Supplementary File S3. Branch support values obtained for the cladistic analyses.

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Neopterygian Phylogeny: the merger assay

Adriana López-Arbarello<sup>1\*</sup>, and Emilia Sferco<sup>2</sup>

Department of Earth- and Environmental Sciences, Palaeontology and Geobiology and GeoBio-Center, Ludwig Maximilian University, Richard-Wagner-Strasse 10, D-80333 Munich, Germany (a.Lopez-Arbarello@lrz.uni-muenchen.de)

<sup>2</sup>CICTERRA-CONICET-UNC. Av. Velez Sarsfield 1611, X0516GCA, Córdoba, Argentina.

The cladistic analyses were performed with TNT under equal and implied weighting. The weighting strength was determined by using K-values of 3 and 8. Branch support was evaluated also with TNT applying bootstrap expressed as values of GC (groups present/contradicted) through 10000 replicates and calculating Bremer decay indexes for each node. Support measurements were calculated for implied (K=8 and K=3) and equal weighting analyses.

## Equal weighting analyses:

```
Bremer supports (from 3720477 trees, cut 0)
```

```
teronisculus_stensioi
— Australosomus_kochi
— Boreosomus_piveteaui
                                                    Plesiofuro_mingshuica

Plesiofuro_mingshuica

Pachycormus_macropterus

Aspidorhynchus_acutirostris

Ichthyokentema_purbeckensis

Catervariolus_hornemani

Knerichthys_bronni

Pholidophoretes_salvus
Pholidophoretes_salvus
Pholidoctenus_serianus

Parapholidophorus_nybelini

Parapholidorhynchodon_malzanni
Annaichthys_pontegiurinens
100?
                                                                                                                   Pholidorhynchodon_malzanni
Annaichthys_pontegiurinensis
Eurycormus_speciosus

Dorsetichthys_bechei

Siemensichthys_macrocephalus
Thrissops_formosus

Varasichthys_ariasi

Luisiella_feruglioi
Luptolepis_coryphaenoides

Anaethalion_angustus

100?——Elops_saurus

Hiodon_alosoides

Orthogonikleithrus_hoelli

f——Ebertichthys_ettlingensis
                                                                                                                                                                                                                                          - orthogonikieithrus_hoelli
Ebertichthys_ettlingensis
- Diplomystus_dentatus
- Brycon_meeki
- Salmo_salar
                                                                                                                                                                                                                                                                             — Rhacolepis_buccalis
— Notelops_brama
                                                                                                Dapedium stollorum
                                                                                                          Dapedium_pholidotum
Dapedium_caelatum
                                                                                                                  Tonoscopus_cyprinoides

Quetzalichtys_perrilliatae

Oshunia_brevis
                                                                                                                                                                         Oshunia_brevis
- Amiopsis_woodwardi
- Amiopsis_lepidota
- Solnhofenamia_elongata
- Cratoamia_gondwanica
- Calamopleurus_cylindricus
- Vidalamia_catalunica
- Pachyamia_mexicana
- Pachyamia_latimaxillaris
- Cyclurus_kehreri
- Cyclurus_gurleyi
- Amia_pattersoni
- Amia_scutata
- longaeva
                                                                                                                   Ticinolepis_longaeva
Ticinolepis_crassidens
— Sangiorgioichthys_sui
4 — Sangiorgioichthys_valmarensis
Sangiorgioichthys_aldae
                                                                                                                              Sangiorgioichthys_aldae

Kyphosichthys_grandei

Semionotus_elegans
Semionotus_capensis
Semionotus_bergeri

Propterus_elongatus

Notagogus_denticulatos
Macrosemius_rostratus
Histionotus_oberndorferi
Semiolepis_brembanus
Paralepidotus_ornatus
Macrosemimius_fegerti
Callipurbeckia_minor
Tlayuamichin_itztli
Occitanichthys_canjuer
                                                                                                                                                      Tlayuamichin_itztli
Occitanichthys_canjuersensis
Neosemionotus_puntanus
Isanichthys_palustris
Isanichthys_lertboosi
Lepidotes_gigas
Camerichthys_lunae
Scheenstia_zappi
Camerichthys_lunae
Scheenstia_maximus
Scheenstia_mantelli
                                                                                                                                                                            Thaiichthys_buddhabutrensis

— Araripelepidotes_temnurus

— Pliodetes_nigerienesis

5 — Obaichthys_decoratus

Dentilepisosteus_laevis

Masillosteus_kelleri
                                                                                                                                                                                                           Masillosteus_kelleri
Masillosteus_janeae
Cuneatus_wileyi
Cuneatus_cuneatus
Lepisosteus_osseus
Atractosteus_spatula
```

Equal weighting analyses: 10000 replicates, cut=1 (tree 0) - Standard Bootstrap GC values, 100 Ichthyokentema\_purbeckensis Catervariolus\_hornemani r10-— Pholidophorus\_gervasutti L<sub>1 1</sub> Knerichthys bronni - Pholidorhynchodon malzanni - Parapholidophorus nybelini Annaichthys\_pontegiurinensis
Eurycormus\_speciosus
Dorsetichthys\_bechei
Siemensichthys\_macrocephalus L<sub>9 5</sub> Varasichthys\_ariasi
\_\_\_ Tharsis\_dubius Tharsis\_dubius

Luisiella\_feruglioi

Leptolepis\_coryphaenoides

Thrissops\_formosus

Anaethalion\_angustus

Elops\_saurus

Hiodon\_alosoides

Orthogonikleithrus\_hoelli - Orthogonikleithrus\_hoelli
- Ebertichthys\_ettlingensis
- Diplomystus\_dentatus
- Brycon\_meeki
9- Salmo\_salar
49- Rhacolepis\_buccalis Robustichthys\_luopingensis
Archaeosemionotus\_connectens
— Watsonulus\_eugnathoides
— Panxianichthys\_imparilis
— Ophionsis\_muensteri hiopsis\_muensteri
-Teoichthys\_brevipina
-Ophiopsiella\_attenuata
-Macrepistius\_arenatus
turus\_furcatus Ophiopsis US\_TRICATES

Lonoscopus\_cyprinoides

Quetzalichtys\_perrilliatae

Oshunia\_brevis

Amiopsis\_woodwardi

Amiopsis\_lepidota - Cratoamia gondwanica - Cratoamia\_gondwanica - Calamopleurus\_cylindricus - Vidalamia\_catalunica 8 - Pachyamia\_mexicana 8 - Pachyamia\_latimaxillaris Dapedium\_stollorum

Dapedium\_pholidotum
Dapedium\_caelatum
Ticinolepis\_longaeva
Ticinolepis\_crassidens

Kyphosichthys\_grandei

Sangiorgioichthys\_sui
Sangiorgioichthys\_aldae

Semiolepis\_brembanus
Paralepidotus\_ornatus
Semionotus\_elegans

Semionotus\_elegans

Semionotus\_bergeri

Macrosemimimus\_fegerti

Callipurbeckia\_minor
Tidayuamichin\_itztli
Occitanichthys\_canjuersensis

Propterus\_elongatus

Macrosemius\_rostratus
Histionotus\_oberndorferi

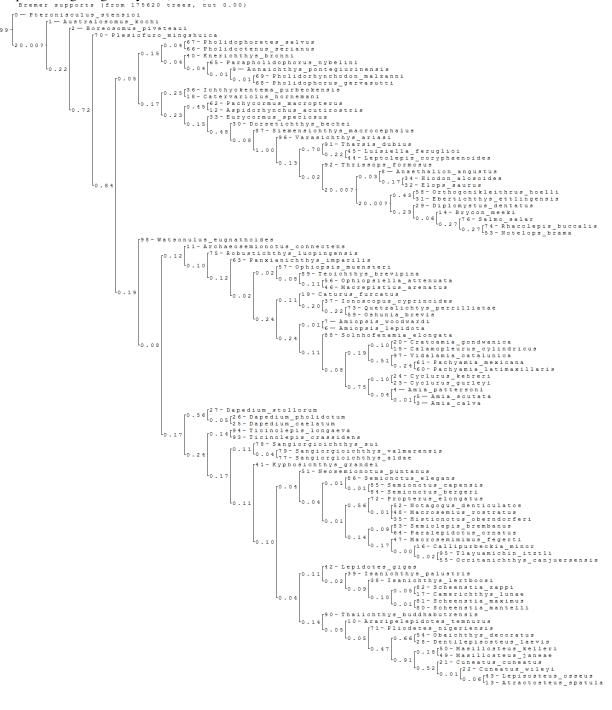
Neosemionotus\_puntanus

Isanichthys\_palustris
Isanichthys\_lertboosi
Lepidotes\_gigas

Lepidotes\_gigas

Lepidotes\_gigas - Amia\_calva L3 8 Lepidotes\_gigas
Scheenstia\_zappi L22 — Camerichthys\_lunae
— Scheenstia\_maximus Scheenstia mantelli

## Implied weighting analyses (K = 3):



```
Implied weighting analyses (K = 3):
```

```
values, 1000 replicates, cut=1 (tree 0) - Standard Bootstrap
                          teronisculus stensioi
                                         Australosomus_kochi
Boreosomus_piveteaui
Plesiofuro_mingshuica
                                                                                                                                                   - Pholidophoretes
100
                                                                                                                                              — Pholidoctenus_serianus
- Knerichthys_bronni
                                                                                                                                                      knerichtnys_bronni
— Pholidorhynchodon_malzanni
— Pholidophorus_gervasutti
— Parapholidophorus_nybelini
— Annaichtnys_pontegiurinensis
Pachycormus_macropterus
                         40
                                                                                                                                                    · Aspidorhynchus_acutirostris
Eurycormus_speciosus
                                                                                                                                                              - Ichthyokentema_purbeckensis
- Dorsetichthys_bechei
                                                                                                                                                                 Varasichthys_ariasi
Tharsis_dubius
                                                                                                                                                                                                         Tharsis_dubius

Luisiella_feruglioi

Leptolepis_coryphaenoides

Thrissops_formosus

Anaethalion_angustus

Hiodon_alosoides

12-

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Panxianichthys_imparilis
Robustichthys_luopingensis
Archaeosemionotus_connectens

Ophiopsis_muensteri

Teoichthys_brevipina
1  Ophiopsiella_attenuata
Macrepistius_arenatus
Ionoscopus_cyprinoides

55  Quetzalichtys_perrilliatae
Oshunia_brevis

Caturus furcatus
                                                                                                                                                                                 Caturus_furcatus
Amiopsis_woodwardi
Amiopsis_lepidota
Solnhofenamia_elongata
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— Cratoamia_gondwanica

— Calamopleurus_cylindricus

— Vidalamia_catalunica
9 - Pachyamia_mexicana
Pachyamia_latimaxillaris

— Cyclurus_kehreri

— Cyclurus_gurleyi

— Amia_pattersoni
2 - Amia_calva
                                                                                                                                                Dapedium_stollorum
Dapedium_pholidotum
Dapedium_caelatum
Ticinolepis_longaeva
Ticinolepis_crassidens

Kyphosichthys_grandei
31-
84-
Sangiorgioichthys_sui
84-
Sangiorgioichthys_aldae
Neosemionotus_puntanus
Semionotus_elegans
32-
23-
Semionotus_capensis
Fropterus_elongatus
87-
Notagogus_denticulatos
                                                                                                                                                                                                          - Notagogus_denticulatos
- Macrosemius_rostratus
                                                                                                                                                                                                               Histionotus_oberndorferi
- Semiolepis_brembanus
- Paralepidotus_ornatus
- Macrosemimimus_fegerti
- Callipurbeckia_minor
                                                                                                                                                                                                                                             - Tlayuamichin_itztli
- Occitanichthys_canjuersensis
                                                                                                                                                                                                             Lepidotes_gigas
Isanichthys_palustris

Isanichthys_lertboosi

Scheenstia_zappi
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Araripelepidotes_temnurus

Pliodetes_nigeriensis

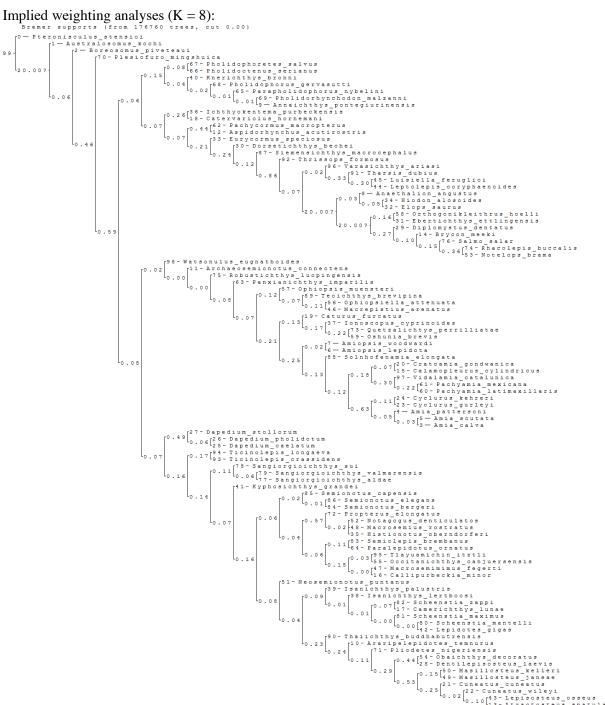
Obaichthys_decoratus

Dentilepisosteus_laevis

Masillosteus_telleri

Masillosteus_janeae

Cuneatus_cuneatus
                                                                                                                                                                                                                                                                                                Cuneatus_wileyi
Cuneatus_sileyi
68- Lepisosteus_osseus
Atractosteus_spatula
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teronisculus_stensioi

Australosomus_kochi

Boreosomus_piveteaui

Plesiofuro_mingshuica
                                                                                  - Pholidophoretes
100

    Pholidoctenus serianus

                                                                                  Pholidorhynchodon_malzanni
Pholidophorus_gervasutti
Parapholidophorus_nybelini
                                                                                  Knerichthys_bronni
Annaichthys_pontegiurinensis
Pachycormus_macropterus
Aspidorhynchus_acutirostris
Ichthyokentema_purbeckensis
                                                                                  Catervariolus_hornemani
Eurycormus_speciosus

Dorsetichthys_bechei

Siemensichthys_macrocephalus
                       Lag
                                                                                                                - Varasichthys
                                                                                                                                                               ariasi
                                                                                                                Thatsac___
Luisiella_feruglioi
52-___Leptolepis_coryphaenoides
                                                                                                                           Thrissops_formosus

Anaethalion_angustus
                                                                                                                                                       Hiodon alosoides
                                                                                                                                                    — Elops_saurus
...o____ Orthogonikleithrus_hoelli
                                                                                                                                                                  - Orthogonikleithrus_hoelli
- Ebertichthys_ettlingensis
- Diplomystus_dentatus
- Brycon_meeki
3- Salmo_salar
42- Rhacolepis_buccalis
76- Notelops_brama
                                                                       Robustichthys_luopingensis
Archaeosemionotus_connectens

Watsonulus_eugnathoides

Panxianichthys_imparilis

24-10-46- Teoichthys_brevipina
Ophiopsis_muensteri

Ohiopsiella_attenuata
Macrepistius_arenatus

Caturus_furcatus

Tonoscopus cyprinoides
                                                                                                           · Ionoscopus_cyprinoides
____Quetzalichtys_perrilliatae
                                                                                                              Oshunia_brevis
Amiopsis_woodwardi
Amiopsis_lepidota
Solnhofenamia_elongata
                                                                                                                                        Pachyamia mexicana
Pachyamia latimaxillaris
                                                                                                                                         Dapedium_stollorum
_____ Dapedium_pholidotum
____ Dapedium_caelatum
                                                                                        Dapedium_caelatum
- Ticinolepis_longaeva
- Ticinolepis_crassidens

Kyphosichthys_grandei
- Sangiorgioichthys_sui
- Sangiorgioichthys_valmarensis
- Sangiorgioichthys_aldae
- Semionotus_elegans
- Semionotus_capensis
- Semionotus_bergeri
- Propterus elongatus
                                                                                                             Propterus_elongatus
Notagogus_denticulatos
Macrosemius_rostratus
Histionotus_oberndorferi
Semiolepis_brembanus
Paralepidotus_ornatus
Macrosemimimus_fegerti
Callipurbeckia_minor
7 Tlayuamichin_itztli
Occitanichthys_cani
                                                                                                           Tlayuamichin_itztli
Occitanichthys_canjuersensis
Neosemionotus_puntanus

Isanichthys_lertboosi

Lepidotes_gigas
Scheenstia_zappi
Camerichthys_lunae
Scheenstia_maximus
Scheenstia_mantelli
                                                                                                                             Thaiichthys_buddhabutrensis
Araripelepidotes_temnurus
Pliodetes_nigeriensis
21  Obaichthys_decoratus
Dentilepisosteus_laevis
87  Masillosteus_kelleri
                                                                                                                                                          Masillosteus_keileri
Masillosteus_janeae

Cuneatus_cuneatus

Cuneatus_wileyi

Lepisosteus_osseus

Atractosteus_spatula
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