**Supplemental material 4: material examined**

List of materials used to construct the character taxon matrix. **Institutional abbreviations** (excluding those given in the main text)— **DPC**, Duke University Primate Center (now Duke University Lemur Center), Durham, North Carolina; **NMMNH**, New Mexico Museum of Natural History and Science, Albuquerque, New Mexico; **SDSNH**, Department of Paleontology, San Diego Natural History Museum, San Diego, California; **SMM**, Science Museum of Minnesota, St. Paul, Minnesota; **UCMP**, University of California, Museum of Paleontology, Berkeley, California; **UW**, University of Wyoming Geological Museum, University of Wyoming, Laramie, Wyoming; **YPM**, Yale Peabody Museum, Yale University, New Haven, Connecticut; **\***, direct observations supplemented by images from Morphobank (O’Leary & Kaufman, 2012).

*Protungulatum donnae*: AMNH 96357, 118260, SMM 62-2028, UCMP 100896, 112110, 125961; Szalay (1977); Boyer *et al.* (2010)

*Mithrandir gillianus*: NMMNH P-3083, USNM 15439, 15521, 37229, 40494; Rigby (1981)

*Altacreodus magnus*: Lillegraven (1969); Fox (2015)

*Arfia* spp.

*A. opisthotoma*: UW 9915; Gingerich & Deutsch (1989)

*A. shoshoniensis*: UM 69474, 77051, 87768, USGS 16473, YPM 36932

*Prolimnocyon* spp.

*P. antiquus*: USNM 493817

*P. atavus*: DPC 5364, USGS 9330, 25407

*P. eerius*: UM 87353; Gingerich (1989)

*P. haematus*: Gingerich & Deutsch (1989)

*Thinocyon* spp.

*T. medius*: AMNH 12154, YPM 12874, 12881

*Thinocyon velox*: AMNH 13082, YPM 12870, 12872; Morlo & Gunnell (2003)

*Thinocyon* spp.: Spaulding & Flynn (2012)

*Limnocyon* spp.

*L. potens*: CM 3373, 11439

*L. verus*: AMNH 12155, 19199, USNM 299722; Matthew (1909)

*L.* sp.: SDSNH 42809, 43741, 43743, 47654, 47707, 47965

*Galecyon* spp.

*G. chronius*: USGS 8769, USGS 15956, 487920, 511004, 521860, YPM 23341

*G. mordax*: USNM 1125, 490637

*G. peregrinus*: USNM 509676

*Prototomus martis*: USGS 25042, USNM 509700, 527677

*Pyrocyon strenuus*: USGS 4727, 6111, 7157, 16475, 27236, USNM 491821

*Prototomus phobos*: YPM-PU 13019

*Tritemnodon agilis*: AMNH 11536, USNM 11544, 361351, 361352, YPM 10073, 11877; Matthew (1909)

*Sinopa* spp.

*S. grangeri*: Matthew (1906)

*S. lania*: AMNH 13142\*

*S. rapax*: AMNH 11535\*, USNM 13305, 13306, 13307, 13309, 173513, YPM 12862, YPM-PU 10244

*Machaeroides* spp.

*M. eothen*: USNM 17059

*M. simpsoni*: CM 45115

CM 2386

*Tytthaena parrisi*: YPM-PU 21454; Gingerich (1980)

*Palaeonictis* spp.

*P. gigantea*: Solé *et al.* (2011)

*P. occidentalis*: AMNH 110, YPM-PU 13001, 16140; Osborn & Wortman (1892)

*Dipsalidictis krausei*: UM 69331; Gunnell & Gingerich (1991)

*Oxyaena*/*Dipsalidictis* spp. (Wasatchian)

*Dipsalidictis platypus*: AMNH 15857

*Dipsalidictis transiens*: YPM-PU 16161

*Oxyaena forcipata*: AMNH 4209, 15607; Matthew (1915)

*Oxyaena gulo*: Matthew (1915)

*Oxyaena woutersi*: Smith & Smith (2001); Solé *et al.* (2011)

*?Oxyaena* sp.: USGS 264, 952, 5029, 5910, 7144, 7160, 7186, 16485, 21863, 25041, 25136, 25272, USNM 521368, 527680

*Ictidopappus mustelinus*: USNM 9295, 9296

*Protictis haydenianus*: AMNH 35389; MacIntyre (1966)

*Bryanictis microlestes*: AMNH 35360, 35364, 35373, 35377, YPM-PU 14253, 14254, 17726, 17724, 18529; MacIntyre (1966)

*Simpsonictis* spp.

*S. pegus*: YPM-PU 14232, 17511, 18682

*S. tenuis*: AMNH 35348, YPM-PU 17509, 17510, 19785; MacIntyre (1966)

*S. jayneannae*: AMNH 87922b, 100449a, AMNH 100798; Rigby (1980)

*Viverravus schaffi*: YPM-PU 13964, 14165, 14441, 18318, 19365; Spaulding & Flynn (2012)

*Viverravus minutus*: CM 8748, YPM 11837; Spaulding & Flynn (2012)

*Viverravus gracilis*: USNM 13322, YPM 11836; Heinrich & Houde (2006); Spaulding & Flynn (2012)

*Viverravus acutus*: USGS 6733, 9193, USNM 493905, uncatalogued material from USGS/JHU locality D-1460Q; Spaulding & Flynn (2012)

*Didymictis* spp.

*D. protenus*: CM 34469, USGS 1721, 5024, 6087, 21835, 21836, 25039, 25040, 27585, YPM-PU 17689; Spaulding & Flynn (2012)

*D. vancleveae*: Spaulding & Flynn (2012)

*Uintacyon gingerichi*: UCMP 212555, 212722, 216040, 216043, 216044; Heinrich *et al.* (2008); Rose *et al.* (2012)

*Uintacyon massetericus*: USGS 8144, 21910, 27572, 27577, USNM 493766, 493767, 509595, 511005, 527535, uncatalogued material from USGS/JHU locality D-1460Q; Heinrich & Rose (1997)

*Vassacyon promicrodon*: AMNH 15161, YPM-PU 20469; Matthew (1915)

*Gracilocyon* spp.

*Gracilocyon winkleri*: Smith & Smith (2010)

*Gracilocyon solei*: Smith & Smith (2010)

*Dormaalocyon latouri*: Solé *et al.* (2014)

*Vulpavus australis*: USGS 206, 210, 1943, 5025, 5030, 7143, 12232, 16488, 25219, 27540, USNM 510879, 510891

*Vulpavus ovatus*: AMNH 11498\*; Spaulding & Flynn (2012)

*Vulpavus profectus*: AMNH 12626\*, USNM 362842, 362843; Spaulding & Flynn (2012)

*Vulpavus palustris*: Gunnell (1998); Spaulding & Flynn (2012)

*Oodectes herpestoides*: YPM 11861, 12845; Spaulding & Flynn (2012)

*Oodectes jepseni*: YPM-PU 16440

*Miacis exiguus*: AMNH 15717, UM 80138; Spaulding & Flynn (2012)

*Miacis petilus*: USGS 6705, 6720, 6734, 7161, USNM 495250, 527551; Spaulding & Flynn (2012)

*Miacis parvivorus*: AMNH 11500, USNM 178298; Spaulding & Flynn (2012)

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