A Baraminological Analysis of the Landfowl (Aves: Galliformes)

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Overview

• Background on the galliform birds

• Methods, results & conclusions from a statistical baraminology study

• Methods, results & conclusions from an analysis of interspecific hybridization in the landfowl

• Overall conclusions & discussion
Introduction to the Galliform Birds

- Order Galliformes = landfowl
  - ≈ 281 extant species in 81 genera, 7 families & 2 superfamilies (sometimes suborders or orders)

- Found on almost all continents

- **Familiar** = chickens, turkeys, pheasants, grouse, quail, partridges, peacocks & guineafowl

- **Less Familiar** = mound-builders, scrub-fowl, brush turkeys, guans, chacalacas & curassows
Galliformes = 7 Families

Superfamily Cracoidea
(2 Families)

Megapodiidae: Mound-builders
Cracidae: Chacalacas, Guans & Curassows
Galliformes = 7 Families

Superfamily Phasianoidea
(Remaining 5 Families)

Meleagrididae: Turkeys

Tetraonidae: Grouse
Galliformes = 7 Families

Superfamily Phasianoidea
(Remaining 5 Families)

Odontophoridae: New World Quail

Phasianidae: Old World Quail, Pheasants & Partridges
Galliformes = 7 Families

Superfamily Phasianoidea
(Remaining 5 Families)

Numididae: Guineafowl
Baraminology of the Galliform Birds

- Landfowl are an osteologically uniform group
- They have been grouped together consistently since the inception of avian taxonomy
- From a baraminological perspective then:
  - Form a distinct cognitum
  - Quite possibly an apobaramin
Statistical Baraminology

• We analyzed a published morphological dataset
  ▪ Dyke et al., 2003, Zool. J. Linn. Soc. 137:227-244
  ▪ 102 characters (primarily osteological)
  ▪ 60 extant landfowl taxa from all 7 families
  ▪ 5 extant waterfowl taxa (Aves: Anseriformes)
  ▪ Baraminic Distance Correlation Analysis (BDC)
  ▪ Classical Multidimensional Scaling (MDS)
    ➢ Uncorrected distance matrices
    ➢ Minimal & 3-D stress calculated
  ▪ BDC also performed for subsets of complete dataset
BDC: Complete Dataset

c.r. = 0.95
98 characters

Phasianoidea

Cracoidea + Anseriformes
MDS: Complete Dataset

- Minimal stress = 12 dim.
- 3D stress = 0.279
BDC vs. MDS

• BDC suggests the possibility of 2 holobaramins

• But MDS seems to show 5 potential holobaramins

• To further test this possibility, we performed BDC for various subsets of taxa in the complete data set
  ▪ Geometry of taxic patterns can adversely influence BDC results (see Cavanaugh et al., 2003)
  ▪ Removal of taxa that dominate correlation calculations might reveal significant – or + correlation patterns undetectable in the complete dataset (Wood, 2005)
BDC: Subsets of Complete Dataset

Phasianoidea

Cracoidea + Anseriformes
BDC: Cracoidea & Anseriformes

- c.r. = 0.95
- 99 characters

Anseriformes

- Anhima
- Chauna
- Anseranas
- Dendrocygna
- Anas
- Megapodius
- Macrocephalon
- Alectura
- Penelope
- Notocrax
- Crax
- Ortalis
- Aburria

Cracidae

Megapodiidae
BDC: Megapodiidae & Anseriformes

c.r.=0.95
99 characters

Anseriformes

Megapodiidae

Anhima
Chauna
Anseranas
Dendrocygna
Anas
Megapodius
Macrocephalon
Alectura
BDC: Megapodiidae & Cracidae

c.r. = 0.95
101 characters

Megapodiidae

Cracidae

- Megapodius
- Macrocephalon
- Alectura
- Penelope
- Nothocrax
- Crax
- Ortalis
- Aburria
BDC: Phasianoidea Alone

c.r. = 0.95
100 characters

Remaining Phasianoidea

Numididae
BDC: Numididae & Every Other Remaining Phasianoidea

c.r. = 0.95

Every Other Remaining Phasianoidea

Numididae
Conclusions from Stats Alone

• Both BDC and MDS suggest the possibility of four holobaramins within the landfowl order
  1) Megapodiidae – Mound-builders
  2) Cracidae – Chacalacas, guans & curassows
  3) Numididae – Guineafowl
  4) Remaining Phasianoidea – Turkeys, grouse, Old & New World quail, etc.

• BUT take a LOOK at the hybridization data!
# Hybridization: Phasianoidea + Cracidae

<table>
<thead>
<tr>
<th>Order</th>
<th>Species</th>
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<tbody>
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<td>CRACIDAE</td>
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<td>Ortalis</td>
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## Hybridization: Megapodiidae

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Overall Conclusions

• Hybridization data connects three of the provisional holobaramins (six families)

• Overall then, we conclude that the landfowl are composed of two monobaramins
  1) Megapodiidae – Enough discontinuity from stats for holobaraminic status?
  2) [Phasianoidea + Cracidae] – Not enough discontinuity around this group for holobaramin
Discussion

• This arrangement should not surprise creationists.

• The idea that 6 families could be part of a single mono/holobaramin is not incompatible with “traditional” avian taxonomy.

• The 5 currently recognized families in the Superfamily Phasianoidea have, until only recently, been considered subfamilies in a more broadly conceived Family Phasianidae.
Discussion

• Perhaps the most surprising result then, is the inclusion of the Cracidae in the phasianoid monobaramin

• This too is supported by more recent phylogenetic analyses of the landfowl
  ▪ The Cracidae are more closely related to the Phasianoidea than once assumed
  ▪ Recent studies suggest that the cracids are a sister group of the phasianoids (instead of the megapodes)
Discussion

• This study:
  1) Emphasizes the continued value of hybridization data in baraminological research
  2) Illustrates the importance of using multiple lines of evidence when delimiting holobaramins
  3) Is suggestive of the potential uses and limitations of statistical baraminology