

Natural History of Birds: Evolution, Classification and Distribution

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As discussed in class, evolutionary convergence has often happened in birds.

At The Field Museum we saw an American Meadowlark and an African Yellow-throated Longclaw. The two species look nearly identical, yet exist on continents separated by the Atlantic Ocean. It seems their habitats are very similar and so natural selection resulted in the same solutions over time.

Of particular interest is evolutionary convergence in raptors. The most well-known example, is in vultures. The American Ornithologists' Union (AOU) has re-classified New World vultures quite often in recent years. Most recently, the North American committee of the AOU determined that their own 1998 decision to move New World vultures (family Cathartidae) from the order Falconiformes to the order Ciconiiformes (which includes storks) was an error. So in 2007, New World vultures were moved back into the order Falconiformes. The 2007 decision was made based on re-evaluation of 1998 evidence, as well as new information from continuing genetic studies (e.g., Cracraft et al. 2004, Fain and Houde 2004, Ericson et al. 2006). This research is not conclusive on where New World vultures belong, so the AOU decided to place them provisionally back in the order Falconiformes. (*The*

check-list of North American birds, as classified by the North American committee is attached.)

Interestingly, the South American committee of the AOU went a different direction based on the same information. Rather than return New World vultures to the order Falconiformes, they opted to place them provisionally in a new order all their own, Cathartiformes. This is because the South American committee of the AOU believes the genetic research will eventually support this decision.

Brief online research, determined that a similar, official list of raptor taxonomy on an international scale doesn't formally exist. However, the XXV International Ornithological Congress is happening August 22-28, 2010, in Brazil. According to the welcome message by the President, it is hoped that an International Ornithologists Union will be initiated at the conference. Perhaps, this international Union will be able to maintain an international checklist (in partnership with the AOU and other regional groups) of all bird species around the world. It is an exciting possibility.

In the meantime, pending the initiation of such a group and on-going genetic research, the global classification of raptors is very much undecided with slightly different grouping and splitting of species depending on your source of information. Looking at publications over the last few decades, some of the controversies are highlighted.

International raptor classification according to *The Life of Birds, 2nd Edition* (Welty, 1975) includes Cathartidae within the Order Falconiformes. Interestingly, it separates Ospreys in their own family called Pandionidae. (*The AOU North American Committee has since classified Ospreys as a sub-family within the Family Accipitridae, within the Order Falconiformes.*) See the outline below for details on how Welty classified raptors in 1975.

Order Falconiformes

- Family Cathartidae (7 species of vultures, western hemisphere)
- Family Sagittariidae (1 species of Secretary Bird, Africa)
- Family Accipitridae (205 species of eagles, hawks, kites, old-world vultures and harriers, world-wide)
- Family Pandionidae (1 species of Osprey, world-wide)
- Family Falconidae (58 species of falcons and caracaras, world-wide)

Order Strigiformes

- Family Tytonidae (11 species of barn owls, world-wide)
- Family Strigidae (123 species of owls, world-wide)

In *Birds of Prey* (edited by Newton, 1990), it is clearly indicated that raptor classification is unclear. Just the same, the book's authors suggest that perhaps all raptors share a tree-dwelling ancestor approximately 55 million years ago. At the time of that book's printing, it was thought that the Strigids (owls) evolved from this common ancestor species and the remaining four groups split off as follows; approximately 50 million years ago a waterbird species split from the tree-dwelling ancestor and the Cathartids (vultures) evolved from that species approximately 40 million years ago, the Accipitrids (hawks, eagles, etc.) split from the Cathartids,

30-35 million years ago the Falconids (falcons) split from the Accipitrids and then finally, the Sagittariids (Secretary bird) also split off from the Accipitrids a few million years later. The authors also indicate that there seems to be a clear distinction taxonomically between nocturnal raptors (owls) and diurnal raptors (all the rest). Presumably to increase readability for laypersons, detailed information on classification (the term “group” is occasionally used to mean “Family”) is not indicated. However, below is an outline of the classification information provided.

Order Falconiformes

- Family Cathartidae (7 species of New World vultures)
- Family Accipitridae (223 species of hawks, buzzards, eagles, kites, Old World vultures, cuckoo-hawks, harriers, etc.)
- Family Pandionids (1 species of Osprey)
- Family Sagittariids (1 species of Secretarybird - Africa)
- Family Falconids (60 species of falcons)

Order Caprimulgiformes

- “Group” (Family?) Strigids (owls - number of species is not indicated)
- Other “Groups” include nightjars, oilbirds, potoos, and frogmouths.

In *Raptors of the World* (Ferguson-Lee and Christie, 2001) the authors provide much more detail than either of the resources above citing exact research. However, like Newton, they begin by acknowledging that raptor classification has “proved extraordinarily difficult to disentangle” (page 69) and state that the information they provide is “conventional” which implies it may or may not be correct. Notably, these authors classify New World vultures within the Order Ciconiiformes. They also “tentatively” raised the Family Sagittariids (Secretary bird) to its own order

and have excluded owls from their publication altogether without explanation within its nearly 1,000 pages. This is a strong indication that they thought owls were not closely related at all. See the outline below for details of how they decided to classify raptors.

Order Ciconiiformes

- Family Cathartidae (7 species of New World vultures - western hemisphere)

Order Accipitriformes

- Family Pandionidae (1 species of osprey - world-wide)
- Family Accipitridae - divided into 20 sub-families (240 species of hawks, kites, buzzards, eagles, vultures, Old World vultures, harriers, goshawks - world-wide)

Order Sagittariiformes

- Family Sagittariidae (1 species of Secretary bird - Africa)

Order Falconiformes

- Family Daptriidae (9 species of caracaras - western hemisphere)
- Family Herpetotheridae - divided into 3 sub-families (8 species of falcons - western hemisphere)
- Family Falconidae - divided into 2 sub-families (46 species of falcons and kestrels - world-wide)

The raptor classification in the book *Raptors of North America* (Snyder and Snyder, 2006) retains New World vultures (Cathartidae) within the Order Ciconiiformes, and sites the fact that the AOU includes them in with storks. Interestingly, it includes Accipitridae and Pandionidae (osprey) within the Order Falconiformes which more closely resembles current AOU classification, but not exactly. Ironically, it's also very close to the classification used in 1975. (*Because*

the scope of this book is limited to North America, the Secretarybird is not included in any way because it is an African bird.)

Not surprisingly, raptor classification is as ambiguous as songbird classification. Some elements seem relatively sure, such as the notion that owls are a distinct group. However, as mentioned earlier, it will be interesting to see how continuing genetic testing (i.e., the Tree of Life Project) will ultimately group all birds, including raptors. Only then will it be clear which species demonstrate parallel evolution and which demonstrate convergence.

References:

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American Ornithologists Union (North American Committee) Checklist (as of 12/6/09)

Order Falconiformes

Family Cathartidae

- 1 *Coragyps atratus* Black Vulture
- 2 *Cathartes aura* Turkey Vulture
- 3 *Cathartes burrovianus* Lesser Yellow-headed Vulture
- 4 *Gymnogyps californianus* California Condor
- 5 *Sarcoramphus papa* King Vulture

Family Accipitridae

Sub-Family Pandioninae

- 1 *Pandion haliaetus* Osprey

Sub-Family Accipitrinae

- 1 *Leptodon cayanensis* Gray-headed Kite
- 2 *Chondrohierax uncinatus* Hook-billed Kite
- 3 *Elanoides forficatus* Swallow-tailed Kite
- 4 *Gampsonyx swainsonii* Pearl Kite
- 5 *Elanus leucurus* White-tailed Kite
- 6 *Rostrhamus sociabilis* Snail Kite
- 7 *Helicolestes hamatus* Slender-billed Kite
- 8 *Harpagus bidentatus* Double-toothed Kite
- 9 *Ictinia mississippiensis* Mississippi Kite
- 10 *Ictinia plumbea* Plumbeous Kite
- 11 *Milvus migrans* Black Kite **A H**
- 12 *Haliaeetus leucocephalus* Bald Eagle
- 13 *Haliaeetus albicilla* White-tailed Eagle
- 14 *Haliaeetus pelagicus* Steller's Sea-Eagle **A**
- 15 *Busarellus nigricollis* Black-collared Hawk
- 16 *Circus cyaneus* Northern Harrier
- 17 *Circus aeruginosus* Western Marsh Harrier
- 18 *Accipiter soloensis* Gray Frog-Hawk **A H**
- 19 *Accipiter superciliosus* Tiny Hawk
- 20 *Accipiter striatus* Sharp-shinned Hawk
- 21 *Accipiter cooperii* Cooper's Hawk
- 22 *Accipiter gundlachi* Gundlach's Hawk
- 23 *Accipiter bicolor* Bicolored Hawk
- 24 *Accipiter gentilis* Northern Goshawk
- 25 *Geranospiza caerulescens* Crane Hawk
- 26 *Leucopternis plumbeus* Plumbeous Hawk
- 27 *Leucopternis princeps* Barred Hawk
- 28 *Leucopternis semiplumbeus* Semiplumbeous Hawk
- 29 *Leucopternis albicollis* White Hawk
- 30 *Buteogallus anthracinus* Common Black-Hawk
- 31 *Buteogallus gundlachii* Cuban Black-Hawk
- 32 *Buteogallus urubitinga* Great Black-Hawk
- 33 *Buteogallus meridionalis* Savanna Hawk
- 34 *Parabuteo unicinctus* Harris's Hawk
- 35 *Harpyhaliaetus solitarius* Solitary Eagle
- 36 *Buteo magnirostris* Roadside Hawk
- 37 *Buteo lineatus* Red-shouldered Hawk
- 38 *Buteo ridgwayi* Ridgway's Hawk
- 39 *Buteo platypterus* Broad-winged Hawk

- 40 *Buteo nitidus* Gray Hawk
- 41 *Buteo brachyurus* Short-tailed Hawk
- 42 *Buteo swainsoni* Swainson's Hawk
- 43 *Buteo albicaudatus* White-tailed Hawk
- 44 *Buteo albonotatus* Zone-tailed Hawk
- 45 *Buteo solitarius* Hawaiian Hawk **H**
- 46 *Buteo jamaicensis* Red-tailed Hawk
- 47 *Buteo regalis* Ferruginous Hawk
- 48 *Buteo lagopus* Rough-legged Hawk
- 49 *Morphnus guianensis* Crested Eagle
- 50 *Harpia harpyja* Harpy Eagle
- 51 *Aquila chrysaetos* Golden Eagle
- 52 *Spizaetus tyrannus* Black Hawk-Eagle
- 53 *Spizaetus ornatus* Ornate Hawk-Eagle
- 54 *Spizaetus melanoleucus* Black-and-white Hawk-Eagle

Family Falconidae

Sub-Family Micrasturinae

- 1 *Micrastur ruficollis* Barred Forest-Falcon
- 2 *Micrastur mirandollei* Slaty-backed Forest-Falcon
- 3 *Micrastur semitorquatus* Collared Forest-Falcon

Sub-Family Caracarinae

- 1 *Ibycter americanus* Red-throated Caracara
- 2 *Caracara cheriway* Crested Caracara
- 3 † *Caracara lutosa* Guadalupe Caracara
- 4 *Milvago chimachima* Yellow-headed Caracara

Sub-Family Falconinae

- 1 *Herpetotheres cachinnans* Laughing Falcon
- 2 *Falco tinnunculus* Eurasian Kestrel **A**
- 3 *Falco sparverius* American Kestrel
- 4 *Falco vespertinus* Red-footed Falcon
- 5 *Falco columbarius* Merlin
- 6 *Falco subbuteo* Eurasian Hobby **A**
- 7 *Falco femoralis* Aplomado Falcon
- 8 *Falco rufigularis* Bat Falcon
- 9 *Falco deiroleucus* Orange-breasted Falcon
- 10 *Falco rusticolus* Gyrfalcon
- 11 *Falco peregrinus* Peregrine Falcon
- 12 *Falco mexicanus* Prairie Falcon

Order Strigiformes

Family Tytonidae

- 1 *Tyto alba* Barn Owl
- 2 *Tyto glaucops* Ashy-faced Owl

Family Strigidae

- 1 *Otus flammeolus* Flammulated Owl
- 2 *Otus sunia* Oriental Scops-Owl **A**
- 3 *Megascops kennicottii* Western Screech-Owl
- 4 *Megascops asio* Eastern Screech-Owl

- 5 ***Megascops seductus*** Balsas Screech-Owl
- 6 ***Megascops cooperi*** Pacific Screech-Owl
- 7 ***Megascops trichopsis*** Whiskered Screech-Owl
- 8 ***Megascops choliba*** Tropical Screech-Owl
- 9 ***Megascops barbarus*** Bearded Screech-Owl
- 10 ***Megascops guatemalae*** Vermiculated Screech-Owl
- 11 ***Megascops clarkii*** Bare-shanked Screech-Owl
- 12 ***Megascops nudipes*** Puerto Rican Screech-Owl
- 13 ***Gymnoglaux lawrencii*** Bare-legged Owl
- 14 ***Lophotrix cristata*** Crested Owl
- 15 ***Pulsatrix perspicillata*** Spectacled Owl
- 16 ***Bubo virginianus*** Great Horned Owl
- 17 ***Bubo scandiacus*** Snowy Owl
- 18 ***Surnia ulula*** Northern Hawk Owl
- 19 ***Glaucidium gnoma*** Northern Pygmy-Owl
- 20 ***Glaucidium costaricanum*** Costa Rican Pygmy-Owl
- 21 ***Glaucidium griseiceps*** Central American Pygmy-Owl
- 22 ***Glaucidium sanchezi*** Tamaulipas Pygmy-Owl
- 23 ***Glaucidium palmarum*** Colima Pygmy-Owl
- 24 ***Glaucidium brasilianum*** Ferruginous Pygmy-Owl
- 25 ***Glaucidium siju*** Cuban Pygmy-Owl
- 26 ***Micrathene whitneyi*** Elf Owl
- 27 ***Athene cunicularia*** Burrowing Owl
- 28 ***Ciccaba virgata*** Mottled Owl
- 29 ***Ciccaba nigrolineata*** Black-and-white Owl
- 30 ***Strix occidentalis*** Spotted Owl
- 31 ***Strix varia*** Barred Owl
- 32 ***Strix fulvescens*** Fulvous Owl
- 33 ***Strix nebulosa*** Great Gray Owl
- 34 ***Asio otus*** Long-eared Owl
- 35 ***Asio stygius*** Stygian Owl
- 36 ***Asio flammeus*** Short-eared Owl
- 37 ***Pseudoscops clamator*** Striped Owl
- 38 ***Pseudoscops grammicus*** Jamaican Owl
- 39 ***Aegolius funereus*** Boreal Owl
- 40 ***Aegolius acadicus*** Northern Saw-whet Owl
- 41 ***Aegolius ridgwayi*** Unspotted Saw-whet Owl
- 42 ***Ninox scutulata*** Brown Hawk-Owl [A](#)