# A Baraminological Analysis of the Landfowl (Aves: Galliformes)



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#### <u>Overview</u>

- 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
- <u>Familiar</u> = chickens, turkeys, pheasants, grouse, quail, partridges, peacocks & guineafowl
- <u>Less Familiar</u> = mound-builders, scrub-fowl, brush turkeys, guans, chacalacas & curassows

# Superfamily Cracoidea (2 Families)



Megapodiidae: Mound-builders



Cracidae: Chacalacas, Guans & Curassows

# Superfamily Phasianoidea (Remaining 5 Families)



Meleagrididae: Turkeys



Tetraonidae: Grouse

# Superfamily Phasianoidea (Remaining 5 Families)



Odontophoridae: New World Quail



Phasianidae: Old World Quail, Pheasants & Partridges

# 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



# **MDS: Complete Dataset**



#### **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**



#### **BDC: Cracoidea & Anseriformes**



## **BDC: Megapodiidae & Anseriformes**



Anhima Chauna Anseranas Dendrocygna Anas Megapodius Macrocephalon Alectura

c.r.=0.95 99 characters

Anseriformes

Megapodiidae

### **BDC: Megapodiidae & Cracidae**



#### **BDC:** Subsets of Complete Dataset



## **BDC: Phasianoidea Alone**

c.r.=0.95 100 characters





# BDC: Numididae & Every Other Remaining Phasianoidea

c.r.=0.95 101 characters

> 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!

## From "Avian Hybrids of the World"



### Hybridization: Phasianoidea + Cracidae

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26 27	28	29	30	31 32	33	34	35	36
CRACIDAE	Pipile 1																																		
	Ortalis 2																																		
	Penelope 3																																		_
	Mitu 4							-											-																_
	Pauxi 5							-											-																
	Crax 6																																		_
NUMIDIDAE	Acryllium 7																																		_
	Numida 8																																		_
TETRAONIDAE	Dendragapus 9																																		_
	Centrocercus 10																																	_	_
	Falcipennis 11																																	_	_
	Tympanuchus 12		_																											_			_	_	_
	Bonasa 13																																	_	_
	Tetrao 14																							_						_					_
	Lagopus 15																																		_
MELEAGRIDIDAE	Meleagris 16																																		_
	Agriocharus 17																																		_
PHASIANIDAE	Corturnix 18																																	Щ.	_
	Alectoris 19																							_											_
	Perdix 20																																		_
	Gallus 21																																		_
	Pavo 22																																		_
	Catreus 23																											-							_
	Lophura 24																																	_	_
	Crossoptilon 25																							_										_	_
	Chrysolophus 26																																		
	Pucrasia 27						-	-											-																
	Lophophorus 28						-	-											-																
	Tragopan 29						-												-																
	Syrmaticus 30						-																												
	Phasianus 31																																		
	Ammoperdix 32																																		
ODONTOPHORIDAE	Callipepla 33																																		
	Oreortyx 34																																		
	Colinus 35																																		
	Philortyx 36																																		

# Hybridization: Megapodiidae

		1	2	3	4	5	6	7	8	9	10	11	12	13
Alectura I. lathami	1													
A. I. purpureicollis	2													
Megapodius affinis	3													_
M. geelvinkianus	4			-										
M. reinwardt	5													
M. c. cumingii	6													
M. c. pusillus	7													
M. forstenii	8													
M. freycinet	9													
M. eremita	10													
Talegalla cuvieri	11													
T. fuscirostris	12													
T. jobiensis	13													

#### **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