454\* | 4.7 |
| ‘*Pr. simpsoni*’ | AMNH 29604 l | 4.7 |
| AMNH 29604 r | 4.8 |
| *P. garzoni* | ACM 3731 l | 5.7 |
| ACM 3731 r | 5.6 |
| MACN A 52-456 | 5.4 |
| MACN A 52-459 | 5.4 |
| MACN A 52-461 | 5.0 |
| AMNH 14154 | 4.9 |
| MPEF 5753 r | 4.7 |
| MPEF 5754 | 5.2 |
| MPEF 5755 | 5.2 |
| MPEF 5761 | 5.0 |
| MPEF 5761 | 4.9 |
| MPEF 5761 | 5.1 |

 Sum of squares df Mean square F p (same)

Between groups: 3.39114 4 0.847784 14.62 3.944E-05

Within groups: 1.0675 17 0.0627941 Permutation p (n=99999)

Total: 4.45864 21 0.00058

Levene´s test for homogeneity of variance, from means p (same): 0.1119

Levene´s test, from medians p (same): 0.1184

Tukey’s multiple comparison test

Tukey’s Q below the diagonal, p(same) above the diagonal

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | *Pr. smithwoodwardi* | ‘*Pr. ameghinorum*’ | ‘*Pr. aequilatus*’ | ‘*Pr. simpsoni*’ | *P. garzoni* |
| *Pr. smithwoodwardi* |  | **0.001344** | **0.003319** | **0.01105** | **1.349E-05** |
| ‘*Pr. ameghinorum*’ | 6.8 |  | 0.9874 | 0.9632 | 0.4596 |
| ‘*Pr. aequilatus*’ | 6.182 | 0.6912 |  | 0.9994 | 0.1868 |
| ‘*Pr. simpsoni*’ | 5.361 | 0.9273 | 0.3091 |  | 0.2191 |
| *P. garzoni* | 10.16 | 2.404 | 3.279 | 3.14 |  |

|  |  |  |
| --- | --- | --- |
| Taxon | Specimen | Length m1 |
| *Pr. smithwoodwardi* | MACN A 52-451 | 4.5 |
| MACN A 52-452 | 4.3 |
|  | MACN A 52-453 | 4.1 |
| ‘*Pr. ameghinorum*’ | AMNH 29574 | 5.4 |
| AMNH 29574\* | 5.5 |
| AMNH 29574\* | 5.3 |
| ‘*Pr. aequilatus*’ | MACN A 52-454 | 5.2 |
| MACN A 52-454\* | 5.1 |
| MACN A 52-454\* | 5.3 |
| ‘*Pr. simpsoni*’ | AMNH 29604 l | 5.6 |
| AMNH 29604 r | 5.5 |
| *P. garzoni* | ACM 3731 l | 6.2 |
| ACM 3731 r | 6.4 |
| AMNH 14154 | 5.7 |
| MACN A 52-459 | 6.0 |
| MACN A 52-460 | 5.6 |
| MACN A 52-461 | 6.1 |
| MACN A 52-463 | 5.9 |
| MPEF 5761 | 6.1 |
| MPEF 5761 | 6.0 |
|  | MPEF 5761 | 6.2 |

 Sum of squares df Mean square F p (same)

Between groups: 7.3171 4 1.82927 45.66 1.48E-08

Within groups: 0.641 16 0.0400625 Permutation p (n=99999)

Total: 7.9581 20 1E-05

Levene´s test for homogeneity of variance, from means p (same): 0.4051

Levene´s test, from medians p (same): 0.4235

Tukey’s multiple comparison test

Tukey’s Q below the diagonal, p(same) above the diagonal

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | *Pr. smithwoodwardi* | ‘*Pr. ameghinorum*’ | ‘*Pr. aequilatus*’ | ‘*Pr. simpsoni*’ | *P. garzoni* |
| *Pr. smithwoodwardi* |  | **4.167E-05** | **0.000399** | **3.43E-05** | **5.495E-09** |
| ‘*Pr. ameghinorum*’ | 9.519 |  | 0.7383 | 0.9203 | **0.001915** |
| ‘*Pr. aequilatus*’ | 7.788 | 1.731 |  | 0.3487 | **0.000104** |
| ‘*Pr. simpsoni*’ | 9.675 | 1.161 | 2.709 |  | 0.05316 |
| *P. garzoni* | 18.46 | 6.655 | 8.801 | 4.287 |  |

|  |  |  |
| --- | --- | --- |
| Taxon | Specimen | Length m2 |
| *Pr. smithwoodwardi* | MACN A 52-451 | 4.6 |
| MACN A 52-452 | 4.4 |
| ‘*Pr. ameghinorum*’ | AMNH 29574 | 5.5 |
| AMNH 29574\* | 5.6 |
| AMNH 29574\* | 5.4 |
| ‘*Pr. aequilatus*’ | MACN A 52-454 | 5.2 |
| MACN A 52-454\* | 5.1 |
| MACN A 52-454\* | 5.3 |
| ‘*Pr. simpsoni*’ | AMNH 29604 l | 5.7 |
| AMNH 29604 r | 5.9 |
| *P. garzoni* | ACM 3731 l | 6.3 |
| ACM 3731 r | 6.5 |
| AMNH 29608 | 6.0 |
| MACN A 52-456 | 5.5 |
| MACN A 52-459 | 6.2 |
| MACN A 52-460 | 5.6 |
| MACN A 52-461 | 6.1 |
| MACN A 52-463 | 6.0 |
| MPEF 5753 r | 5.8 |
| MPEF 5761 | 6.1 |
| MPEF 5761 | 6.0 |
| MPEF 5761 | 6.2 |

 Sum of squares df Mean square F p (same)

Between groups: 5.03023 4 1.25756 22.21 1.444E-06

Within groups: 0.9625 17 0.0566176 Permutation p (n=99999)

Total: 5.99273 21 1E-05

Levene´s test for homogeneity of variance, from means p (same): 0.4117

Levene´s test, from medians p (same): 0.4213

Tukey’s multiple comparison test

Tukey’s Q below the diagonal, p(same) above the diagonal

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | *Pr. smithwoodwardi* | ‘*Pr. ameghinorum*’ | ‘*Pr. aequilatus*’ | ‘*Pr. simpsoni*’ | *P. garzoni* |
| *Pr. smithwoodwardi* |  | **0.002051** | **0.03508** | **0.0003556** | **1.697E-06** |
| ‘*Pr. ameghinorum*’ | 6.511 |  | 0.5498 | 0.6471 | **0.0237** |
| ‘*Pr. aequilatus*’ | 4.558 | 2.184 |  | 0.08528 | **0.0004278** |
| ‘*Pr. simpsoni*’ | 7.726 | 1.953 | 3.906 |  | 0.7302 |
| *P. garzoni* | 11.87 | 4.834 | 7.596 | 1.751 |  |

**Supplemental Appendix 1.3.** Compared dental measurements of *Prosotherium*. Bold figures indicate approximate values. Values with \* are measurements of the alveoli, and in MACN A 52-461, they correspond to alveoli of deciduous teeth.

**Abbreviations**: **ACM,** Amherst College Museum of Natural History, Massachusetts, U.S.A.; **H**, holotype; **L**, maximum preserved length; **l**, left; **Le**, lectotype; **MACN A**, Museo Argentino de Ciencias Naturales ‘Bernardino Rivadavia’, Ameghino collection, Buenos Aires, Argentina; **MLP**, Museo de La Plata, La Plata, Argentina; **MPEF**, Museo Paleontológico Egidio Feruglio; **P**, paralectotype; **r**, right; **W**, maximum preserved width.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Taxon | Specimen | C | P1 | P2 | P3 | P4 | M1 | M2 | M3 |
| L | W | L | W | L | W | L | W | L | W | L | W | L | W | L | W |
| *P. garzoni* | ACM 3731l | ― | ― | ― | 2.3 | 5.0 | 3.1 | 5.4 | 3.4 | 4.9 | 3.5 | 6.4 | 4.6 | 6.0 | 4.3 | 5.7 | 3.8 |
| ACM 3731r | ― | ― | 3.2 | 2.5 | 4.9 | 3.1 | 5.2 | 3.3 | 5.0 | 3.8 | 6.2 | 4.4 | 5.8 | 4.2 | 5.6 | 3.9 |
| AMNH 14154l | ― | ― | ― | ― | 4.5 | 3.1 | 5.1 | 3.5 | ― | ― | 6.1 | 4.2 | 5.8 | 3.8 | 5.9 | 3.2 |
| AMNH 14154r | ― | ― | 3.2 | 2.4 | 4.6 | 3.2 | 5.0 | 3.7 | 5.1 | 3.9 | 6.1 | 4.4 | **6.2** | **4.2** | 6.1 | 3.2 |
| AMNH 29608 | ― | ― | ― | 3.0 | 4.0 | 3.3 | 4.4 | 4.0 | 5.9 | 5.0 | 6.0 | 4.3 | 6.2 | 3.9 | 6.0 | 3.9 |
| MACN A 52-455 (Le) l | ― | ― | 3.4 | 2.5 | 5.4 | 3.1 | 5.7 | 3.5 | ― | ― | 6.2 | 4.7 | 5.7 | 4.4 | 5.6 | 3.8 |
| MACN A 52-455 (Le) r | ― | ― | 3.3 | 2.6 | 5.7 | 3.3 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― |
| MANC A 52-458 | ― | ― | **3.4** | **2.4** | 6.1 | 2.8 | 6.1 | 3.1 | ― | ― | ― | ― | ― | ― | ― | ― |
| ‘*P. robustum*’ | MACN A 52-465 (H) | ― | ― | 4.6 | 3.0 | 5.6 | 3.6 | 6.4 | 4.5 | 6.6 | 4.7 | 6.7 | 5.0 | 6.5 | 4.7 | 7.1 | 4.3 |
| MACN A 52-468 | ― | ― | ― | ― | **4.4** | **2.9** | **4.7** | **3.1** | 5.1 | 3.7 | 6.4 | 4.8 | ― | ― | ― | ― |
| ‘*P. triangulidens*’ | MACN A 52-464 (H) | ― | ― | 4.1 | 3.4 | 5.3 | 3.9 | 5.4 | 4.1 | 6.0 | **4.2** | 6.4 | **4.2** | 6.3 | **3.6** | 7.0 | 3.5 |
|  | MLP 79-XII-18-38 | ― | ― | ― | ― | 4.4 | 3.4 | 5.4 | 4.0 | ― | ― | ― | ― | ― | ― | ― | ― |
| *Prosotherium* sp. | MLP 93-XI-21-54g | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 6.5 | 5.1 | ― | ― | ― | ― |
| MPEF-PV 5761 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 5.2 | 5.1 | ― | ― | ― | ― |
| MPEF-PV 5761 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | **5.0** | **3.5** | ― | ― | ― | ― |
| MPEF-PV 5761 | ― | ― | ― | ― | ― | ― | ― | ― | 6.5 | 3.1 | ― | ― | ― | ― | ― | ― |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Taxon | Specimen | c | p1 | p2 | p3 | p4 | m1 | m2 | m3 |
| L | W | L | W | L | W | L | W | L | W | L | W | L | W | L | W |
| *P. garzoni* | ACM 3731l | ― | ― | 1.7\* | 1.3\* | 4.8 | 2.9 | 5.4 | 3.0 | 5.7 | 3.1 | 6.2 | 3.1 | 6.3 | 3.3 | 7.5 | 3.0 |
| ACM 3731r | ― | ― | 1.9\* | 1.5\* | 4.9 | 2.8 | 5.5 | 2.9 | 5.6 | 3.0 | 6.4 | 3.2 | 6.5 | 3.5 | 7.6 | 2.9 |
| AMNH 14154 | ― | ― | ― | ― | ― | ― | 5.1 | 2.5 | 5.2 | 2.6 | 5.7 | **2.7** | ― | ― | ― | ― |
| AMNH 29608 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 6.0 | 3.9 | 7.8 | 3.4 |
| MACN A 52-456 (P) | ― | ― | ― | ― | 4.5 | 2.7 | 4.6 | 2.9 | 5.4 | 2.9 | ― | ― | 5.5 | 2.8 | 7.1 | 2.7 |
| MACN A 52-459 | ― | ― | ― | ― | 4.7 | 2.8 | 5.3 | 2.8 | 5.4 | 3.0 | 6.0 | **2.8** | 6.2 | 3.2 | ― | **3.1** |
| MACN A 52-460 | ― | ― | ― | ― | ― | ― | 4.6 | 3.1 | 4.8 | 3.1 | 5.6 | 3.1 | 5.6 | 3.1 | 6.9 | 2.7 |
| MACN A 52-461 l | 0.7\* | 0.7\* | 1.7\* | 1.4\* | 4.1 | 2.5 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― |
| MACN A 52-461 r | 0.7\* | 0.7\* | 1.6\* | 1.4\* | 5.0\* | 3.0\* | 4.8 | 2.7 | 5.0 | 2.7 | 6.1 | 3.1 | 6.1 | 3.2 | ― | ― |
| MACN A 52-463 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 5.9 | **3.5** | 6.0 | 3.3 | ― | ― |
| ‘*P. quartum*’ | MACN A 52-467 (H) | ― | ― | 2.2\* | 1.5\* | 4.4\* | 3.3\* | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― |
| ‘*P. triangulidens*’ | MACN A 52-466 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 8.1 | 2.9 |
| *Prosotherium* sp. | MPEF-PV 5753 l | ― | ― | ― | ― | 4.9 | 2.1 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― |
| MPEF-PV 5753 r | ― | ― | ― | ― | 4.7 | 2.1 | 4.5 | 2.3 | 4.7 | 1.9 | ― | **2.3** | 5.8 | 2.2 | ― | ― |
| MPEF-PV 5754 | ― | ― | ― | ― | 4.7 | 2.7 | 4.9 | 2.7 | 5.2 | 2.8 | ― | ― | ― | ― | ― | ― |
| MPEF-PV 5755 | ― | ― | ― | ― | 4.7 | 2.7 | 5.5 | **3.5** | 5.6 | 2.6 | ― | ― | ― | ― | ― | ― |
| MPEF-PV 5761 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 6.1 | **2.9** | ― | ― | ― | ― |
| MPEF-PV 5761 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 6.2 | 3.2 | ― | ― | ― | ― |
| MPEF-PV 5761 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 6.0 | 2.9 | ― | ― | ― | ― |
| MPEF-PV 5761 | ― | ― | ― | ― | ― | ― | 5.0 | 2.7 | ― | ― | ― | ― | ― | ― | ― | ― |
| MPEF-PV 5761 | ― | ― | ― | ― | ― | ― | 4.9 | 2.8 | ― | ― | ― | ― | ― | ― | ― | ― |
| MPEF-PV 5761 | ― | ― | ― | ― | ― | ― | 5.1 | 2.7 | ― | ― | ― | ― | ― | ― | ― | ― |

**Supplemental Appendix 1.4.** Compared dental measurements of *Propachyrucos*. Measurements of *Pr. ameghinorum* taken from Simpson (1945) and *Pr*. cf. *Pr*. *smithwoodwardi* from Cerdeño and Reguero (2015). Bold figures indicate approximate values. Values with \* are measurements of the alveoli.

**Abbreviations**: **AMNH**, American Museum of Natural History, New York, U.S.A.; **H**, holotype; **L**, maximum preserved length; **Le**, lectotype; **MACN A**, Museo Argentino de Ciencias Naturales ‘Bernardino Rivadavia’, Ameghino collection, Buenos Aires, Argentina; **MCNAM**, Museo de Ciencias Naturales y Antropológicas ‘J. C. Moyano’; **MLP**, Museo de La Plata, La Plata, Argentina; **P**, paralectotype; **W**, maximum preserved width.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Taxon | Specimen | C | P1 | P2 | P3 | P4 | M1 | M2 | M3 |
| L | W | L | W | L | W | L | W | L | W | L | W | L | W | L | W |
| *Pr. ameghinorum* | AMNH 29574 (H) | ― | ― | 3.3 | 2.7 | 4.7 | 3.9 | 4.8 | 3.9 | 4.7 | 4.0 | 5.6 | 4.6 | 5.4 | 4.1 | 6.0 | 3.4 |
| *Pr.* cf. *Pr. smithwoodwardi* | MCNAM-PV 4189 | ― | ― | ― | ― | ― | ― | ― | ― | 4.7 | 4.0 | 6.3 | 4.4 | 5.7 | 4.1 | 5.4 | 3.6 |
| MCNAM-PV 4654 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 5.0 | 4.0 | 5.2 | 4.3 | ― | ― |
| *Propachyrucos* sp. | MLP 12-2889a | ― | ― | ― | ― | ― | ― | ― | ― | 3.9 | 2.5 | ― | ― | ― | ― | ― | ― |
| MLP 61-IV-11-143 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 4.0 | 2.5 | ― | ― | ― | ― |
| MLP 61-IV-11-148 | ― | ― | ― | ― | ― | ― | ― | ― | 3.5 | 2.4 | ― | ― | ― | ― | ― | ― |
| MLP 61-IV-11-316 | ― | ― | ― | ― | 3.7 | 2.1 | 3.7 | 2.2 | 4.0 | 2.4 | **4.1** | 2.5 | ― | ― | ― | ― |
| MLP 61-IV-11-143 | ― | ― | ― | ― | ― | ― | ― | ― | **3.8** | **2.4** | 3.8 | 2.7 | ― | ― | ― | ― |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Taxon | Specimen | c | p1 | p2 | p3 | p4 | m1 | m2 | m3 |
| L | W | L | W | L | W | L | W | L | W | L | W | L | W | L | W |
| ‘*Pr. aequilatus*’ | MACN A 52-454 (H) | ― | ― | ― | ― | ― | ― | ― | ― | 4.8 | 2.4 | 5.2 | 2.4 | 5.2 | 2.4 | 6.4 | 2.3 |
| ‘*Pr. ameghinorum*’ | AMNH 29574 (H) | ― | ― | ― | ― | 5.0 | 2.5 | 4.9 | 2.6 | 4.9 | 2.6 | 5.4 | 2.9 | 5.5 | 2.8 | 7.5 | 2.5 |
| ‘*Pr. crassus*’ | MACN A 52-448 (Le) | **2.8** | **1.6** | **5.5** | **2.7** | **6.7** | **3.6** | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― |
| MACN A 52-449 (P) | 2.4\* | 1.5\* | 6.8 | 2.9 | 6.4 | 3.4 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― |
| ‘*Pr. depressus*’ | MLP 12-2915a (H) | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 4.8 | 2.0 |
| MLP 12-2915a (H) | ― | ― | ― | ― | ― | ― | ― | ― | **3.1** | **1.6** | 3.6 | 1.7 | 3.4 | 1.8 | **4.7** | **1.7** |
| MLP 12-2915a (H) | ― | ― | ― | ― | ― | ― | 4.1 | 2.3 | 4.2 | 2.3 | ― | ― | ― | ― | ― | ― |
| ‘*Pr. medianus*’ | MLP 12-3160 (H) | ― | ― | ― | ― | ― | ― | 4.1 | 2.3 | ― | ― | ― | ― | ― | ― | ― | ― |
| MLP 12-3160 (H) | ― | ― | ― | ― | ― | ― | ― | ― | 4.3 | 2.4 | ― | ― | ― | ― | ― | ― |
| ‘*Pr. robustus*’ | MLP 12-3161 (H) | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | **7.5** | **3.3** | ― | ― | ― | ― |
| *Pr. smithwoodwardi* | MACN A 52-451 (H) | 1.6\* | 1.3\* | 2.6\* | 1.6\* | 3.1 | 1.7 | 3.7 | 2.2 | 3.9 | 2.3 | 4.5 | 2.4 | 4.6 | 2.3 | 5.2 | 2.2 |
| MACN A 52-452 | ― | ― | ― | ― | ― | ― | 3.6 | 2.2 | 3.7 | 2.2 | 4.3 | 2.4 | 4.4 | 2.4 | ― | ― |
| MACN A 52-453 | ― | ― | ― | ― | 3.3 | 1.8 | ― | ― | ― | ― | 4.1 | 2.2 | ― | ― | ― | ― |
| ‘*Pr. simpsoni*’ | AMNH 29604l | 2.0\* | 1.3\* | 2.2\* | 1.5\* | 4.3 | 2.5 | 4.6 | 2.7 | 4.7 | 2.7 | 5.6 | 2.9 | 5.7 | 2.8 | 7.1 | 2.5 |
| AMNH 29604r | ― | ― | 2.2\* | 1.4\* | 4.2 | 2.6 | 4.5 | 2.7 | 4.8 | 2.9 | 5.5 | 2.8 | 5.9 | 2.8 | 7.1 | 2.4 |
| ‘*Pr.* cf. *Pr. smithwoodwardi*’ | MCNAM-PV 3960 | ― | ― | ― | ― | ― | ― | 5.3 | 3.0 | 5.4 | 3.1 | 6.5 | 3.0 | 6.6 | 3.2 | ― | ― |
| MCNAM-PV 3962 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 4.5 | 2.7 | 5.0 | 2.5 | **7.0** | 2.5 |
| MCNAM-PV 3964 | ― | ― | ― | ― | 3.8 | 2.2 | 3.7 | 2.6 | **4.2** | 2.6 | ― | ― | 4.6 | 2.6 | 6.2 | 2.4 |
| MCNAM-PV 4190 | ― | ― | ― | ― | ― | ― | 4.6 | 2.4 | 4.5 | 2.6 | 5.2 | 2.7 | **5.8** | **2.5** | ― | ― |
| MCNAM-PV 4223 | ― | ― | ― | ― | **3.3** | **1.5** | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― |
| MCNAM-PV 4642 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 6.5 | 3.7 |
| MCNAM-PV 4711 | ― | ― | ― | ― | 4.2 | 2.1 | 4.8 | 2.5 | 5.2 | 2.8 | ― | ― | ― | ― | ― | ― |
| MCNAM-PV 4793 | ― | ― | ― | ― | 3.7 | 2.0 | 3.7 | 2.6 | 3.8 | 2.8 | ― | ― | ― | ― | ― | ― |
| MCNAM-PV 4805 | ― | ― | ― | ― | ― | ― | 3.7 | 2.4 | ― | ― | ― | ― | ― | ― | ― | ― |
| *Propachyrucos* sp. | MLP 12-2889a | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 4.1 | 2.4 | 4.2 | 2.5 | 5.0 | 2.1 |
| MLP 12-2889a | ― | ― | ― | ― | 2.5 | 1.6 | 3.1 | 2.1 | ― | ― | ― | ― | ― | ― | ― | ― |
| MLP 59-II-26-91 | ― | ― | ― | ― | ― | ― | ― | ― | 4.2 | 2.5 | ― | ― | ― | ― | ― | ― |
| MLP 59-II-26-91 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 5.5 | 2.4 |
| MLP 61-IV-11-139 | ― | ― | ― | ― | **3.2** | **1.8** | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― |
| MLP 61-IV-11-140 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 3.6 | 2.2 | ― | ― | ― | ― |
| MLP 61-IV-11-141 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 3.9 | 2.3 | ― | ― | ― | ― |
| MLP 61-IV-11-142 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 3.7 | 2.0 | ― | ― | ― | ― |
| MLP 61-IV-11-145 | ― | ― | ― | ― | ― | ― | 3.2 | 2.1 | ― | ― | ― | ― | ― | ― | ― | ― |
| MLP 61-IV-11-145 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― |
| MLP 61-IV-11-147 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 4.6 | 2.3 |
| MLP 61-IV-11-149 | ― | ― | ― | ― | 2.9 | 1.7 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― |
| MLP 61-IV-11-151 | ― | ― | ― | ― | ― | ― | ― | ― | 3.4 | 2.1 | ― | ― | ― | ― | ― | ― |
| MLP 61-IV-11-152 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 3.8 | **2.3** | ― | ― | ― | ― |
| MLP 61-IV-11-164 l | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 3.8 | 2.2 | 5. | 1.9 |
| MLP 61-IV-11-164 r | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 3.7 | 2.2 | ― | ― |
| MLP 61-IV-11-165 | ― | ― | ― | ― | ― | ― | **3.2** | **1.9** | **3.4** | **2.2** | ― | ― | ― | ― | ― | ― |
| MLP 61-IV-11-186 | ― | ― | ― | ― | ― | ― | ― | ― | 3.5 | 2.2 | 3.7 | 2.1 | 3.7 | 2.2 | ― | ― |
| MLP 61-IV-11-189 | ― | ― | ― | ― | ― | ― | ― | ― | 2.9 | 1.7 | 3.5 | 2.2 | ― | ― | ― | ― |
| MLP 61-IV-11-191 | ― | ― | ― | ― | ― | ― | ― | ― | ― | ― | 3.6 | 1.7 | ― | ― | ― | ― |
| MLP 61-IV-11-192 | ― | ― | ― | ― | ― | ― | ― | ― | 3.7 | 2.3 | 4.1 | 2.3 | ― | 2.3 | ― | ― |
| MLP 61-IV-11-207 | ― | ― | ― | ― | ― | ― | 3.8 | 2.2 | 3.9 | 2.4 | ― | ― | ― | ― | ― | ― |

**Supplemental Appendix 1.5.** Comparison between *Prosotherium*, *Propachyrucos* and *Pachyrukhos*.

**FIGURE S1.** Lower series in oclusal view. **A,** *Prosotherium garzoni* MACN A 52-456 (paralectotype) with p2–m3, except m1; **B,** *Propachyrucos smithwoodwardi* MACN A 52-451 with p2–m3; **C,** *Pachyrukhos moyani* MLP 12-2860 with p2–m3. Note the morphology of both lobes in the p2 (arrow 1); the size and morphology of the talonids (arrow 2 and compare with Table 2); the absence of the posterolingual projection in molars of *Prosotherium* and *Propachyrucos* but it is present in *Pachyrukhos* (plp, arrow 3); the morphology of the third lobe in the m3 (arrow 4); and the different size (the three specimens are at the same scale). Scale bar equals 1 cm.

Abbreviations: ceb, centred enamel band; e, ectoflexid; plp, posterolingual projection; tg, talonid groove.

