

SUPPLEMENTARY DATA 1

**Unriddling an old dolphin: platanistoid *Notocetus vanbenedeni* Moreno, 1892 from the  
early Miocene of Patagonia (Argentina)**

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**Supplementary Data 1.** List of specimens revised for the study of *Notocetus vanbenedeni*, as well as list of references for the taxonomic background analyses of the species.

**Table S1.** List of specimens revised and literature used during the phylogenetic and anatomical study of the present contribution. These include additional or alternative material to those listed by Viglino *et al.* (2018b). All specimens are held in public scientific collections.

Species	Collection number	Reference
<i>Allodelphis pratti</i>		Boersma & Pyenson (2016); Kimura & Barnes (2016)
<i>Araeodelphis natator</i>		Kellogg (1957); Godfrey <i>et al.</i> (2017)
<i>Arktocara yakataga</i>	USNM 214830	Boersma & Pyenson (2016)
<i>Delphinus delphis</i>	CNPMAMM 620; MACN 20529	
<i>Dilophodelphis fordycei</i>	USNM 214911	Boersma <i>et al.</i> (2017)
<i>Goedertius oregonensis</i>		Boersma & Pyenson (2016)
<i>Huaridelphis raimondii</i>		Lambert <i>et al.</i> (2014)
<i>Hyperoodon ampullatus</i>	IRSNB 1503	
<i>Kogia breviceps</i>	MACN 17824	Schulte (1917)
<i>Lipotes vexillifer</i>	AMNH 57333	Miller (1918)
<i>Medocinia tetragorhina</i>	Cast of MHN B 174 at MNHN	Delfortrie (1875); Muizon (1988)
<i>Mesoplodon bidens</i>	IRSNB 16232; IRSNB 39517	
<i>Mesoplodon grayi</i>	CNPMAMM 662	
<i>Mesoplodon hectori</i>	MACN 20400; MACN 20401	
<i>Ninjabdelphis ujiharai</i>	GMNH-PV 2570	Kimura & Barnes (2016)
	AMNH 29026; MLP 5-5; MLP 5-10; MLP 5-17; MLP 5-52; MLP 76-VI-1-1; MPEF-PV 681; MPEF-PV 683; MPEF-PV 1117; MPEF-PV 1118; MPEF-PV 1119; MPEF-PV 1120; MPEF-PV 1375; MPEF-PV 1660; MPEF-PV 1804; MPEF-PV 2579; MPEF-PV 2580; MLP 17-XII-22; MLP 77-XII-22; MLP 76-IX-2-5; MLP 76-IX-2-9; MLP 76-IX-2-11; MLP 76-IX-2-12; MLP 87-XII-20-1	Moreno (1892); Lydekker (1893); True (1910); de Muizon (1987); Uyua (2011); present study.
<i>Notocetus vanbenedeni</i>		
<b>Peruvian</b> <i>Notocetus</i>	MUSM 1395	Bianucci <i>et al.</i> (2014)
<i>vanbenedeni</i> *	MUSM 3896; MUSM 3897; MUSM 1484	Bianucci <i>et al.</i> (2020)
<i>Notoziphius bruneti</i>		Buono & Cozzuol (2013)

<i>Platanista gangetica</i>	IRSNB 1507	Anderson (1878); van Beneden & Gervais (1880)
<i>Pomatodelphis inaequalis</i>	USNM 187414; USNM 299695	Allen (1921); Kellogg (1959)
<i>Pontoporia blainvillei</i>	MACN 27283	
<i>Prosqualodon australis</i>	MLP 5-8	Lydekker (1893); Gaetán <i>et al.</i> (2019)
<i>Squalodon bariensis</i>		Muizon (1991)
<i>Squalodon calvertensis</i>	USNM 24356; USNM 25910; USNM 328343; USNM 25356; USNM 22092; USNM 10484; USNM 23537	Kellogg (1923)
<i>Squaloziphius emlongi</i>		Muizon (1991)
<i>Tasmacetus shepherdi</i>	NMNZ s/n; NMNZ 416; NMNZ 2184; USNM 484878	
<i>Zarhachis flagellator</i>	USNM 10485	Cope (1868); Kellogg (1924, 1926)
<i>Zarhinocetus errabundus</i>	USNM 52660 (cast)	Kellogg (1931); Boersma & Pyenson (2016)
<i>Ziphius cavirostris</i>	CNPMAMM 657; IRSNB 1504; IRSNB 4027	

\*These specimens were assigned as *Notocetus vanbenedeni* in their original publications. However, based on the phylogenetic results of our study, we did not recover them as such.

Additional references not included in the main manuscript:

**Allen, G. M.** 1921. Fossil cetaceans from the Florida phosphate beds. *Journal of Mammalogy*, **2**, 144–159.

**Buono, M. R. & Cozzuol, M. A.** 2013. A new beaked whale (Cetacea, Odontoceti) from the Late Miocene of Patagonia, Argentina. *Journal of Vertebrate Paleontology*, **33**, 986–997.

**Cope, E. D.** 1868. Second contribution to the history of the Vertebrata of the Miocene period of the United States. *Proceedings of the Academy of Natural Sciences of Philadelphia*, **20**, 184–194.

**Delfortrie, M.** 1875. Un daupin d'espece nouvell dans les faluns du Sud-Ouest. *Actes de La Société Linnéenne de Bordeaux*, **30**, 177–181.

- Kellogg, R.** 1924. A fossil porpoise from the Calvert formation of Maryland. *Proceedings of the United States National Museum*, **63**, 1–39.
- Kellogg, R.** 1926. Supplementary observations on the skull of the fossil porpoise *Zarhachis flagellator* Cope. *Proceedings of the United States National Museum*, **67**, 1–19.
- Kellogg, R.** 1931. Pelagic mammals from the Temblor Formation of the Kern River Region, California. *Proceedings of the California Academy of Sciences*, **29**, 217–397.
- Kellogg, R.** 1957. Two additional Miocene porpoises from the Calvert Cliffs, Maryland. *Proceedings of the United States National Museum*, **108**, 279–337.
- Kellogg, R.** 1959. Description of the skull of *Pomatodelphis inaequalis* Allen. *Bulletin of the Museum of Comparative Zoology*, **121**, 2–26.
- Miller, G. S.** 1918. A new river-dolphin from China. *Smithsonian Miscellaneous Collections*, **68**, 1–12.
- Muizon, C. de.** 1988. Le polyphylétisme des Acrodelphidae, Odontocètes longirostres du Miocène européen. *Bulletin Du Muséum d'Histoire Naturelle, Paris*, **10**, 31–88.
- Schulte, H. v. W.** 1917. The skull of *Kogia breviceps* Blainv. *Bulletin of the American Museum of Natural History*, **37**, 361–404.
- van Beneden, M. P. J. & Gervais, P.** 1880. Ostéographie de cétacés vivants et fossiles. Berthrand, Paris, Atlas, 64 tavv.; texte: VIII + 634 pp

**Table S2.** List of references where *Notocetus vanbenedeni* Moreno, 1892 was used, in order to support the validity of this genus and species under the Principle of Priority of Article 23.1 of the ICZN (see main text for further details).

<b>Citation of <i>Notocetus vanbenedeni</i> Moreno, 1892</b>	<b>Full reference</b>
Simpson (1945): 101	(See main text)
de Muizon (1984): 69	<b>de Muizon, C.</b> 1984. Les vertébrés fossiles de la formation Pisco (Pérou). Deuxime partie: Les Odontocetes (Cetacea, Mammalia) du Pliocène inférieur de Sud-Sacaco. <i>Recherche sur les grandes civilisations Mémoire</i> , <b>50</b> , 1–188.
de Muizon (1985): 359	(See main text)
Pilleri (1985): 28	<b>Pilleri, G.</b> 1985. The Miocene cetaceans of the Belluno sandstones. <i>Memorie di Scienze Geologiche</i> , <b>36</b> , 1–50.
de Muizon (1987): 1	(See main text)
de Muizon (1988a): 72	<b>de Muizon, C.</b> 1988. Le polyphylétisme des Acrodelphidae, Odontocètes longirostres du Miocène européen. <i>Bulletin du Muséum National d'Histoire Naturelle. 4° Série</i> , <b>10</b> , 31–88.
de Muizon (1988b): 170	<b>de Muizon, C.</b> 1988b. Les relations phylogenetiques des Delphinida (Cetacea, Mammalia). <i>Annales de Paléontologie</i> , <b>74</b> , 159–227.
Fordyce (1989): 277	<b>Fordyce, R. E.</b> 1989. Origins and evolution of Antarctic marine mammals. <i>Geological Society, London, Special Publications</i> , <b>47</b> , 269–281.
Cione & Cozzuol (1990): 451	<b>Cione, A. L. &amp; Cozzuol, M. A.</b> 1990. Reidentification of <i>Portheus patagonicus</i> Ameghino, 1901, a supposed fish from the Middle Tertiary as a delphinoid cetacean. <i>Journal of Paleontology</i> , <b>64</b> , 451–453.
de Muizon (1991): 303	(See main text)
Fordyce (1994): 158	(See main text)
Cozzuol (1996): 324	<b>Cozzuol, M. A.</b> 1996. The record of aquatic mammals in southern South America. <i>Münchner Geowissenschaftliche Abhandlungen</i> , <b>30</b> , 321–342.
Luo & Marsh (1996): 333	<b>Luo, Z. &amp; Marsh, K.</b> 1996. Petrosal (periotic) and inner ear of a Pliocene kogiine whale (Kogiinae, Odontoceti): implications on relationships and hearing evolution of toothed whales. <i>Journal of Vertebrate Paleontology</i> , <b>16</b> , 328–348.
Dooley (1998): 54	<b>Dooley Jr., A. C.</b> 1998. A review of the north american <i>Squalodontidae</i> (Mammalia, Cetacea). PhD thesis, Louisiana State University, 280 pp.

Luo & Gingerich (1999): 26	(See main text)
Fordyce & de Muizon (2001): 183	(See main text)
Sánchez-Villagra <i>et al.</i> (2001): 229	<b>Sánchez-Villagra, M. R., Gasparini, Z., Lozsan, R., Moody Jr., J. M. &amp; Uhen, M. D.</b> 2001. New discoveries of vertebrates from near-shore marine fauna from the Early Miocene of northwestern Venezuela. <i>Paläontologische Zeitschrift</i> , <b>75</b> , 227–232.
Fordyce (2002): 213	<b>Fordyce, R. E.</b> 2002. <i>Simocetus rayi</i> (Odontoceti: Simocetidae, New Family): a bizarre new archaic Oligocene dolphin from the Eastern North Pacific. <i>Smithsonian Contributions to Paleobiology</i> , <b>93</b> , 185–222.
Geisler & Sanders (2003): 28	<b>Geisler, J. H. &amp; Sanders, A. E.</b> 2003. Morphological evidence for the phylogeny of Cetacea. <i>Journal of Mammalian Evolution</i> , <b>10</b> , 23–129.
Barnes (2006): 27	<b>Barnes, L. G.</b> 2006. A phylogenetic analysis of the Superfamily Platanistoidea (Mammalia, Cetacea, Odontoceti). <i>Beiträge zur Paläontologie</i> , <b>30</b> , 25–42.
Bianucci & Landini (2006): 124	<b>Bianucci, G. &amp; Landini, W.</b> 2006. Killer sperm whale: a new basal physeteroid (Mammalia, Cetacea) from the Late Miocene of Italy. <i>Zoological Journal of the Linnean Society</i> , <b>148</b> , 103–131.
Fordyce (2006): 764	<b>Fordyce, R. E.</b> 2006. A southern perspective on cetacean evolution and zoogeography. Pp. 755–778 in J. R. Merrick (ed) <i>Evolution and biogeography of australasian vertebrates</i> . Australian Scientific Publishing, Sydney.
Lambert & Louwye (2006): 184	<b>Lambert, O. &amp; Louwye, S.</b> 2006. <i>Archaeoziphius microglenoideus</i> , a new primitive beaked whale (Mammalia, Cetacea, Odontoceti) from the Middle Miocene of Belgium. <i>Journal of Vertebrate Paleontology</i> , <b>26</b> , 182–191.
Uhen <i>et al.</i> (2007): 583	<b>Uhen, M. D., Fordyce, R. E. &amp; Barnes, L. G.</b> 2007. Odontoceti. Pp. 566–606 in C. M. Janis, G. F. Gunnell & M. D. Uhen (eds) <i>Evolution of tertiary mammals of North America</i> . Cambridge University Press, Chicago.
Cozzuol <i>et al.</i> (2008): 196	<b>Cozzuol, M. A. &amp; Aguilera, O. A.</b> 2008. Cetacean remains from the Neogene of northwestern Venezuela. <i>Paläontologische Zeitschrift</i> , <b>82</b> , 196–203.
Uhen (2008): 447	<b>Uhen, M. D.</b> 2008. A new Xenorophus-like odontocete cetacean from the Oligocene of North Carolina and a discussion of the basal odontocete radiation. <i>Journal of Systematic Palaeontology</i> , <b>6</b> , 433–452.

Fordyce (2009): 213	<b>Fordyce, R. E.</b> 2009. Cetacean fossil record. Pp. 207–215 in W. F. Perrin, B. Würsig & J. G. M. Thewissen (eds) <i>Encyclopedia of Marine Mammals, 3rd Ed.</i> Academic Press, New York.
Kimura <i>et al.</i> (2009): 169	<b>Kimura, T., Hasegawa, Y. &amp; Okumura, Y.</b> 2009. Early Miocene Platanistoid from the Mizunami Group, Central Japan. <i>Paleontological Research</i> , <b>13</b> , 167–171.
Kazár (2010): 548	<b>Kazár, E.</b> 2010. Revision of the genus <i>Pachyacanthus</i> Brandt, 1871 (Mammalia: Cetacea: Odontoceti). <i>Annalen des Naturhistorischen Museums in Wien</i> , <b>112</b> , 537–568.
Barnes <i>et al.</i> (2010): 455	(See main text)
Cione <i>et al.</i> (2011): 428	(See main text)
Geisler <i>et al.</i> (2011): 6	(See main text)
Gatesy <i>et al.</i> (2012): 492	<b>Gatesy, J., Geisler, J. H., Chang, J., Buell, C., Berta, A., Meredith, R. W., Springer, M. S. &amp; McGowen, M. R.</b> 2012. A phylogenetic blueprint for a modern whale. <i>Molecular Phylogenetics and Evolution</i> , <b>66</b> , 479–506.
Aguirre-Fernández <i>et al.</i> (2014): 208	<b>Aguirre-Fernández, G. &amp; Fordyce, R. E.</b> 2014. <i>Papahu taitapu</i> , gen. et sp. nov., an early Miocene stem odontocete (Cetacea) from New Zealand. <i>Journal of Vertebrate Paleontology</i> , <b>34</b> , 195–210.
Bianucci <i>et al.</i> (2014): 6	(See main text)
Geisler <i>et al.</i> (2014): 385	<b>Geisler, J. H., Colbert, M. W. &amp; Carew, J. L.</b> 2014. A new fossil species supports an early origin for toothed whale echolocation. <i>Nature</i> , <b>508</b> , 383–396.
Gutstein <i>et al.</i> (2014): 64	(See main text)
Lambert <i>et al.</i> (2014): 987	(See main text)
Murakami <i>et al.</i> (2014): 140	<b>Murakami, M., Shimada, C., Hikida, Y. &amp; Hirano, H.</b> 2014. Asymmetrical basal delphinoid skull from the upper Lower Miocene Yamato Formation of Hokkaido, Northern Japan: Implications on evolution of cranial asymmetry and symmetry in Odontoceti. <i>Paleontological Research</i> , <b>18</b> , 134–149.
Tanaka & Fordyce (2014): 2	(See main text)
Viglino <i>et al.</i> (2014): 275	<b>Viglino, M., Flores, D. A., Ercoli, M. D. &amp; Álvarez, A.</b> 2014. Patterns of morphological variation of the vertebral column in dolphins. <i>Journal of Zoology</i> , <b>294</b> , 267–277.
Gutstein <i>et al.</i> (2015): 342	<b>Gutstein, C. S., Horwitz, F., Valenzuela-Toro, A. M. &amp; Figueroa-Bravo, C. P.</b> 2015. Cetáceos fósiles de Chile: Contexto evolutivo y paleobiogeográfico. <i>Publicación Ocasional del Museo Nacional de Historia Natural, Chile</i> , <b>63</b> , 339–383.

Lambert <i>et al.</i> (2015): 81	<b>Lambert, O., de Muizon, C. &amp; Bianucci, G.</b> 2015. A new archaic homodont toothed cetacean (Mammalia, Cetacea, Odontoceti) from the early Miocene of Peru. <i>Geodiversitas</i> , <b>37</b> , 79–108.
Murakami <i>et al.</i> (2015): 103	<b>Murakami, M., Shimada, C., Hikida, Y. &amp; Hirano, H.</b> 2015. New fossil remains from the Pliocene Koetoi Formation of northern Japan provide insights into growth rates and the vertebral evolution of porpoises. <i>Acta Palaeontologica Polonica</i> , <b>60</b> , 97–111.
Tanaka & Fordyce (2015a): 29	(See main text)
Tanaka & Fordyce (2015b): 13	(See main text)
Aguirre-Fernández <i>et al.</i> (2016): 73	<b>Aguirre-Fernández, G., Carrillo-Briceño, J. D., Sánchez, R., Amson, E. &amp; Sánchez-Villagra, M. R.</b> 2016. Fossil cetaceans (Mammalia, Cetacea) from the Neogene of Colombia and Venezuela. <i>Journal of Mammalian Evolution</i> , <b>24</b> , 71–90.
Boersma & Pyenson (2016): 5	(See main text)
Buono <i>et al.</i> (2016): 325	<b>Buono, M. R., Viglino, M., Cozzuol, M. A. &amp; Lucero, S.</b> 2016. Descifrando la historia evolutiva de los Neoceti (Mammalia Cetacea) Aportes del registro fósil del Neógeno del Atlántico Sudoccidental. <i>Contribuciones del MACN</i> , <b>6</b> , 323–334.
Tanaka & Fordyce (2016): 16	(See main text)
Godfrey <i>et al.</i> (2016): 166	<b>Godfrey, S. J., Uhen, M. D., Osborne, J. E. &amp; Edwards, L. E.</b> 2016. A new specimen of <i>Agorophius pygmaeus</i> (Agorophiidae, Odontoceti, Cetacea) from the early Oligocene Ashley Formation of South Carolina, USA. <i>Journal of Paleontology</i> , <b>90</b> , 154–169.
Marx <i>et al.</i> (2016): 126	(See main text)
Tanaka & Fordyce (2017): 380	(See main text)
Boersma <i>et al.</i> (2017): 3	(See main text)
Boessenecker <i>et al.</i> (2017): 5	<b>Boessenecker, R. W., Fraser, D., Churchill, M. &amp; Geisler, J. H.</b> 2017. A toothless dwarf dolphin (Odontoceti: Xenorophidae) points to explosive feeding diversification of modern whales (Neoceti). <i>Proceedings of the Royal Society of London. Series B: Biological Sciences</i> , <b>284</b> , 20170531.
Godfrey <i>et al.</i> (2017): 3	(See main text)
Tanaka <i>et al.</i> (2017): 20	<b>Tanaka, Y., Abella, J., Aguirre-Fernandez, G., Gregori, M. &amp; Fordyce, R. E.</b> 2017. A new tropical Oligocene dolphin from Montanita/Olon, Santa Elena, Ecuador. <i>PLoS One</i> , <b>12</b> , e0188380.
Albright <i>et al.</i> (2018): 15	<b>Albright, L. B., Sanders, A. E. &amp; Geisler, J. H.</b> 2018. An unexpectedly derived odontocete from the Ashley Formation (upper Rupelian) of South



	Carolina, U.S.A. <i>Journal of Vertebrate Paleontology</i> , 38, 1–15.
Bianucci <i>et al.</i> (2018a): 2	(See main text)
Bianucci <i>et al.</i> (2018b): 263	<b>Bianucci, G., Collareta, A., Bosio, G., Landini, W., Gariboldi, K., Gioncada, A., Lambert, O., Malinverno, E., de Muizon, C., Varas-Malca, R., Villa, I. M., Coletti, G., Urbina, M. &amp; Di Celma, C.</b> 2018. Taphonomy and palaeoecology of the lower Miocene marine vertebrate assemblage of Ullujaya (Chilcatay Formation, East Pisco Basin, southern Peru). <i>Palaeogeography, Palaeoclimatology, Palaeoecology</i> , <b>511</b> , 256–279.
Di Celma <i>et al.</i> (2018): 264	<b>Di Celma, C., Malinverno, E., Collareta, A., Bosio, G., Gariboldi, K., Lambert, O., Landini, W., Pierantoni, P. P., Gioncada, A., Villa, I. M., Coletti, G., de Muizon, C., Urbina, M. &amp; Bianucci, G.</b> 2018. Facies analysis, stratigraphy and marine vertebrate assemblage of the lower Miocene Chilcatay Formation at Ullujaya (Pisco basin, Peru). <i>Journal of Maps</i> , <b>14</b> , 257–268.
Nelson & Uhen (2018): 3	<b>Nelson, M. D. &amp; Uhen, M. D.</b> 2018. First occurrence of a squalodelphinid (Cetacea, Odontoceti) from the early Miocene of Washington State. <i>Journal of Vertebrate Paleontology</i> , <b>38</b> , e1428197.
Viglino <i>et al.</i> (2018a): 261	(See main text)
Viglino <i>et al.</i> (2018b): 511	(See main text)
Cuitiño <i>et al.</i> (2019): 112	(See main text)
Di Celma <i>et al.</i> (2019): 400	<b>Di Celma, C., Pierantoni, P. P., Malinverno, E., Collareta, A., Lambert, O., Landini, W., Bosio, G., Gariboldi, K., Gioncada, A., de Muizon, C., Molli, G., Marx, F. G., Varas-Malca, R. M., Urbina, M. &amp; Bianucci, G.</b> 2019. Allostratigraphy and paleontology of the lower Miocene Chilcatay Formation in the Zamaca area, East Pisco basin, southern Peru. <i>Journal of Maps</i> , <b>15</b> , 393–405.
Gaetán <i>et al.</i> (2019): 1	(See main text)
Kimura (2019): 3	<b>Kimura, T.</b> 2019. First squalodelphinid from the early Miocene of the Pacific realm in the Northern Hemisphere. <i>Journal of Vertebrate Paleontology</i> , <b>38</b> , 1–6.
Bianucci <i>et al.</i> (2020): 3	(See main text)
Coombs <i>et al.</i> (2020): 12	<b>Coombs, E. J., Clavel, J., Park, T., Churchill, M. &amp; Goswami, A.</b> 2020. Wonky whales: the evolution of cranial asymmetry in cetaceans. <i>BMC Biology</i> , <b>18</b> , 86.
Nelson & Uhen (2020): 1506	<b>Nelson, M. D. &amp; Uhen, M. D.</b> 2020. A new platanistoid, <i>Perditicetus yaconensis</i> gen. et sp. nov. (Cetacea, Odontoceti), from the Chattian–

	Aquitanian Nye Formation of Oregon. <i>Journal of Systematic Palaeontology</i> , <b>18</b> , 1497–1517.
Viglino <i>et al.</i> (2020): 4	<b>Viglino, M., Gaetán, C. M., Cuitiño, J. I. &amp; Buono, M. R.</b> 2020. First toothless platanistoid from the early Miocene of Patagonia: the golden age of diversification of the Odontoceti. <i>Journal of Mammalian Evolution</i> . doi: 10.1007/s10914-020-09505-w