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A new early Miocene octodontoid rodent (Hystricognathi, Caviomorpha) from Patagonia
(Argentina) and a reassessment of the early evolution of Octodontoidea

MICHELLE ARNAL,^{*,1} ALEJANDRO G. KRAMARZ,² M. GUIOMAR VUCETICH,¹ and E.
CAROLINA VIEYTES³

¹Departamento Paleontología de Vertebrados, Facultad de Ciencias Naturales y Museo, Paseo
del Bosque s/n, 1900 La Plata, Argentina, michoarnal@fcnym.unlp.edu.ar;
vucetich@fcnym.unlp.edu.ar;

²Sección Paleontología de Vertebrados, Museo Argentino de Ciencias Naturales “Bernardino
Rivadavia,” Av. Ángel Gallardo 470, C1405DJR Buenos Aires, Argentina,
agkramarz@macn.gov.ar;

³Sección Mastozoología, División Zoología de Vertebrados, Facultad de Ciencias Naturales y
Museo, Paseo del Bosque s/n, 1900 La Plata, Argentina, cvieytes@fcnym.unlp.edu.ar

APPENDIX 2. List of characters of the data matrix. We cite the source of 47 characters taken from the literature, and indicate when we have modified these characters with an asterisk. The following characters are treated as ordered: 3, 10, 11, 18, 27, 33, 39, 49, 53, 61, 63, 69, 74, 75, 91, 95, 96, and 102.

- (1) P3/DP3: present (0); absent (1).
- (2) Cingula: present (0); absent (1).
- (3) Hypsodonty: brachyodont (0); mesodont (1); protohypsodont (2); euhypsodont (3).
- (4) Crests thickness in occlusal view: slenderer than flexi/ids (0); equal or broader than flexi/ids (1).
- (5) Deciduous premolars (Marivaux et al., 2004): normal replacement (0); retention (1).
- (6) Terraced occlusal surface: present (0); absent (1).
- (7) Cusp differentiation: yes, labial cusps of upper molars and lingual cusps of lower molars wider than their associated crests (0); no, cusps indistinct, entirely submerged in their associated crests (1).
- (8) Mesolophule on DP4: present (0); absent (1).
- (9) Metaloph on DP4: present and joined lingually to the anterior arm of the hypocone (0); present and joined lingually to the posteroloph (1); indistinct, probably fused to the posteroloph (2).
- (10) Anterior arm of the metacone on DP4 (Antoine et al., 2011): absent (0); weakly pronounced (1); high (2).
- (11) Mesostyle on DP4 (Antoine et al., 2011): indistinct or absent (0); moderate (1); strong (2).

- (12) Hypocone on DP4 (Antoine et al., 2011)*: small (0); moderate (as large as the protocone) (1).
- (13) Size of P4 with respect to M1 (Marivaux et al., 2004)*: $P4 \geq M1$ (0); $P4 < M1$ (1).
- (14) Crown outline of P4 (Antoine et al., 2011)*: transverse (0); oval (1); heart shape (2); quadrangular (3); reversed heart shape (4).
- (15) Anterocingulum on P4 (Antoine et al., 2011)*: small, short (0); long (1).
- (16) Anterocingulum on P4 (Antoine et al., 2011): low (0); high (anteroloph) (1).
- (17) Anterocingulum (or anteroloph)–paracone connection (Antoine et al., 2011): absent (0); present (via a parastyle or not) (1).
- (18) Mesolophule on P4 (Antoine et al., 2011): absent (0); short (1); reaches the buccal side (2).
- (19) Metaloph on P4: present (0); absent (1).
- (20) Metaloph on P4 (Antoine et al., 2011)*: connected to the metaconule (0); connected to the anterior arm of the hypocone (1); connected to the posteroloph (2).
- (21) Metacone on P4 (Antoine et al., 2011)*: small (0); strong (1).
- (22) Hypocone on P4: absent (0); present (1).
- (23) Hypocone on P4: labial to protocone (0); linguallly aligned to protocone (1).
- (24) Anterior arm of the hypocone on P4 (Antoine et al., 2011): absent (0); present (1).
- (25) Posteroloph–metacone connection on P4 (Antoine et al., 2011): absent (0); present (1).
- (26) Hypoflexus on P4: absent (0); present (1).
- (27) Hypoflexus on P4: as a superficial lingual groove (0); as a moderately deep lingual groove separating protocone and hypocone, less penetrating than in molars (1); very deep, as in molars (2).

- (28) Figure-8 dental pattern (Vucetich and Kramarz, 2003): absent (0); present (1).
- (29) Crest obliquity on M1–M3: transverse to the anteroposterior axis of the teeth (0); anterolabially-posterolingually oblique (1). All crests should be oblique to consider character state 1.
- (30) Anteroloph on M1–M3 (Antoine et al., 2011)*: moderately high (0); high (1).
- (31) Anteroloph on M1–M3: short, not reaching the paracone (0); reaches the paracone (1); long, reaches the labial border of the crown but not connected to the paracone (2).
- (32) Paracone on M1–M3: larger than metacone (0); equal to metacone (1).
- (33) Posterior arm of the paracone (Antoine et al., 2011): absent (0); weakly pronounced (1); strong and high (2).
- (34) Paracone–metacone position on M2 (Antoine et al., 2011): mesiodistally opposed (0); metacone slightly lingual (1).
- (35) Anterolingual angle of the tooth on M1–M3: rounded or forming an obtuse angle (0); forming a right angle (1).
- (36) Mesolophule on M1–M3: present (0); absent (1).
- (37) Direction of the mesolophule (Antoine et al., 2011)*: straight (transverse) (0); slightly oblique (distobuccally oriented) (1).
- (38) Metaloph on M1–M3: lingually joined to the anterior arm of the hypocone (0); lingually joined to the posteroloph (1); indistinct, probably fused to the posteroloph (2); lingually joined to the mesolophule (3).
- (39) Anterior arm of the metacone (Marivaux et al., 2004)*: absent (0); weakly pronounced (1); high (2).
- (40) Hypocone on M1–M2: labial to protocone (0); lingually aligned to protocone (1).

- (41) Posteroloph–metacone connection (Antoine et al., 2011): absent (0); present (1).
- (42) Mure (Marivaux et al., 2004)*: absent (0); present (1).
- (43) Mure connection (Antoine et al., 2011): on the protoloph (central to the tooth) (0); on the protoloph more lingually (1).
- (44) Metacone size on M3 (Antoine et al., 2011): distinct cusp (as large as the paracone) (0); reduced but distinct (1); crestiform (2).
- (45) Hypocone position in relation to the protocone on M3 (Antoine et al., 2011)*: more labial (0); strongly more labial (1); at the same level (2).
- (46) Hypoflexus orientation on M1–M3: anteriorly oblique (0); slightly anteriorly oblique or transverse to the anteroposterior axis of the tooth (1).
- (47) Mesoflexus groove with respect to metaflexus groove in M1 and M2: mesoflexus groove deeper than metaflexus groove (0); mesoflexus groove equal than metaflexus groove (1).
- (48) Size of M1/M2 (Antoine et al., 2011)*: $M1 < M2$ (0); $M1 = M2$ (1).
- (49) Size of M3/M2 (Antoine et al., 2011): $M3 < M2$ (0); $M3 = M2$ (1); $M3 > M2$ (2).
- (50) M1 length/width proportions (Antoine et al., 2011)*: length = width (0); length < width (1); length > width (2).
- (51) M2 length/width proportions (Antoine et al., 2011)*: length = width (0); length < width (1); length > width (2).
- (52) Upper incisors: laterally compressed (0); laterally not compressed (1); laterally compressed when anteroposterior diameter/transverse diameter ≥ 1.5 .
- (53) Posterior arm of the metaconid (metastylar fold) on dp4 (Marivaux et al., 2004): absent (0); weak and low (1); well developed and high (2).
- (54) Anteroconid on dp4 (Marivaux et al., 2004): present (0); absent (1).

- (55) Metaconid position with respect to protoconid on dp4: anterior (0); aligned (1); posterior (2).
- (56) Metalophulid I on dp4: present (0); absent (1).
- (57) Metalophulid II on dp4: present (0); absent (1).
- (58) Metalophulid II on dp4: conspicuous (0); reduced (1).
- (59) Mesolophid on dp4: present (0); absent (1).
- (60) Mesolophid on dp4: conspicuous (0); reduced (1).
- (61) Ectolophid on dp4 (Marivaux et al., 2004)*: absent (0); mesially interrupted (unconnected to the protoconid) (1); complete (connected to the protoconid) (2).
- (62) Metaconid position with respect to protoconid on p4: anterior (0); aligned (1).
- (63) Posterior arm of the metaconid (metastylar fold) on p4 (Marivaux et al., 2004)*: absent (0); weak and low (1); well developed, high, and long (2).
- (64) Flexid on anterior aspect of metalophulid I on p4 (Vucetich and Kramarz, 2003): present (0); absent (1).
- (65) Metalophulid II on p4: absent (0); present (1).
- (66) Mesolophid on p4: absent (0); present (1).
- (67) Mesolophid on p4 (Antoine et al., 2011): short (0); long, reaches the lingual side (1).
- (68) Hypolophid on p4 (Marivaux et al., 2004): absent (0); present (1).
- (69) Anterior arm of the hypoconid on p4 (Antoine et al., 2011): absent (0); thin (1); strong (2).
- (70) Hypoconulid on p4 (Antoine et al., 2011): minute to absent (0); moderate (1).
- (71) Posterolophid–entoconid connection (Antoine et al., 2011): absent (0); present (1).
- (72) Talonid on p4 (Marivaux et al., 2004)*: subequal (0); wider than the trigonid (1).

- (73) Size of p4/m1 (Marivaux et al., 2004)*: $p4 \geq m1$ (0); $p4 < m1$ (1).
- (74) Proportion of p4 (Antoine et al., 2011)*: length clearly > width (0); length > width (1); length \geq width (2).
- (75) Anterofossettid and metafossettid on lower molariforms: persistent (0); ephemeral (1); absent (2). Fossetids are considered ephemeral when they are lost in juvenile-adult specimens.
- (76) Metaconid position with respect to protoconid on m1–m3: anterior (0); aligned (1).
- (77) Metalophulid II on m1 and m2: present (0); absent (1).
- (78) Metalophulid II on m1 and m2: complete (0); reduced (1)-
- (79) Metalophulid II connection (Antoine et al., 2011)*: mesiobuccally to the metaconid (0); distolingually to the metaconid, on the posterior arm of the metaconid (1); distolingually to the metaconid, on the mesostylid (2); do not contact neither (3).
- (80) Metalophular spur (Antoine et al., 2011)*: absent (0); short (1).
- (81) Entoconid position with respect to hypoconid on m1–m3: aligned (0); anterior (1).
- (82) Posterolophid on m1–m2: short (0); long (1).
- (83) Posterolophid–entoconid connection (Antoine et al., 2011): absent (0); present (1).
- (84) Crest obliquity on m1–m3: transverse to the anteroposterior axis of the teeth (0); anterolabially-posterolingually oblique (1). All crests should be oblique to consider character state 1.
- (85) Anterior arm of the hypoconid: absent in unworn or little worn teeth (0); present in all stages (1).
- (86) Mesiodistal pinch of the hypoconid (Antoine et al., 2011): absent (0); present (1).
- (87) Hypoconulid on m1–m3: recognizable (0); indistinct (1).

- (88) Spur of the posterior margin of metalophulid I on m1 and m2: present (0); absent (1).
- (89) Accessory cusp posterior to metalophulid I on m1 and m2: present (0); absent (1).
- (90) Posterior arm of the metaconid on m1 and m2: present (0); absent (1).
- (91) Hypoflexid orientation on m1–m3: posteriorly oblique, or opposed to the metaflexid or hypolophid (0); transverse or opposed to the hypolophid or mesoflexid (1) anteriorly oblique or opposed to the anteroflexid (2).
- (92) Size of m3/m2 (Marivaux et al., 2004): $m3 = m2$ (0); $m3 < m2$ (1).
- (93) Lower incisors: laterally compressed (0); laterally not compressed (1); laterally compressed when anteroposterior diameter is at least 1.5 the width.
- (94) Anterior face of lower incisors: curve (0); forming a right lingual border and a curved labial one (1); plane (2).
- (95) Lower incisors: long, passing beneath m3 (0); the base reaching m3 (1); short, the base does not reach m3 (2).
- (96) Lower incisors enamel microstructure: multiseriate HSB with acute IPM (0); multiseriate HSB with transitional IPM (1); multiseriate HSB with rectangular IPM (2).
- (97) Mental foramen: present (0); absent (1).
- (98) Position of the mental foramen: anterior to the lowest part of the diastema (0); at the lowest part of the diastema (1); beneath p4/dp4 (2).
- (99) Position of the anterior border of notch for the masseter muscle pars infraorbitalis (mmio): beneath m1 (0); anterior to m1 (1).
- (100) Position of the mmio with respect to mandible: above the middle of the mandible (0); at the middle of the mandible high (1).

- (101) Origin of the masseteric crest: includes the notch for the masseter muscle pars infraorbitalis (0); does not include the notch for the masseter muscle pars infraorbitalis (1).
- (102) Depth of the anterior portion of the masseteric fossa (Candela, 2000): shallow or flat (0); moderately deep (1); deep (2).
- (103) Ventral root of the zygomatic arch: similar anteroposterior and dorsoventral diameters (0); anteroposterior diameter twice dorsoventral or more (1).
- (104) Groove for the infraorbitalis nerve within the infraorbital foramen: absent (0); present (1).
- (105) Groove for the passage of the infraorbitalis nerve within the infraorbital foramen: present with a small lateral rim (0); present with a large lateral rim (1).
- (106) Masseteric tuberosity (for the insertion of the masseteric superficial muscle): poorly developed (0); well developed (1).