## Supplemental material 2

## A new species of *Plohophorus* Ameghino (Cingulata, Glyptodontidae) from the latest Pliocene–earliest Pleistocene of the Pampean Region (Argentina): the last survivor of a Neogene lineage

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**Supplementary 2:** Character matrix. Character-taxon matrix used in the cladistics analysis (Part 1)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** |
| **Euphractus sexcintus** | - | 0 | 0 | 0 | 1 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - | 1 | 0 | 0 | 1 | 0 |
| **Pampatherium humdboltii** | - | 0 | 0 | 0 | 1 | - | 0 | 0 | ? | 0 | 0 | 0 | 0 | 0 | - | 1 | 1 | 0 | 1 | 0 |
| **Propalaehoplophorus australis** | 0 | 0 | 0 | 0 | 1 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 0 | 0 | 1 | 0 |
| **Eucinepeltus petestatus** | 0 | 0 | 0 | 0 | 1 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 0 | 0 | ? | 0 |
| **Cochlops muricatus** | 0 | 0 | 0 | 0 | 1 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | ? | 0 |
| **Hoplophorus euphractus** | ? | 0 | 1 | 0 | ? | ? | 0 | ? | 1 | 0 | 0 | ? | ? | 1 | ? | ? | ? | ? | ? | 0 |
| **Pseudoplohophorus absolutus** | 0 | 0 | 0 | 0 | 1 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | ? | 1 | 0 | 0 | 0 | 0 |
| **Glyptotherium texanum** | 1 | 0 | 0 | 0 | 1 | - | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 2 | 0 | 0 |
| **Glyptotherium cylindricum** | ? | ? | ? | 0 | 1 | ? | ? | ? | 0 | 1 | 0 | ? | ? | 1 | 1 | 0 | ? | 2 | 0 | ? |
| **Boreostemma acostae** | 0 | 0 | 0 | 0 | 1 | ? | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 2 | 0 | 0 |
| **Boreostemma venezolensis** | ? | ? | ? | 0 | ? | ? | ? | ? | 0 | 0 | ? | ? | ? | ? | 1 | ? | ? | ? | ? | ? |
| **Glyptodon munizi** | 1 | 1 | 0 | 0 | 1 | - | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 0 |
| **Glyptodon reticulatus** | 1 | 1 | 0 | 0 | 1 | - | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 0 |
| **Glyptodon jatunkhirkhi** | 1 | 1 | 0 | 0 | 1 | ? | 1 | 0 | 0 | 1 | 1 | 0 | ? | 1 | 0 | 0 | 0 | 2 | ? | 0 |
| **Plohophorus figuratus** | 0 | 0 | 0 | 0 | 1 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | ? | 0 |
| **Doedicurus clavicaudatus** | 0 | 0 | 0 | 0 | 1 | - | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 0 | 0 |
| **Eleutherocercus solidus** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 0 | 1 |
| **Eleutherocercus antiquus** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | ? | 1 |
| **Panochthus intermedius** | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | ? | 0 | 1 | ? | 0 | ? | 2 | ? | 0 |
| **Panochthus tuberculatus** | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 2 | 0 | 0 |
| **Propanochthus bullifer** | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| **Neosclerocalyptus ornatus** | 0 | 0 | 1 | 1 | 0 | - | 0 | 0 | ? | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | ? | 0 |
| **Neosclerocalyptus paskoensis** | 0 | 0 | 1 | 1 | 0 | - | 0 | 0 | ? | ? | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 |
| **Plohophorus avellaneneda** | 0 | 0 | 0 | 0 | 1 | - | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 2 | ? | 0 |

Note: ?, missing data.

**Supplementary 2:** Character matrix. Character-taxon matrix used in the cladistics analysis (Part 2)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **20** | **21** | **22** | **23** | **24** | **25** | **26** | **27** | **28** | **29** | **30** | **31** | **32** | **33** | **34** | **35** | **36** | **37** | **38** | **39** |
| **Euphractus sexcintus** | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | - | - | 0 | - | 1 | - | 0 | 0 | - | ? | - |
| **Pampatherium humdboltii** | 1 | 0 | 0 | 1 | 1 | ? | 1 | 0 | 0 | - | - | ? | - | 0 | - | ? | 0 | - | ? | - |
| **Propalaehoplophorus australis** | 0 | 0 | 0 | 0 | 1 | 1 | ? | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | - | 2 | ? |
| **Eucinepeltus petestatus** | 0 | 0 | 0 | 0 | 0 | ? | ? | ? | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 |
| **Cochlops muricatus** | ? | 0 | 0 | 0 | 1 | ? | ? | ? | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 |
| **Hoplophorus euphractus** | ? | ? | 0 | ? | ? | ? | ? | ? | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | ? | - | 0 | 0 |
| **Pseudoplohophorus absolutus** | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | - | 0 | ? |
| **Glyptotherium texanum** | 0 | 0 | 0 | ? | ? | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | - | 1 | 1 |
| **Glyptotherium cylindricum** | 0 | 0 | 0 | ? | ? | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | - | 0 | 1 |
| **Boreostemma acostae** | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | - | 0 | 0 |
| **Boreostemma venezolensis** | 0 | ? | 0 | ? | ? | ? | ? | ? | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | - | 0 | 0 |
| **Glyptodon munizi** | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | - | 0 | 0 |
| **Glyptodon reticulatus** | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | - | 0 | 0 |
| **Glyptodon jatunkhirkhi** | ? | 0 | 0 | ? | ? | 0 | 0 | 1 | ? | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | - | 0 | 0 |
| **Plohophorus figuratus** | 0 | 0 | 0 | ? | ? | ? | ? | 1 | ? | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | - | 0 | 0 |
| **Doedicurus clavicaudatus** | 0 | 2 | 0 | 0 | 0 | 1 | 1 | 1 | ? | 0 | 2 | 0 | 2 | 2 | - | 2 | 0 | 0 | 3 | 0 |
| **Eleutherocercus solidus** | 0 | 1 | 1 | ? | ? | ? | ? | 1 | ? | 0 | 2 | 0 | 2 | 2 | - | 2 | 0 | 1 | 3 | ? |
| **Eleutherocercus antiquus** | ? | 2 | 1 | ? | ? | ? | ? | 1 | ? | 0 | 2 | 0 | 2 | 2 | - | 2 | 0 | 1 | 3 | ? |
| **Panochthus intermedius** | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 3 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | - | 0 | 0 |
| **Panochthus tuberculatus** | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 3 | 1 | 0 | 1 | ? | 0 | 0 | 1 | - | 0 | 0 |
| **Propanochthus bullifer** | ? | ? | 0 | ? | ? | ? | ? | ? | ? | 3 | 1 | 0 | 1 | ? | ? | 0 | 1 | - | 2 | ? |
| **Neosclerocalyptus ornatus** | ? | 0 | 0 | ? | ? | 1 | ? | 1 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 |
| **Neosclerocalyptus paskoensis** | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 |
| **Plohophorus avellaneneda** | ? | 0 | 0 | ? | ? | ? | ? | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | - | 0 | ? |

Note: ?, missing data.

**Supplementary 2:** Character matrix. Character-taxon matrix used in the cladistics analysis (Part 3)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **40** | **41** | **42** | **43** | **44** | **45** | **46** | **47** | **48** | **49** | **50** | **51** | **52** | **53** | **54** | **55** | **56** | **57** | **58** | **59** |
| **Euphractus sexcintus** | - | 0 | - | ? | ? | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - | 0 | - | - | - | 0 | - | - |
| **Pampatherium humdboltii** | - | 0 | - | ? | ? | 0 | 0 | - | 0 | 0 | 0 | 0 | - | 0 | - | - | - | 0 | - | - |
| **Propalaehoplophorus australis** | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | - | 1 | - | 0 | 0 | 0 | - | - |
| **Eucinepeltus petestatus** | ? | 0 | ? | 0 | 0 | 1 | 0 | 0 | ? | 0 | 1 | 1 | - | ? | ? | ? | ? | ? | ? | ? |
| **Cochlops muricatus** | ? | 0 | ? | 0 | 0 | 1 | 0 | 0 | ? | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | - | 0 |
| **Hoplophorus euphractus** | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | ? | ? | 2 | 1 | 1 | 1 | 1 | 1 | 1 | - | 0 |
| **Pseudoplohophorus absolutus** | ? | 0 | ? | 0 | 0 | ? | 0 | 0 | 1 | ? | ? | 2 | 0 | 1 | 1 | 1 | 0 | 0 | - | 0 |
| **Glyptotherium texanum** | 1 | 0 | 1 | 1 | 0 | 2 | 0 | 1 | 0 | 1 | 0 | 0 | - | 0 | - | 0 | 0 | 0 | 1 | - |
| **Glyptotherium cylindricum** | 1 | 0 | 1 | 1 | 0 | 2 | 0 | 1 | 0 | 1 | 0 | 0 | - | 0 | - | ? | ? | 0 | 1 | - |
| **Boreostemma acostae** | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | - | 0 | - | 0 | 0 | 0 | - | - |
| **Boreostemma venezolensis** | 1 | 0 | 1 | 1 | 0 | ? | 1 | 0 | ? | 0 | 0 | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| **Glyptodon munizi** | 1 | 0 | 2 | 1 | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | - | 0 | - | 0 | 0 | 0 | 0 | - |
| **Glyptodon reticulatus** | 1 | 0 | 2 | 1 | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | - | 0 | - | 0 | 0 | 0 | 0 | - |
| **Glyptodon jatunkhirkhi** | 1 | 0 | 1 | 1 | 0 | 2 | 0 | 1 | 0 | 1 | 0 | 0 | - | 0 | - | 0 | 0 | 0 | 0 | ? |
| **Plohophorus figuratus** | 1 | 0 | 1 | ? | ? | 0 | 0 | 0 | 1 | ? | ? | 2 | 0 | 1 | 1 | 1 | 0 | 0 | - | 0 |
| **Doedicurus clavicaudatus** | 1 | 0 | 0 | - | - | 3 | 0 | 0 | 1 | 0 | - | 2 | 1 | 2 | 3 | 0 | 0 | 1 | - | 2 |
| **Eleutherocercus solidus** | ? | 1 | ? | - | - | 3 | 0 | ? | 0 | ? | ? | 2 | 1 | 2 | 1 | 1 | 0 | 1 | - | 1 |
| **Eleutherocercus antiquus** | 1 | 1 | ? | - | - | 3 | 0 | ? | 0 | ? | ? | 2 | 1 | 2 | 1 | 1 | 0 | 1 | - | 1 |
| **Panochthus intermedius** | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 0 | - | 0 |
| **Panochthus tuberculatus** | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 0 | - | 0 |
| **Propanochthus bullifer** | 1 | ? | 1 | 0 | 1 | 0 | 0 | ? | 1 | ? | ? | 2 | 1 | 1 | 2 | 1 | 1 | 0 | - | 0 |
| **Neosclerocalyptus ornatus** | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 0 | 1 | 1 | 1 | 0 | 0 | - | 0 |
| **Neosclerocalyptus paskoensis** | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 0 | 1 | 1 | 1 | 0 | 0 | - | 0 |
| **Plohophorus avellaneneda** | 1 | 0 | ? | 0 | 0 | 0 | 0 | ? | 1 | ? | ? | ? | 0 | 2 | 1 | 1 | 0 | 0 | - | 0 |

Note: ?, missing data.

**Supplementary 2:** Character matrix. Character-taxon matrix used in the cladistics analysis (Part 4)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **60** | **61** | **62** | **63** | **64** | **65** | **66** |
| **Euphractus sexcintus** | - | - | - | - | - | - | - |
| **Pampatherium humdboltii** | - | - | - | - | - | - | - |
| **Propalaehoplophorus australis** | - | - | - | - | - | - | - |
| **Eucinepeltus petestatus** | ? | ? | ? | ? | ? | ? | - |
| **Cochlops muricatus** | 0 | - | - | 0 | 1 | - | 1 |
| **Hoplophorus euphractus** | - | - | - | 1 | ? | ? | 0 |
| **Pseudoplohophorus absolutus** | 1 | 0 | 1 | 1 | 1 | - | 1 |
| **Glyptotherium texanum** | - | - | - | - | - | - | - |
| **Glyptotherium cylindricum** | - | - | - | - | - | - | - |
| **Boreostemma acostae** | - | - | - | - | - | - | - |
| **Boreostemma venezolensis** | - | - | - | - | - | - | - |
| **Glyptodon munizi** | - | - | - | - | - | - | - |
| **Glyptodon reticulatus** | - | - | - | - | - | - | - |
| **Glyptodon jatunkhirkhi** | - | - | - | - | - | - | - |
| **Plohophorus figuratus** | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| **Doedicurus clavicaudatus** | - | - | - | 0 | - | - | - |
| **Eleutherocercus solidus** | - | - | - | 1 | 2 | - | 0 |
| **Eleutherocercus antiquus** | - | - | - | 1 | 2 | - | 0 |
| **Panochthus intermedius** | - | - | - | 1 | 0 | 1 | 0 |
| **Panochthus tuberculatus** | - | - | - | 1 | 0 | 1 | 0 |
| **Propanochthus bullifer** | - | - | - | 1 | 0 | 1 | 0 |
| **Neosclerocalyptus ornatus** | 1 | 1 | 2 | 1 | 1 | - | 0 |
| **Neosclerocalyptus paskoensis** | 1 | 1 | 2 | 1 | 1 | - | 0 |
| **Plohophorus avellaneneda** | 1 | 0 | 1 | 1 | 0 | 0 | 1 |

Note: ?, missing data.