

**Podicipediformes**

# Morfologie

## Znaky odlišné od potáplic

- prachový šat mlád'at - 1
- flexe prstů - bez rotace
- mlád'ata – semi-nidifugní
- Nemají rýdovací pera



*Aechmophorus  
occidentalis*

Sklony k nelétavosti!

# Fylogeneze

## Division 1

### Cohort Gavio-impennes

Order Sphenisciformes; Spheniscidae, Penguins

Order Gaviiformes: Gaviidae, Loons

Podicipedidae, Grebes

### Cohort Stegano-tubinares

#### Order Procellariiformes

Suborder Diomedae; Diomedidae, Albatrosses

Suborder Procellariae; Hydrobatidae, Storm Petrels

Procellariidae, Shearwaters, etc.

#### Order Pelecaniformes

Suborder Phaethontes, Phaethontidae, Tropicbirds

#### Suborder Steganopodes

Infraorder Fregatae; Fregatidae, Frigatebirds

#### Infraorder Pelecani

Superfam. Pelecanoidea; Pelecanidae, Pelicans

Superfam. Suloidea; Sulidae, Boobies, Gannets

Phalacrocoracidae, Cormorants, Anhingas

**Suborder Ciconii**

**Infraorder Falconides**

**Parvorder Accipitrida**

**Family Accipitridae**

**Subfamily Pandioninae: Osprey**

**Subfamily Accipitrinae: Eagles, Old World Vultures, Hawks, Kites,  
Harriers**

**Family Sagittariidae: Secretary-bird**

**Parvorder Falconida**

**Family Falconidae: Falcons, Caracaras**

**Infraorder Ciconiides**

**Parvorder Podicipedida**

**Family Podicipedidae: Grebes**

**Parvorder Phaethontida**

**Family Phaethontidae: Tropicbirds**

**Parvorder Sulida**

**Superfamily Suloidea**

**Family Sulidae: Boobies, Gannets**

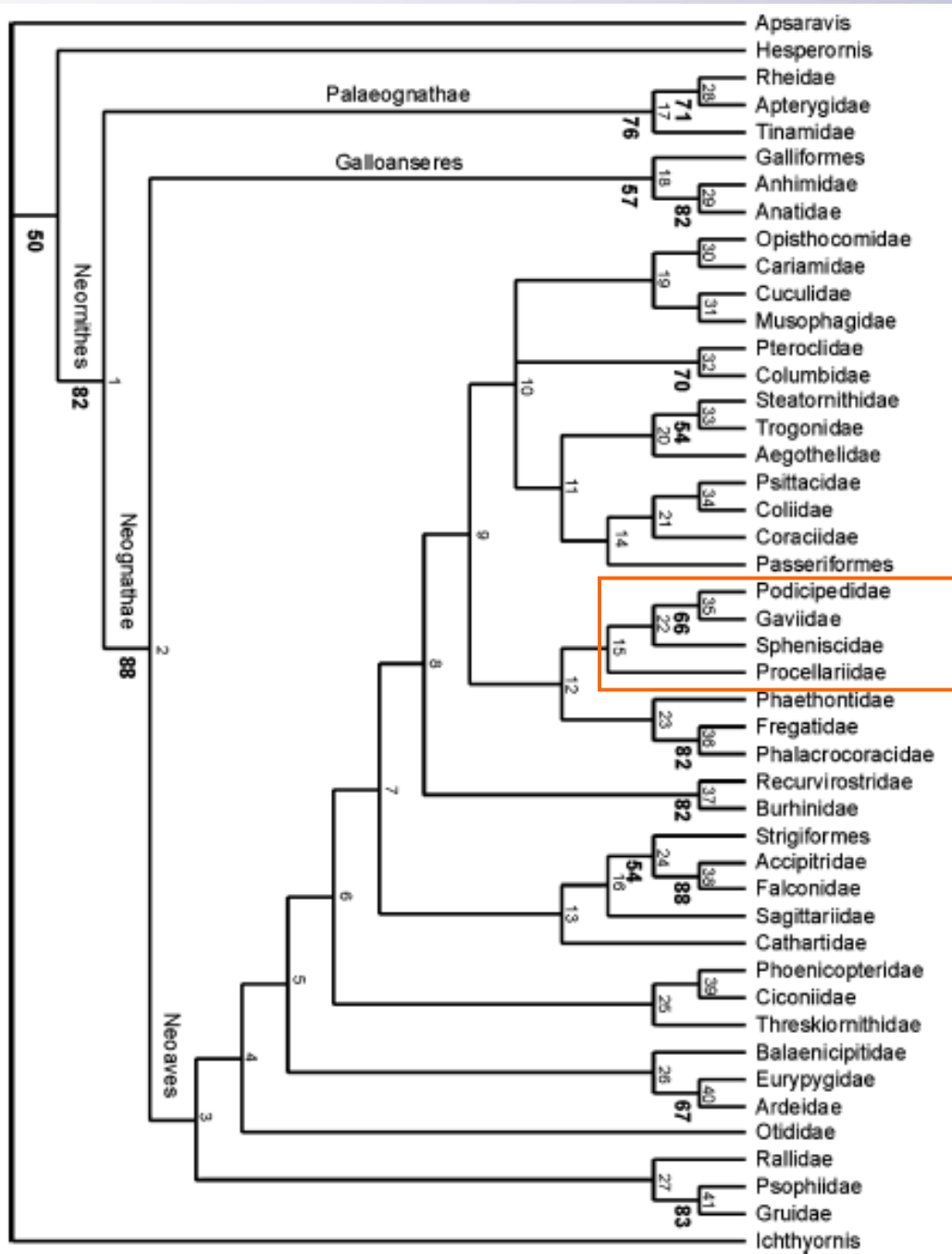
**Family Anhingidae: Anhingas, Darters**

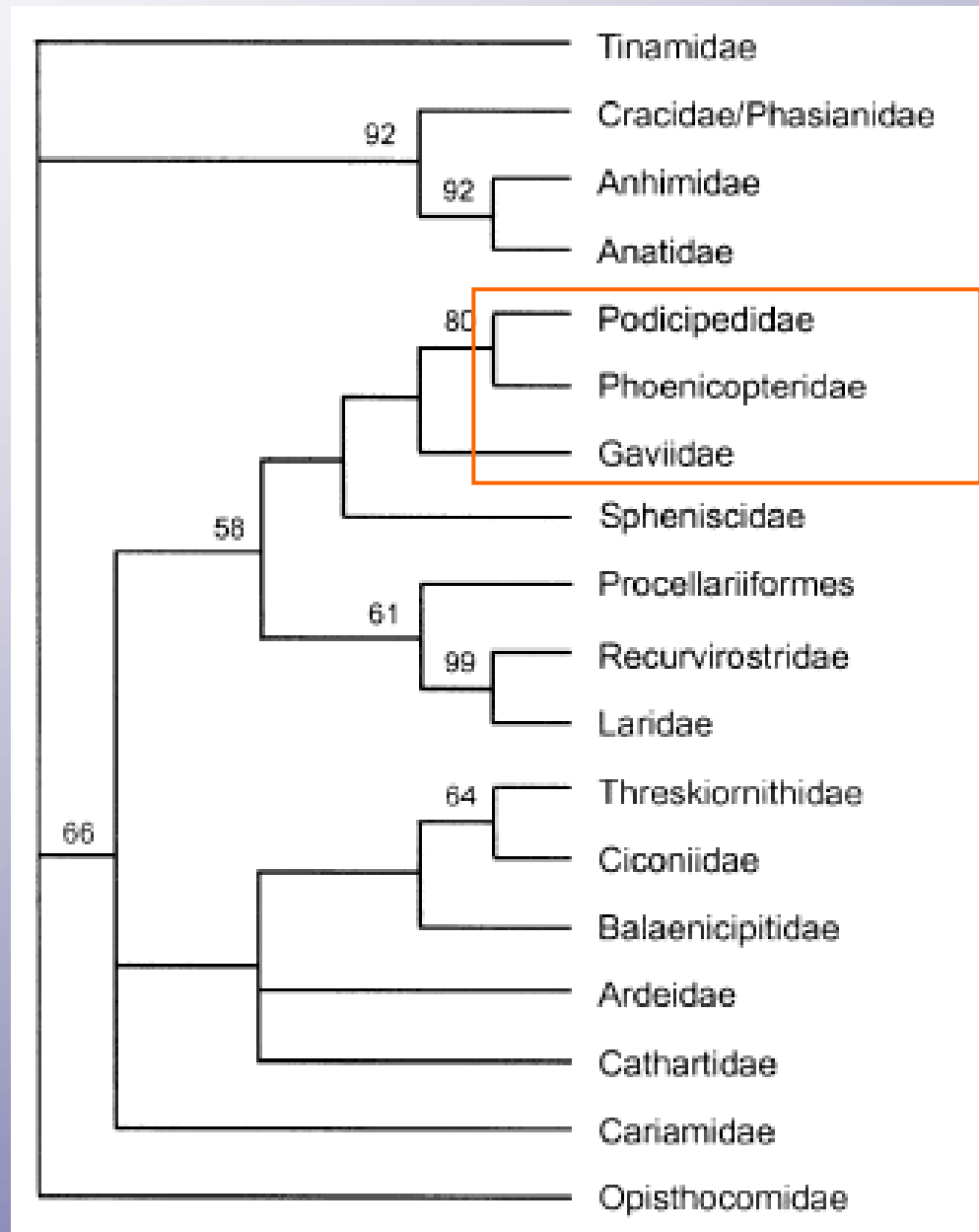
**Superfamily Phalacrocoracoidea**

**Family Phalacrocoracidae: Cormorants, Shags**

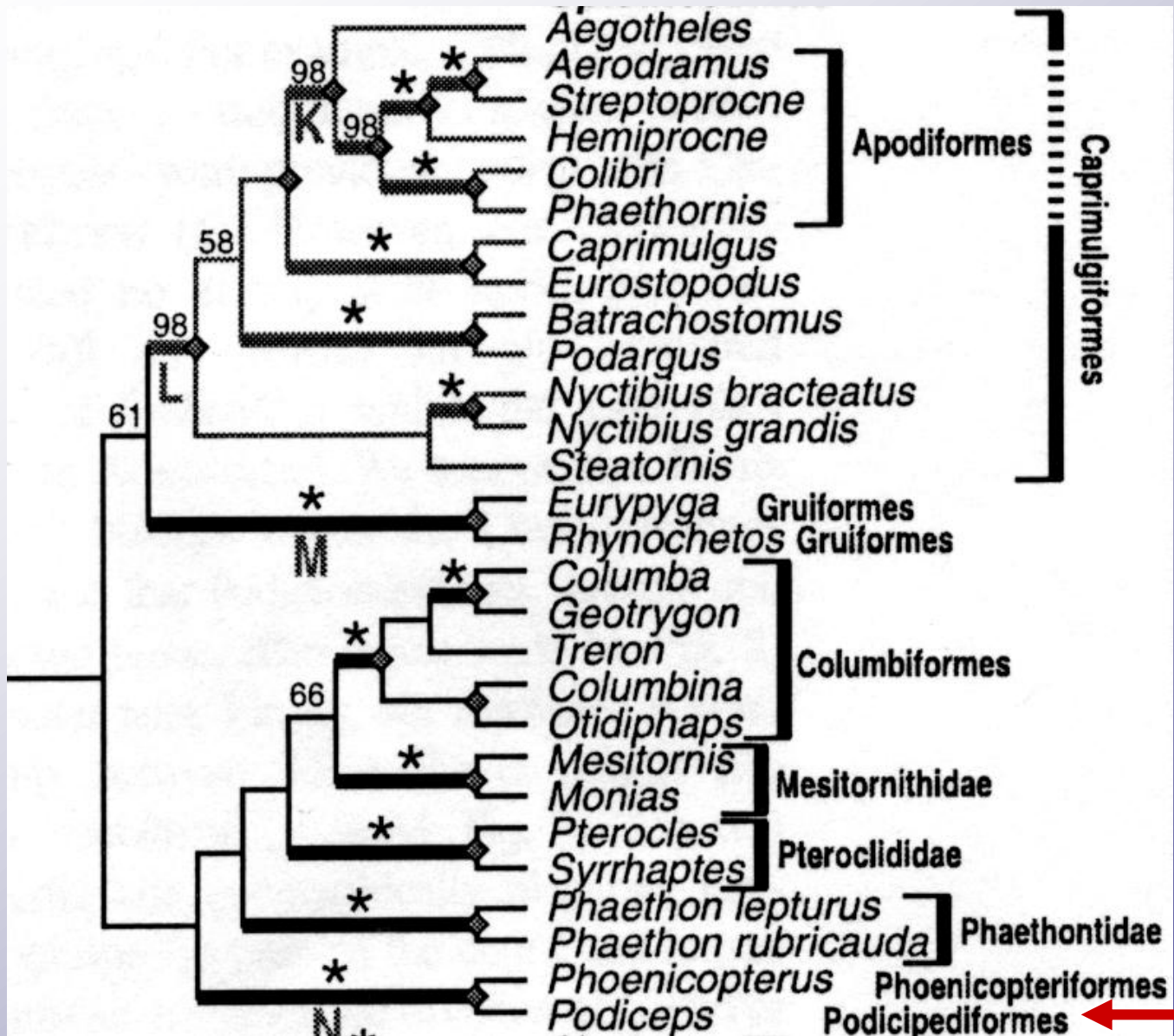
**Sibley & Ahlquist 1990,  
DNA-DNA hybridization**

(Mayr & Clarke  
2003, anatomie)

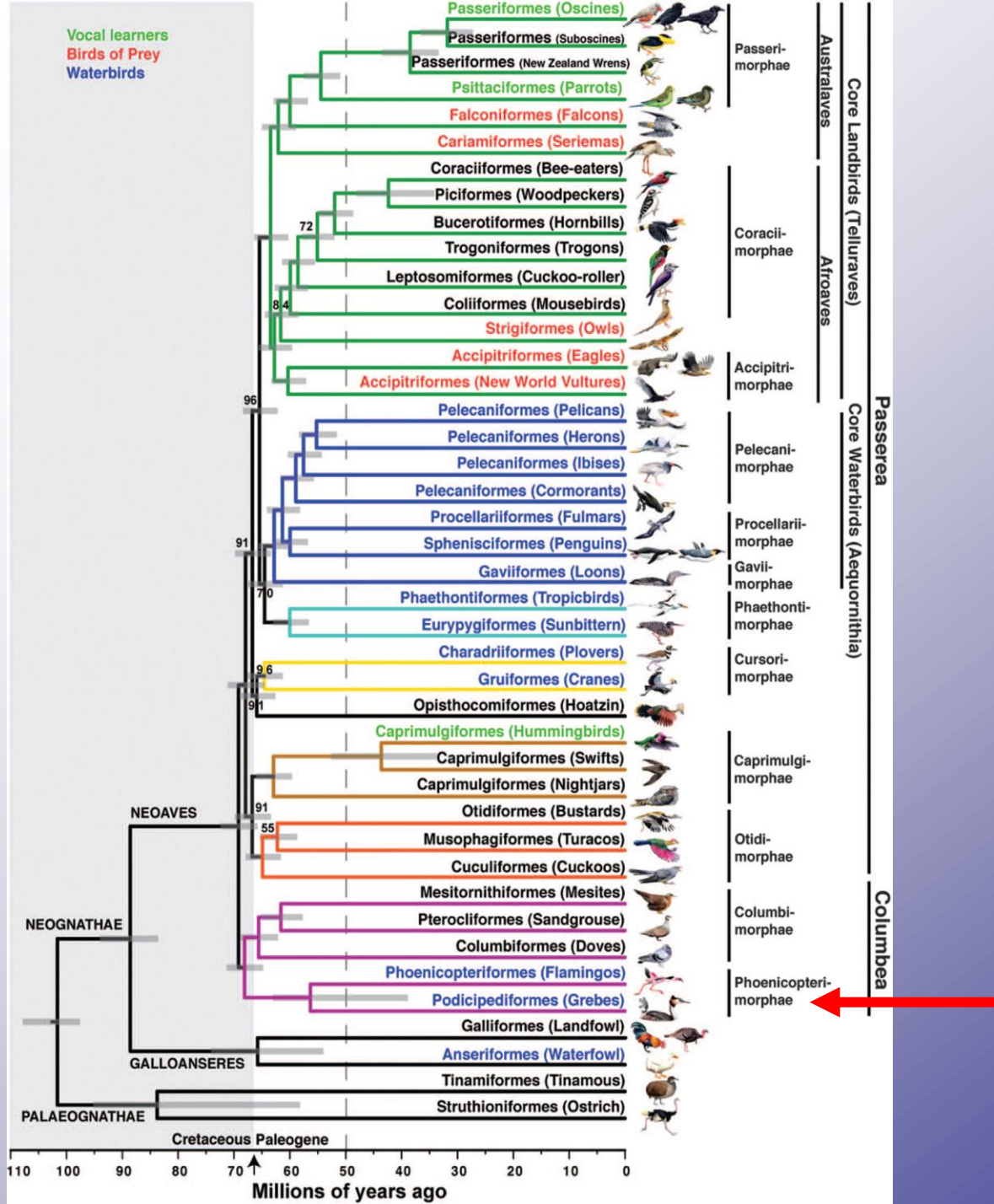




(Mayr, 2004 – anatomie)



(Hackett et al. 2008, DNA)

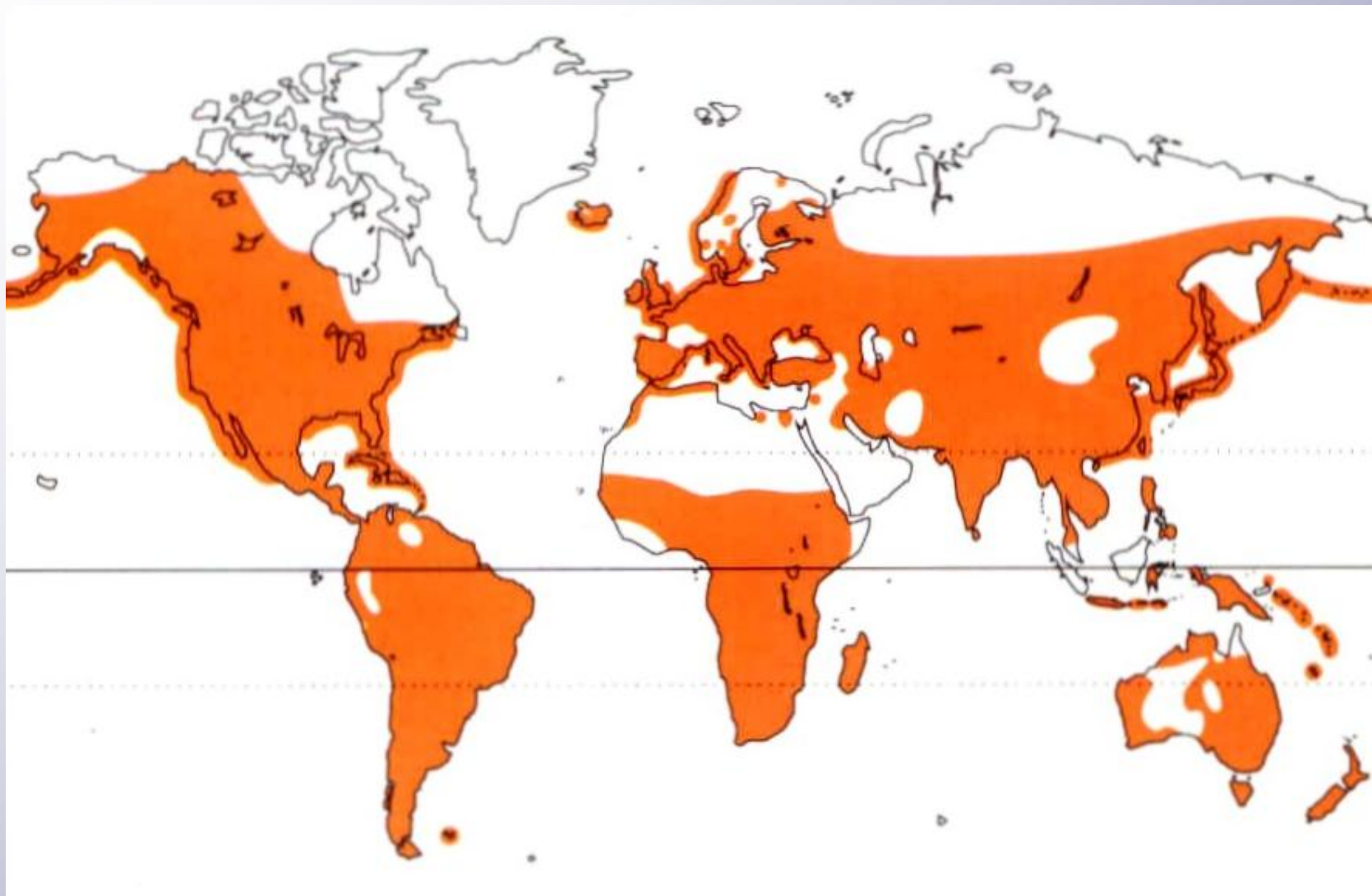


Jarvis et al. 2014,  
sekvenace celých genomů



# **Podicipedidae**

## **(6/22)**







*Tachybaptus ruficollis* (Starý svět)



*Tachybaptus ruficollis* – prostý šat



*Tachybaptus novaehollandiae* (Australie, NZ, PNG)



*Tachybaptus dominicus* (S. a J. Amerika)



*Podilymbus podiceps* (Nový Svět)





*Podilymbus podiceps* - mládě



*Podilymbus gigas* (j. Atitlán)

nelétavý, žral korýše



*Rollandia rolland* (J. Amerika)



*Rollandia microptera* (j. Titicaca)  
nelétavá



Hoary-headed Grebe *Poliiocephalus poliocephalus*  
©Paul Hackett 2002

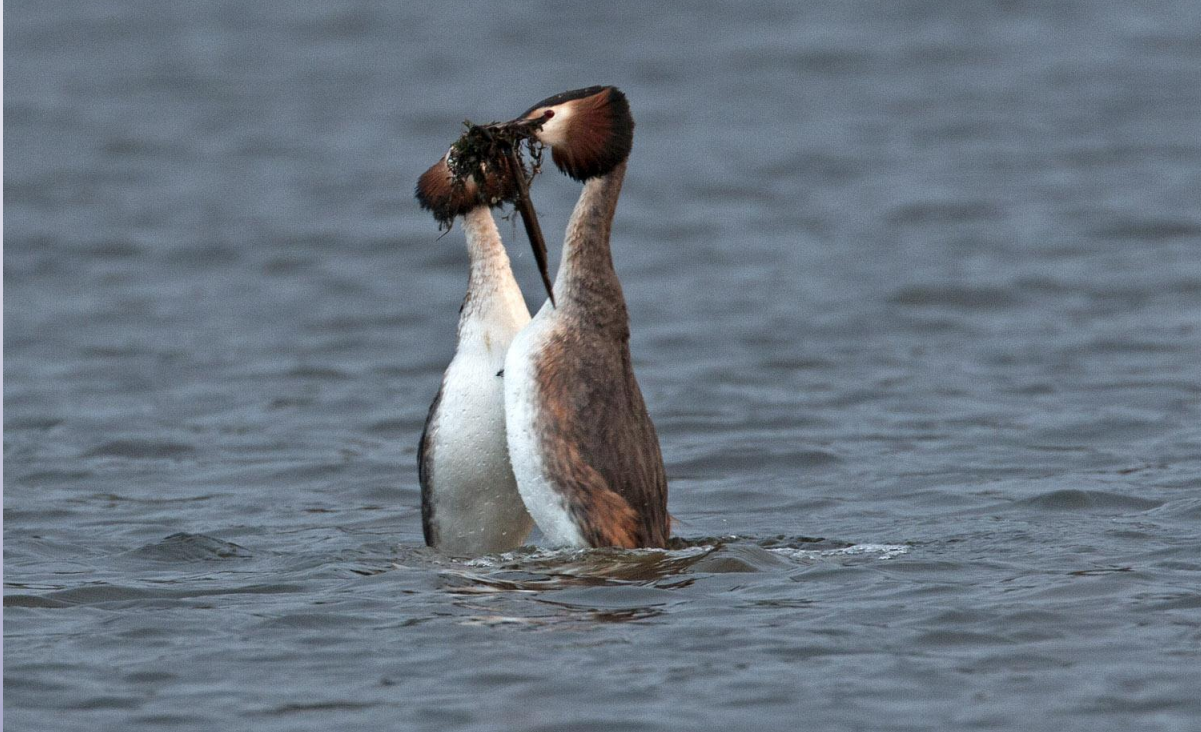
*Poliiocephalus poliocephalus* (Australie)



*Poliiocephalus rufopectus* (NZ)



*Podiceps cristatus* (Starý svět)







*Podiceps grisegena* (Holarktida)



*Podiceps auritus* (Holarktida)



*Podiceps nigricollis* (Holarktida, Afrika)



*Podiceps taczanowski* – nelétavá (j. Junin)



*Podiceps gallardoi* – nelétavá (Argentina)



*Aechmophorus occidentalis* (S. Am.)



*Aechmophorus occidentalis* - námluvy

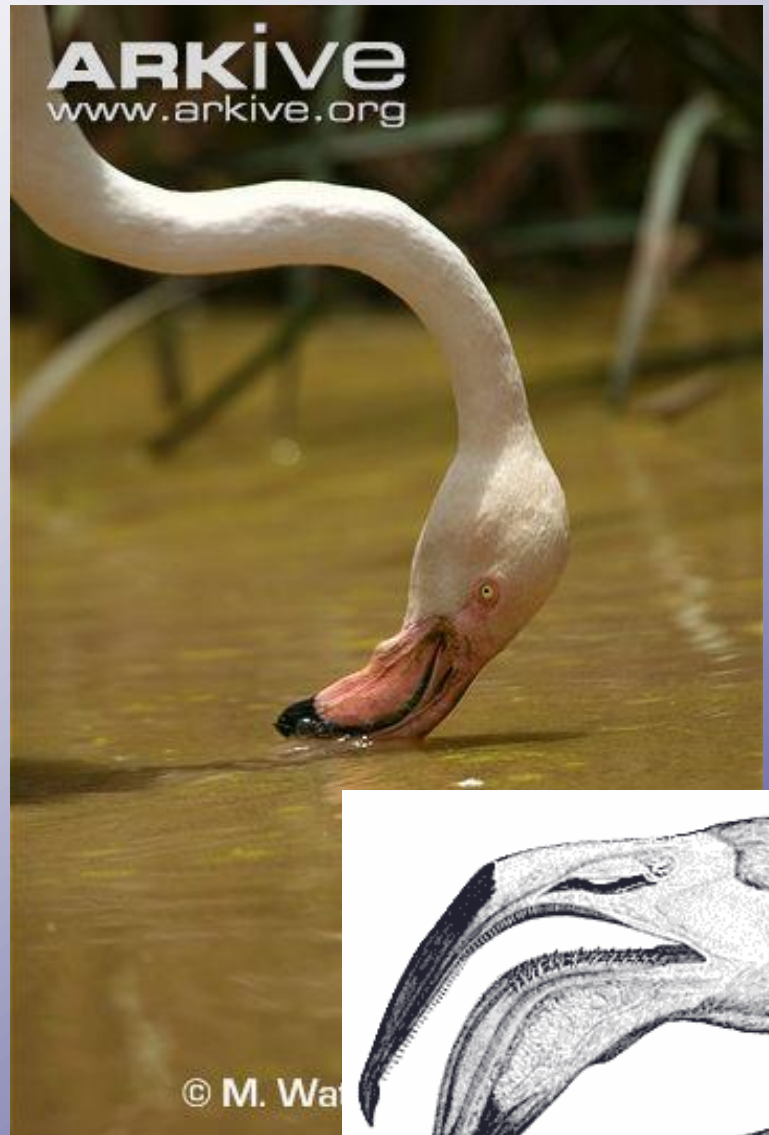
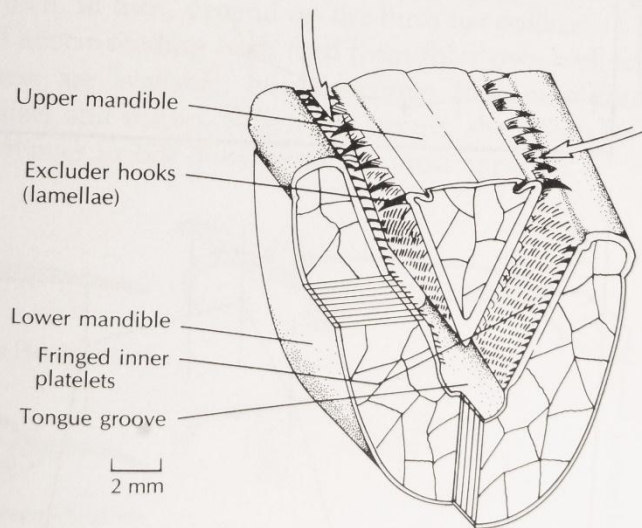
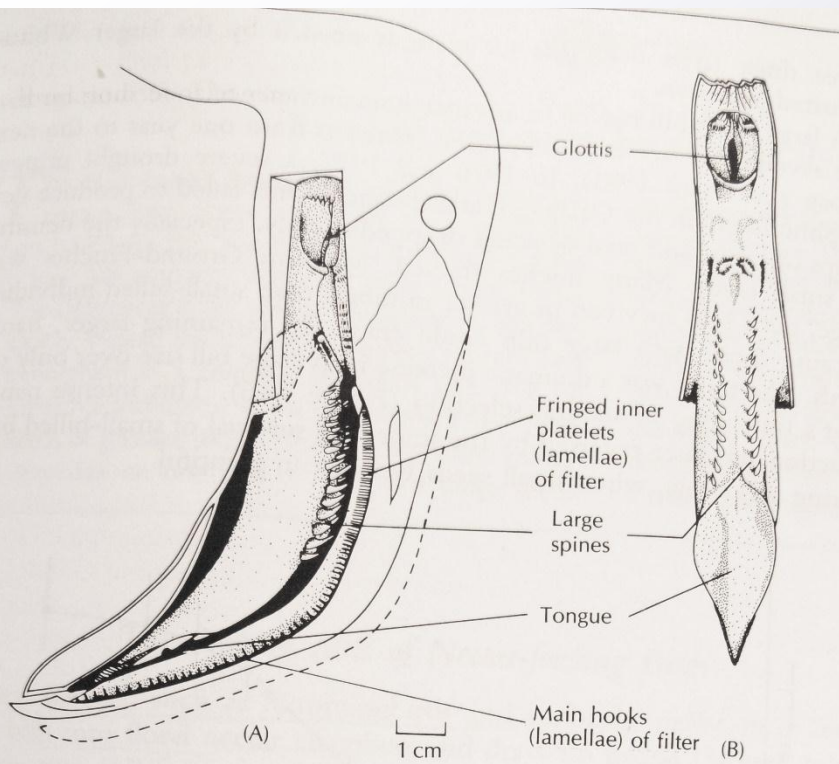
**Phoenicopteriiformes**

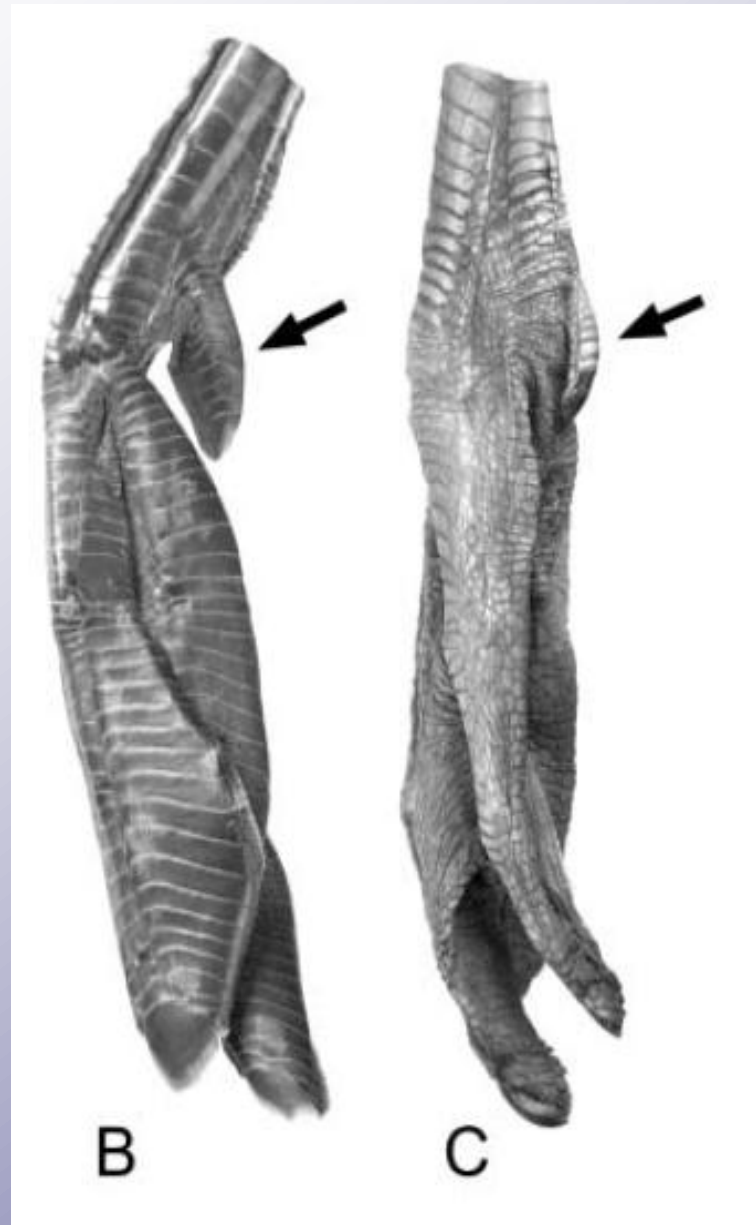


# Společné znaky řádu

- Desmogátní patro
- Zadní prst malý nebo chybí
- Srostlé karotidy
- Solné žlázy
- 11 RL
- Nidifugní mlád'ata
- Adaptace k filtraci
- Koloniální
- 1 vejce







*Podiceps cristatus*

*Phoenicopterus ruber*

### Division 3

#### Order Ciconiiformes

Suborder Ardeae; Ardeidae, Herons  
Balaenicipitidae, Shoebill

#### Suborder Ciconiae

Infraorder Scopiae; Scopidae, Hammerhead

#### Infraorder Ciconii

Superfam. Threskiornithoidea; Threskiornithidae, Ibises, etc.

Superfam. Ciconoidea; Ciconiidae, Storks

Phoenicopteridae, Flamingos

#### Order Falconiformes

Suborder Cathartae, Cathartidae, New World Vultures

#### Suborder Accipitres

Infraorder Sagittarii; Sagittariidae, Secretarybird

#### Infraorder Falconi

Superfam. Strigoidea, Strigidae, Owls

Superfam. Falconoidea, Pandionidae, Osprey

Accipitridae, Accipitrinae, Hawks, Eagles

Falconinae, Falcons

(Cracraft 1981, morfologie)

Order CICONIIFORMES

Suborder Ciconii

Infraorder Ciconiides

Parvorder Ciconiida

Superfamily Ardeoidea

Family Ardeidae: Herons, Bitterns, Egrets

Superfamily Scopioidea

Family Scopidae: Hamerkop or Hammerhead

Superfamily Phoenicopterioidea

Family Phoenicopteridae: Flamingos

Superfamily Threskiornithoidea

Family Threskiornithidae: Ibises, Spoonbills

Superfamily Pelecanoidea

Family Pelecanidae

Subfamily Balaenicipitinae: Shoebill

Subfamily Pelecaninae: Pelicans

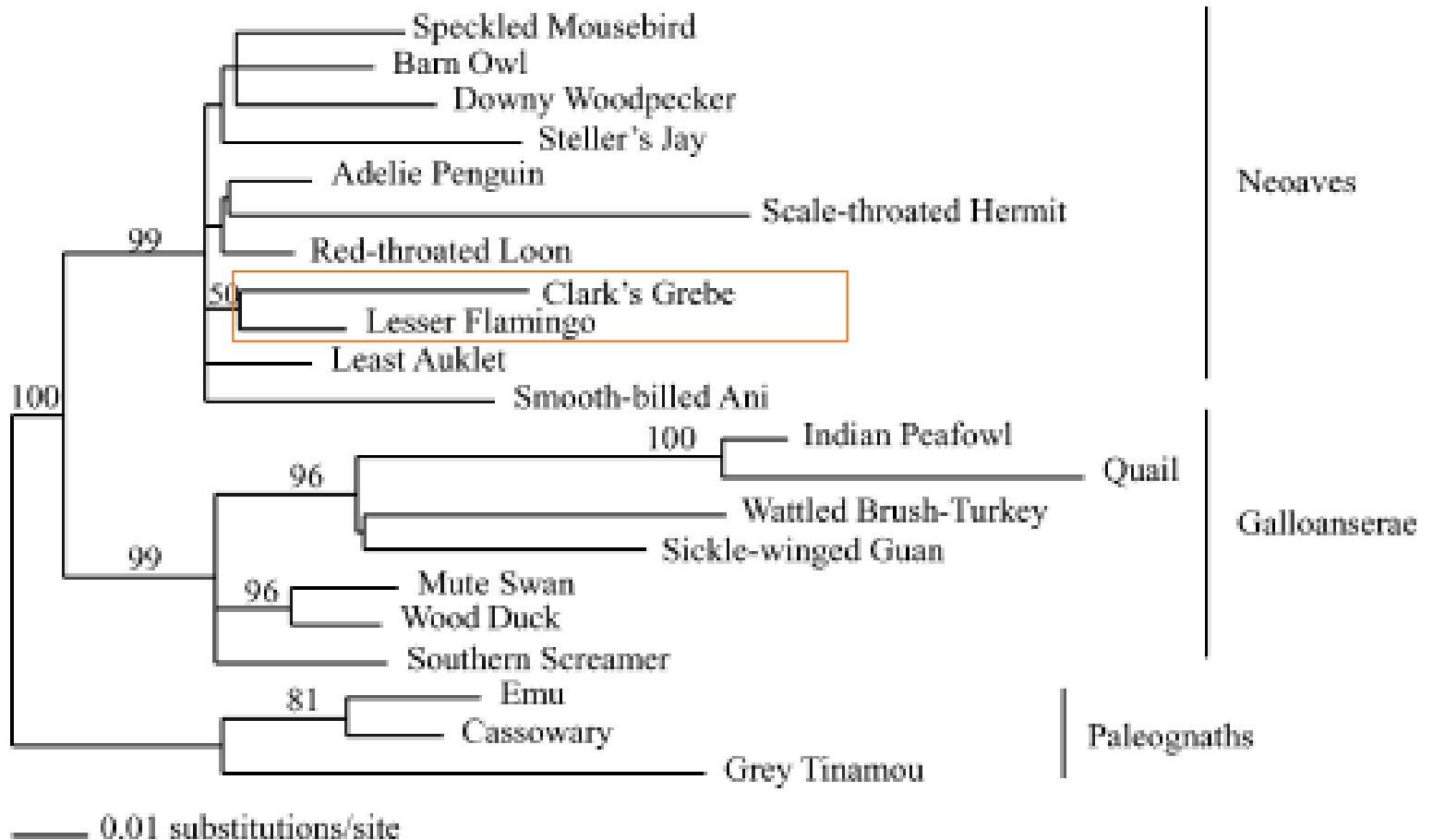
Superfamily Ciconioidea

Family Ciconiidae

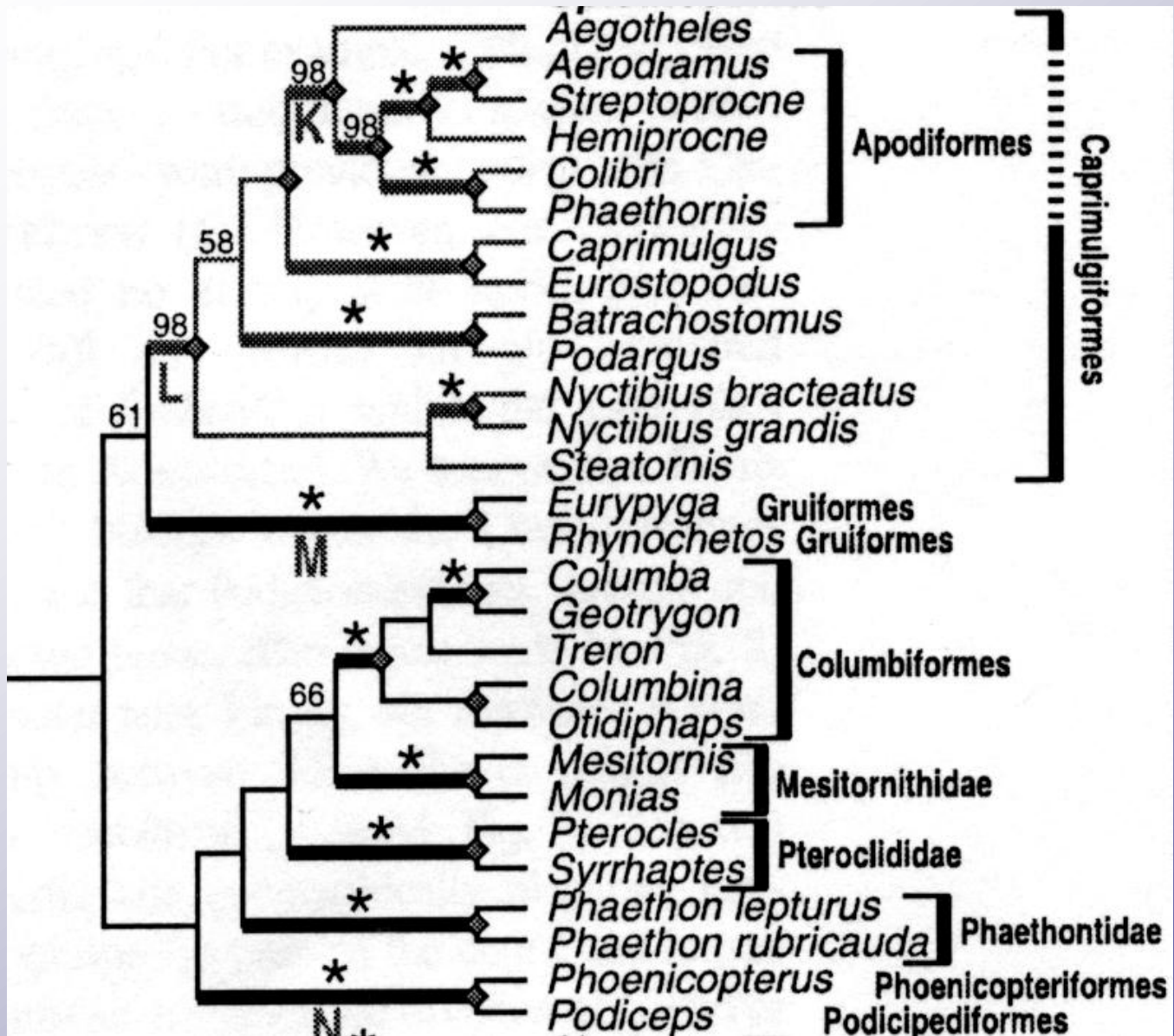
Subfamily Ciconiinae: Storks, Openbills, Adjutants, Jabiru

Subfamily Cathartinae: New World Vultures

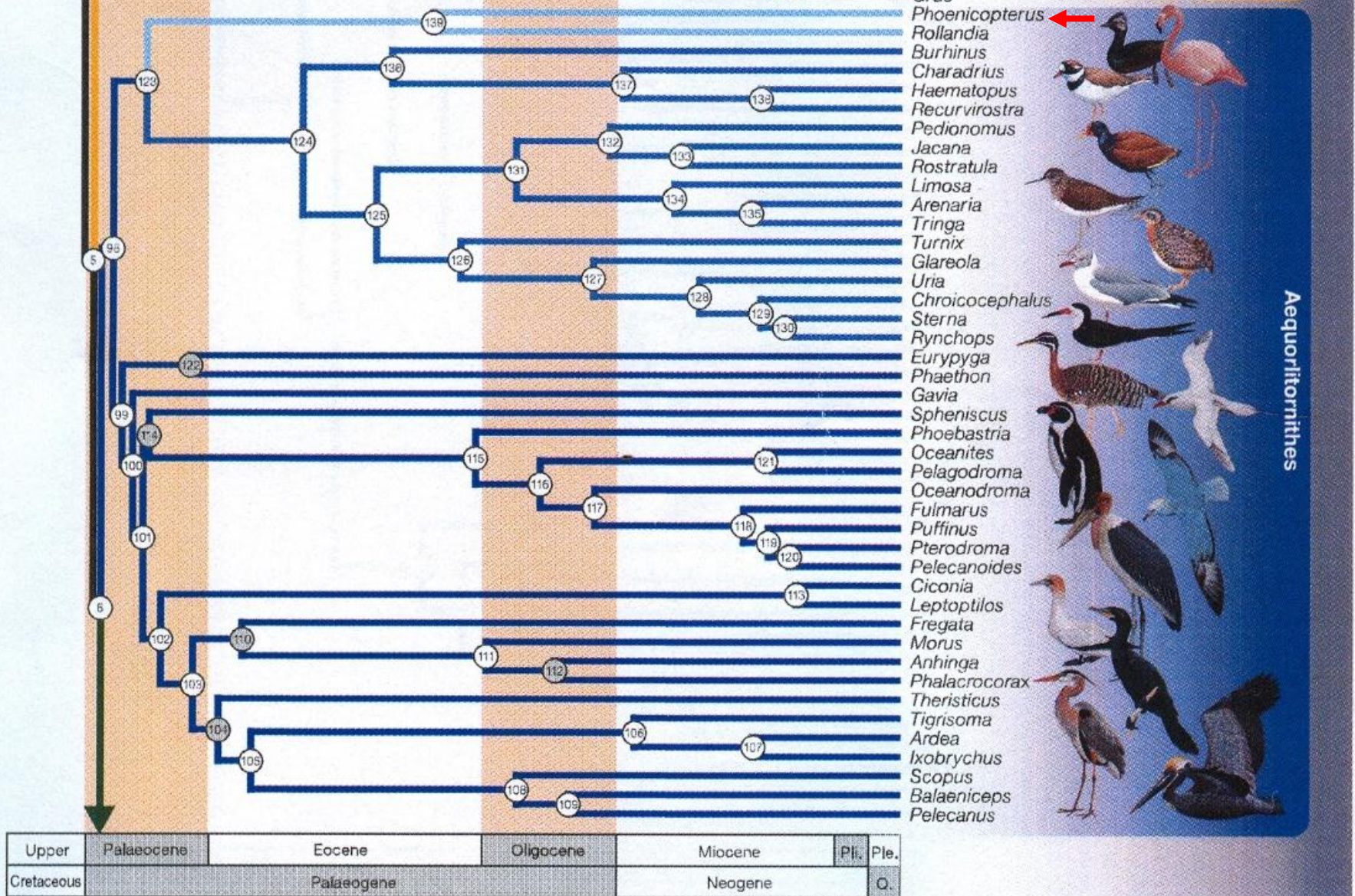
(Sibley & Ahlquist 1990, DNA hybridizace)



(Chubb 2004, DNA)



(Hackett et al. 2008, DNA)



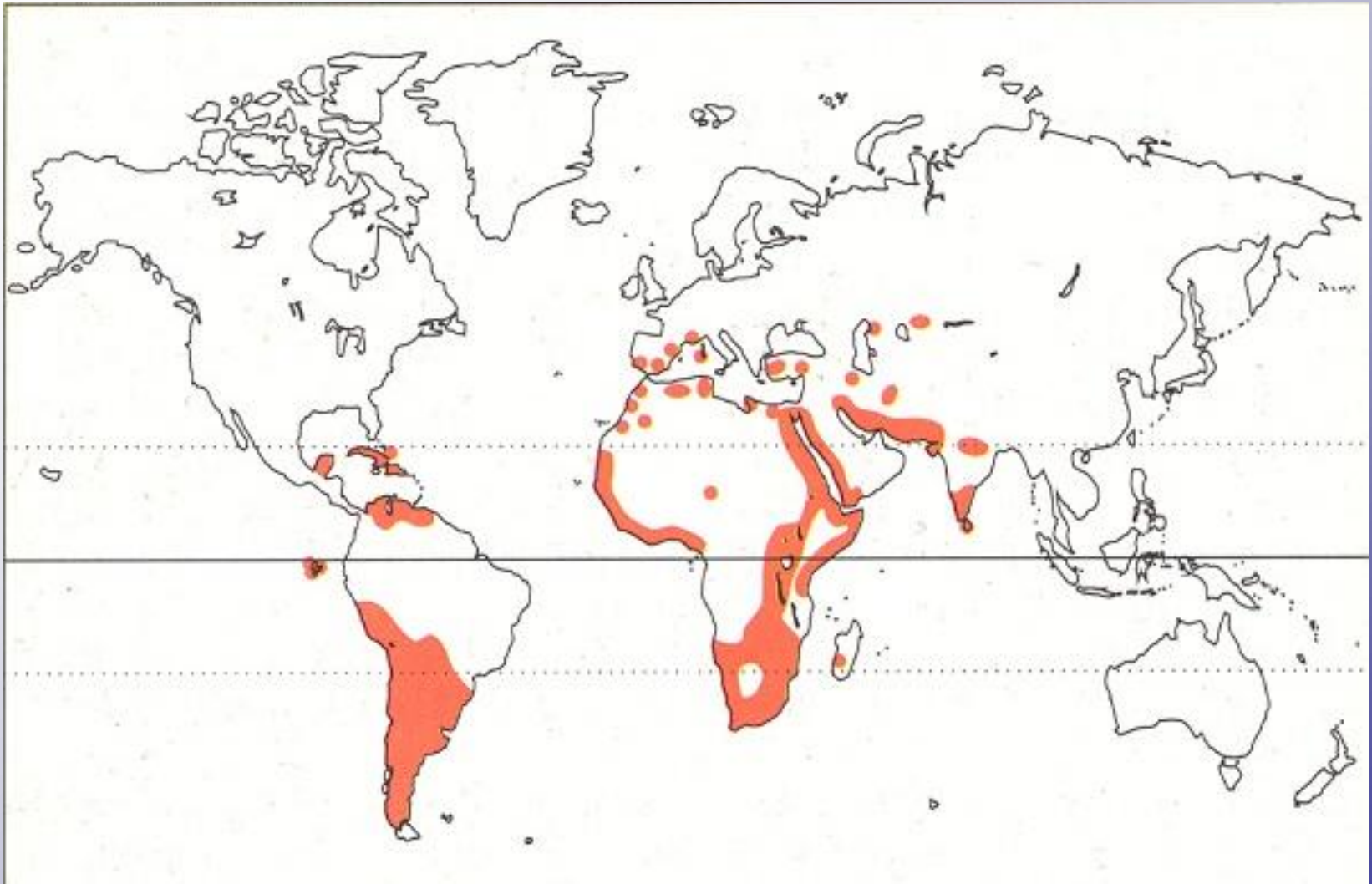
(Prum et al. 2015) – 394 genů



# **Phoenicopteridae**

## **(3/5)**

# Phoenicopteridae



# *Phoenicopterus ruber*



Stř. Amerika, Eurasie, Afrika

*Phoenicopterus ruber*



*Phoenicopterus ruber* - odpočinek



# *Phoenicopterus ruber* - námluvy



# *Phoenicopterus ruber* - kolonie



# *Phoenicopterus ruber*



*N. Bougloffan  
Madrid, 2003*

Flamant rose  
(*Phoenicopterus ruber*)



# *Phoenicopterus roseus* - hnízdo



*Phoeniconaias minor*



Afrika

# *Phoenicoparrus andinus*



Andy

# *Phoenicopterus chilensis*



J. Amerika

Video: [www.arkive.org](http://www.arkive.org)

**Ciconiiformes**

# Společné znaky řádu

- Desmognátní patro
- Diastataxie
- Malá slepá střeva
- Tracheobronchální syrinx
- Dlouhé nohy



# Některé odlišné znaky v rámci řádu

čeleď	RL	RP	drobivý prach	prachový šat ml. po vylíhnutí	nares perviale	blána mezi prsty (náznak)	urohydróza
<b>Balaenicipitidae</b>	<b>11</b>	<b>12</b>	<b>+</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>+</b>
<b>Scopidae</b>	<b>10</b>	<b>12</b>	<b>-</b>	<b>+</b>	<b>?</b>	<b>+</b>	<b>-</b>
<b>Ardeidae</b>	<b>10-11</b>	<b>10,12</b>	<b>+</b>	<b>-</b>	<b>+</b>	<b>+</b>	<b>-</b>
<b>Ciconiidae</b>	<b>12</b>	<b>12</b>	<b>-</b>	<b>slabé opeření</b>	<b>+</b>	<b>+</b>	<b>+</b>
<b>Threskiornithidae</b>	<b>10</b>	<b>12</b>	<b>-</b>	<b>+</b>	<b>-</b>	<b>+</b>	<b>-</b>

### Division 3

#### Order Ciconiiformes

Suborder Ardeae; Ardeidae, Herons  
Balaenicipitidae, Shoebill

#### Suborder Ciconiae

Infraorder Scopiae; Scopidae, Hammerhead

#### Infraorder Ciconii

Superfam. Threskiornithoidea; Threskiornithidae, Ibises, etc.

Superfam. Ciconoidea; Ciconiidae, Storks

Phoenicopteridae, Flamingos

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Superfam. Falconoidea, Pandionidae, Osprey

Accipitridae, Accipitrinae, Hawks, Eagles

Falconinae, Falcons

(Cracraft 1981, morfologie)



Order CICONIIFORMES

Suborder Ciconii

Infraorder Ciconiides

Parvorder Ciconiida

Superfamily Ardeoidea

Family Ardeidae: Herons, Bitterns, Egrets

Superfamily Scopoidea

Family Scopidae: Hamerkop or Hammerhead

Superfamily Phoenicopteroidae

Family Phoenicopteridae: Flamingos

Superfamily Threskiornithoidea

Family Threskiornithidae: Ibises, Spoonbills

Superfamily Pelecanoidea

Family Pelecanidae

Subfamily Balaenicipitinae: Shoebill

Subfamily Pelecaninae: Pelicans

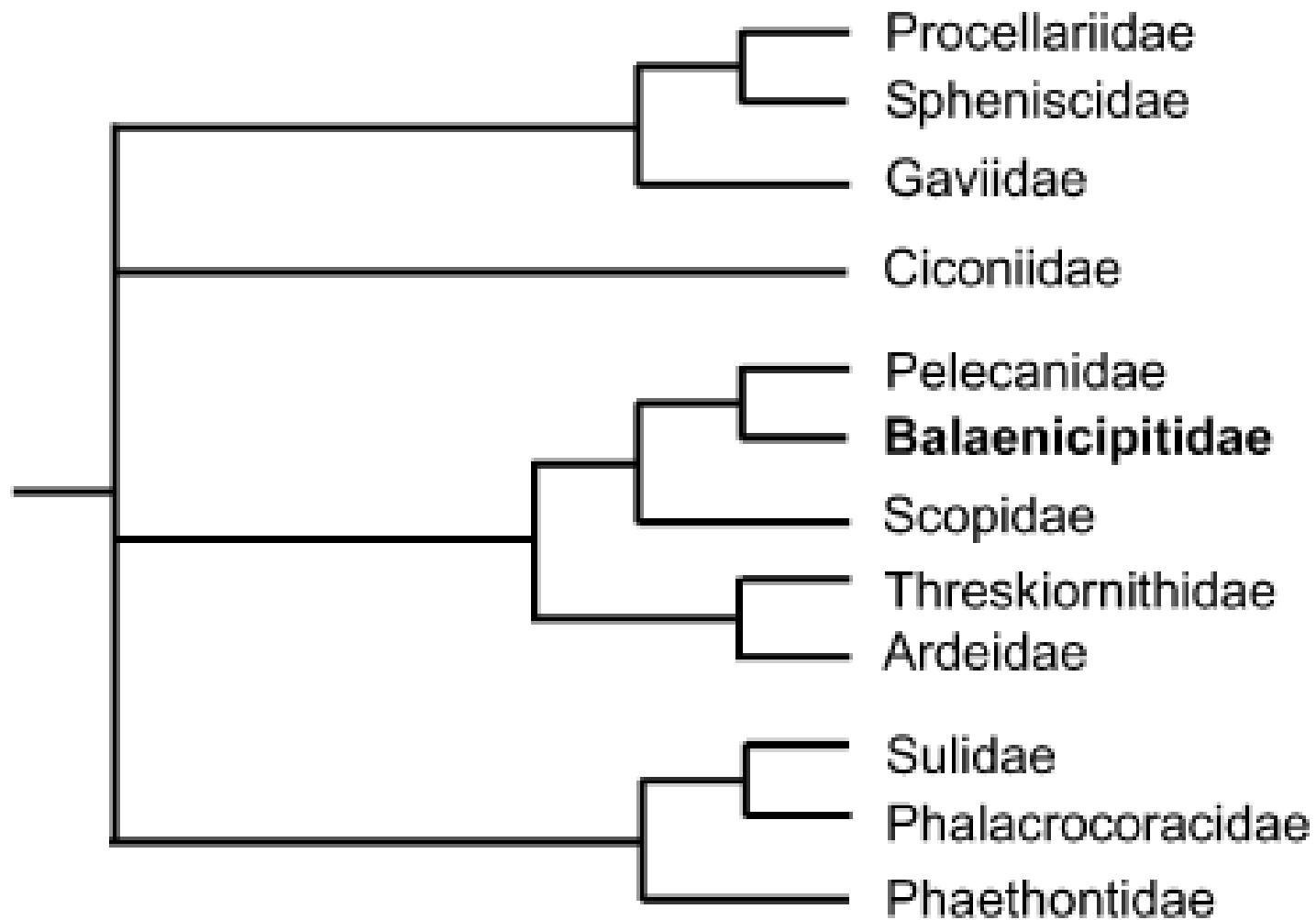
Superfamily Ciconioidea

Family Ciconiidae

Subfamily Ciconiinae: Storks, Openbills, Adjutants, Jabiru

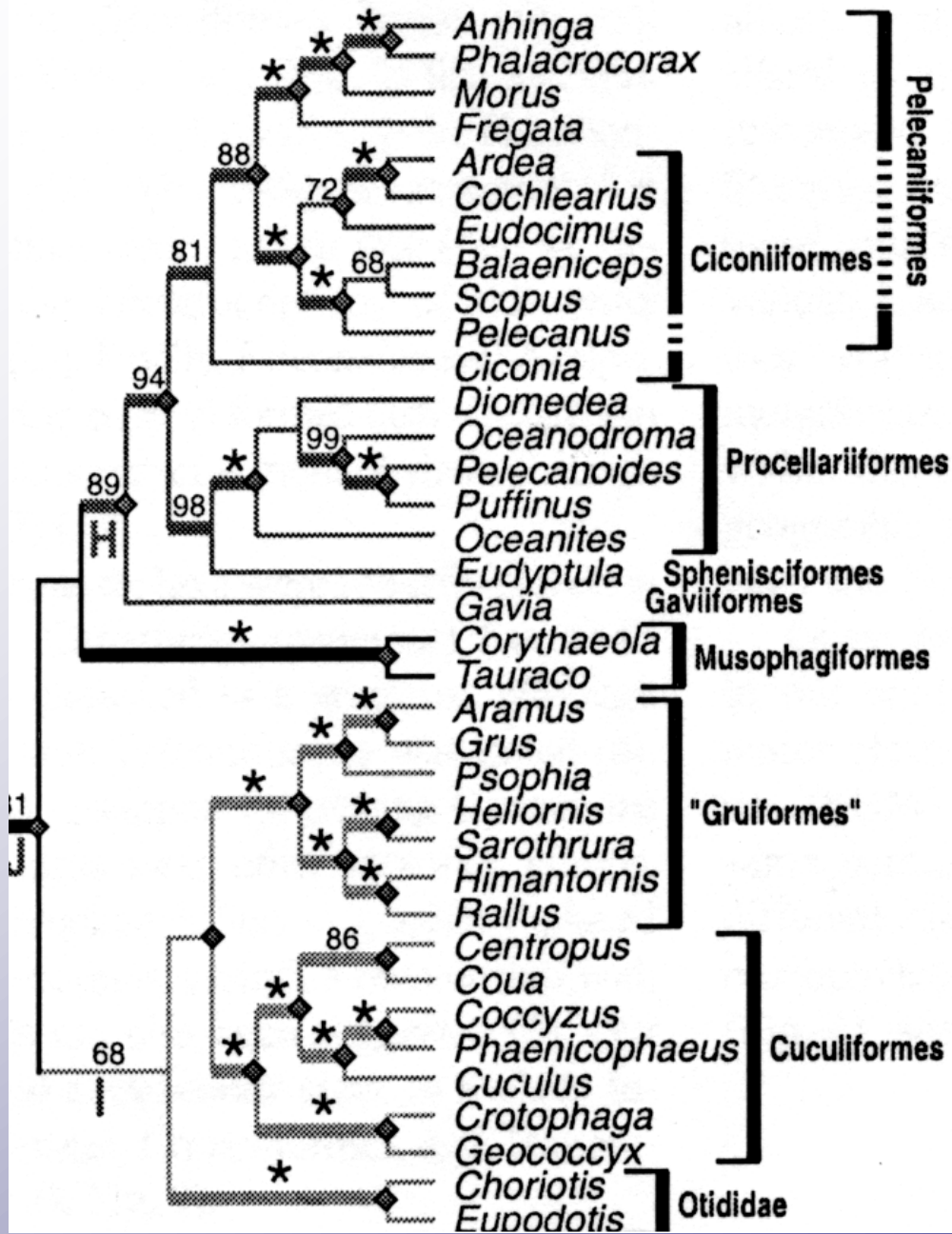
Subfamily Cathartinae: New World Vultures

(Sibley & Ahlquist 1990, DNA hybridizace)

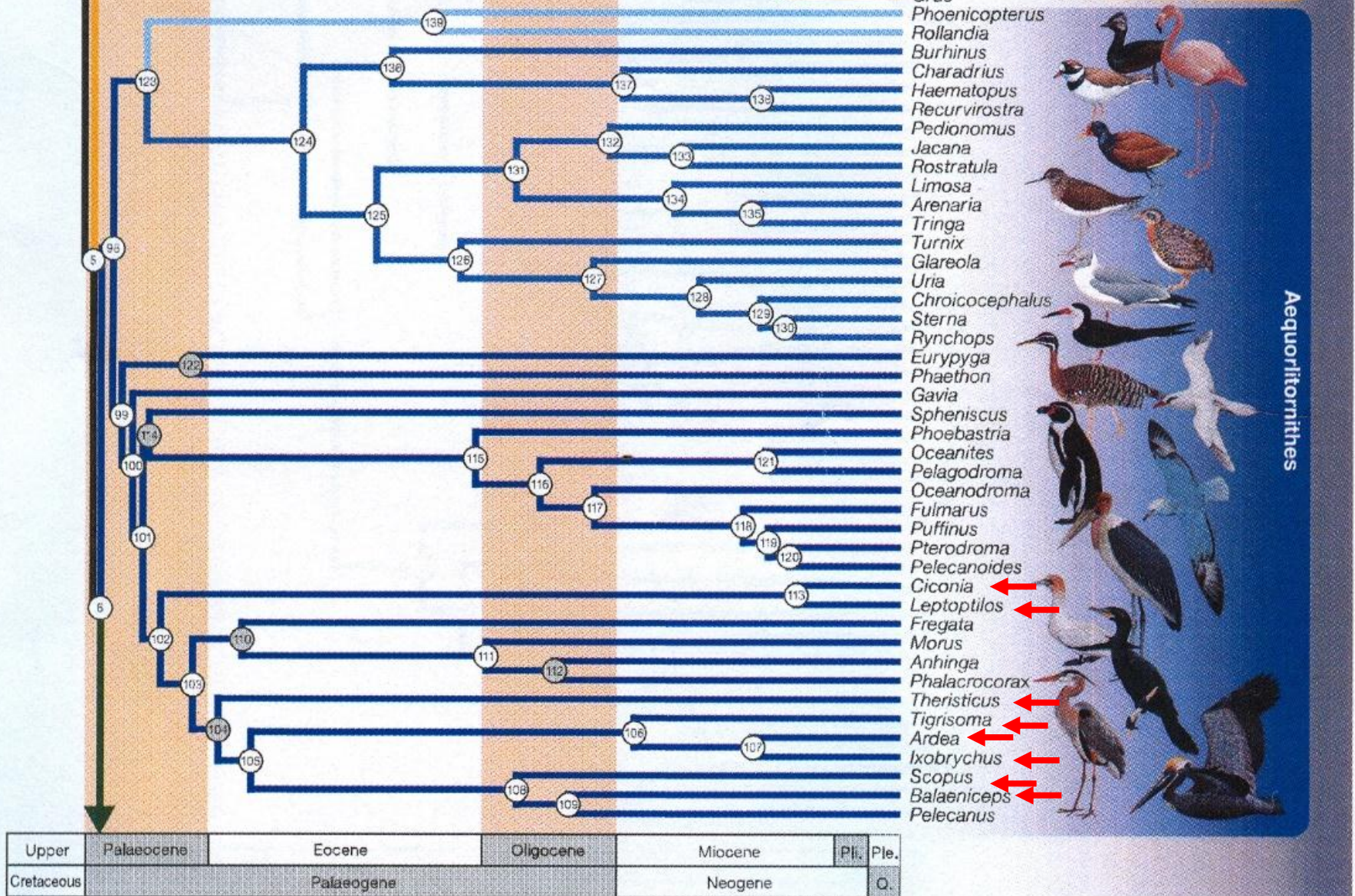


van Tuinen et al. (2001: fig. 2)

DNA



(Hackett et al. 2008, DNA)



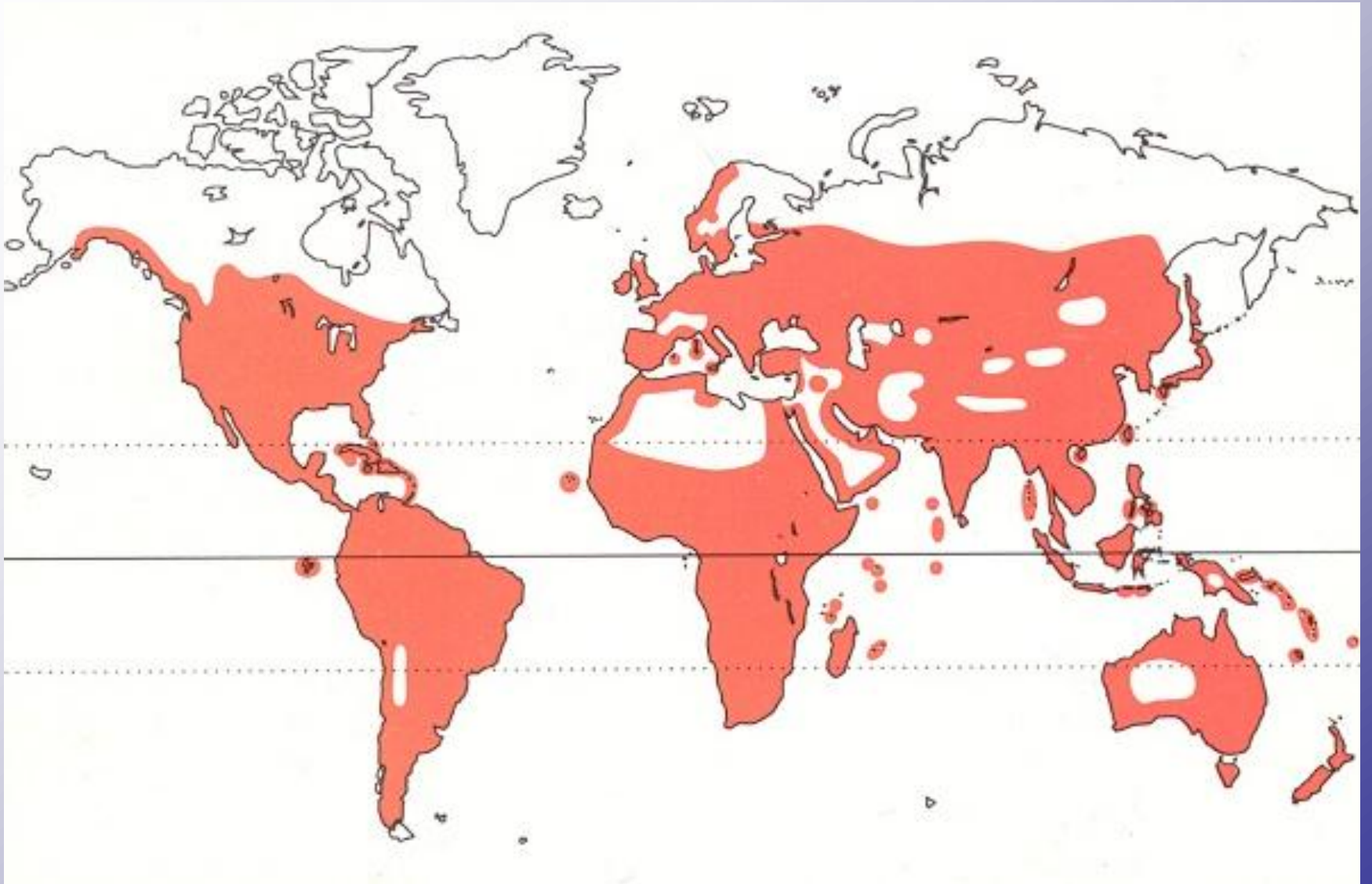
(Prum et al. 2015) – 394 genù

# Ardeidae

## (17/60)

- Ardeinae – denní volavky
- Nycticoracinae – noční volavky
- Tigrisomatinae – „Tiger-herons“
- Botaurinae – bukači a bukáčci

# Ardeidae





© John A. Schmitt







**ARDEIDAE**

**ARDEINAE**



day-herons  
34 species  
(*Syrigma*, *Pilherodius*, *Ardea*,  
*Egretta*, *Bubulcus*, *Ardeola*,  
*Butorides*, *Agamia*)

**NYCTICORACINAE**

**TIGRISOMATINAE**

**BOTAURINAE**



tiger-herons  
5 species  
(*Tigrisoma*, *Zonerodius*,  
*Tigriornis*)

**NYCTICORACINI**



night-herons  
7 species  
(*Nycticorax*, *Gorsachius*)

**COCHLEARIINI**



Boat-billed Heron  
1 species  
(*Cochlearius*)

**ZEBRILINI**



Zigzag Heron  
1 species  
(*Zebrilus*)

**BOTAURINI**



bitterns  
12 species  
(*Ixobrychus*, *Botaurus*)

**FAMILY**

**SUBFAMILY**

**TRIBE**

# **Ardeinae**



*Ardea cinerea* (Eurasie)

*Ardea  
purpurea*



Eurasie

# *Ardea herodias*



Nový svět



*Agamia agami* (J. Amerika)



*Syrigma sibilatrix* (J. Amerika)





*Pilherodius pileatus* (J. Amerika)



monacoeye.com

*Egretta alba* (Kosmopolitní)

# *Egretta garzetta*



Starý svět

# *Egretta garzetta*





*Egretta ardesiaca* (Afrika)

# *Bubulcus ibis*



Kosmopolitní

# *Butorides striatus*



Pantropický

*Butorides striatus*





# Nycticoracinae

# *Nycticorax nycticorax*



Kosmopolitní

# *Gorsachius goisagi*



JV Asie

# *Cochlearius cochlearius*



J. Amerika

# *Cochlearius cochlearius*



# **Tigrisomatinae**

*Tigrisoma mexicanum*



J. Amerika

# **Botaurinae**



# *Zebrilus undulatus*



J. Amerika

# *Ixobrychus minutus*



Starý svět

# *Botaurus stellaris*



Starý svět

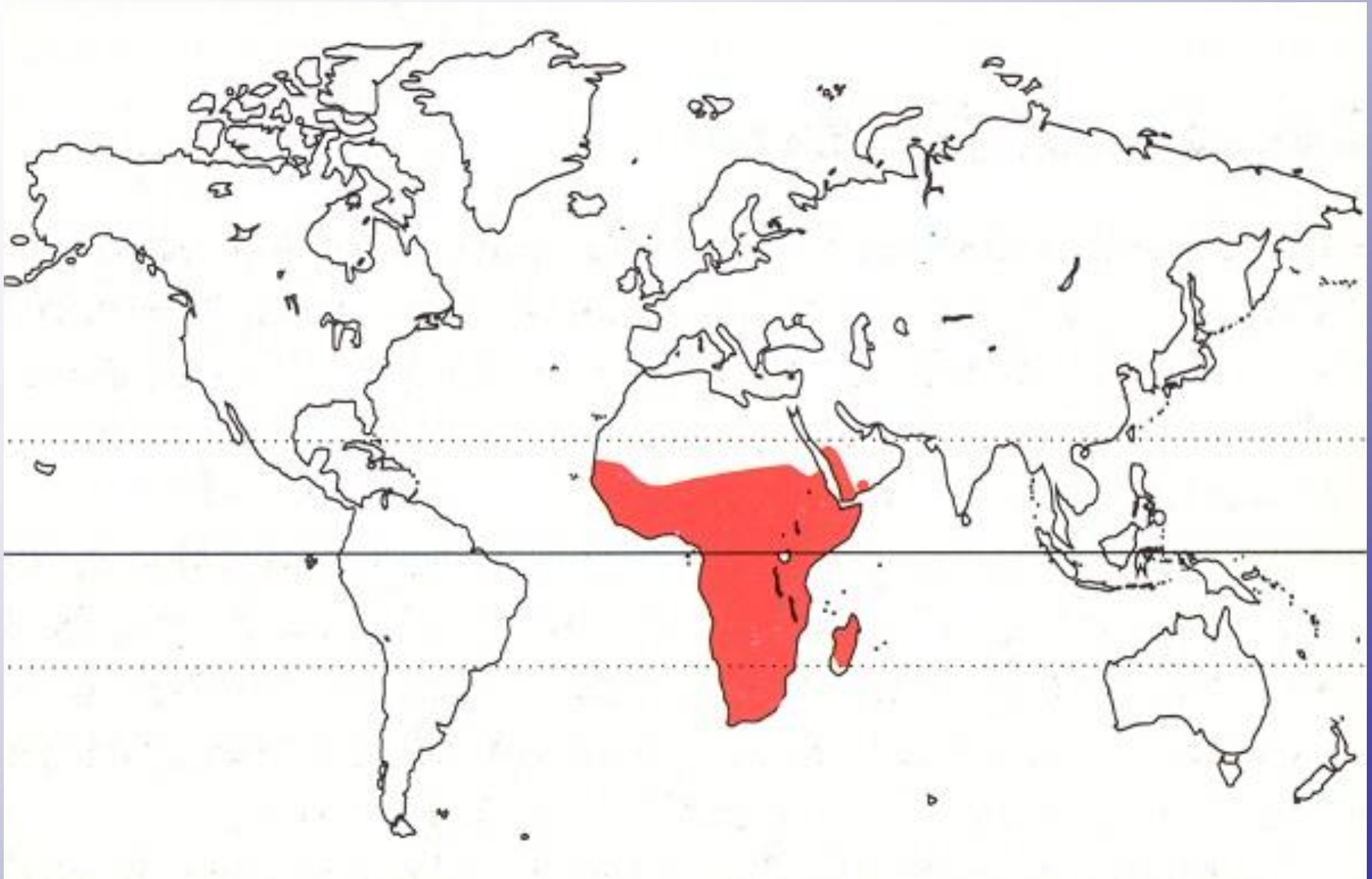
# *Botaurus stellaris*



# **Scopidae**

## **(1/1)**

# Scopidae



# *Scopus umbretta*



Afrika

# *Scopus umbretta*







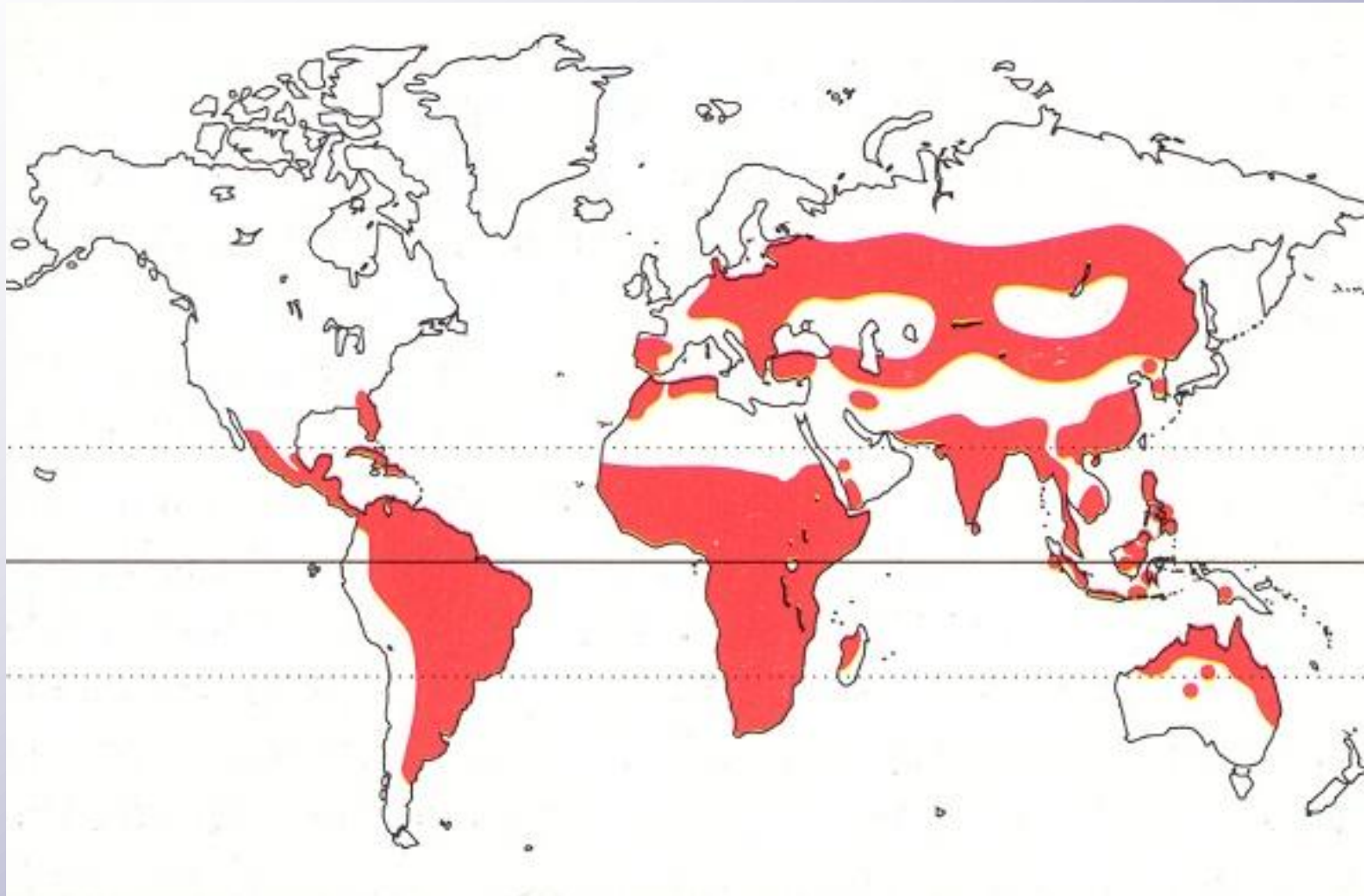


# Ciconiidae

## (6/19)

- Mycteriini (*Mycteria*, *Anastomus*) – malí lesní čápi, hlavní potravou ryby a mlži, často koloniální
- Ciconiini (*Ciconia*) – středně velcí čápi většinou otevřených prostranství, oportunisté, vyjímečně koloniální.
- Leptoptilini (*Jabiru*, *Ephippiorhynchus*, *Leptoptilos*) – velcí čápi, mrchožraví nebo rybožraví, často koloniální.

# Ciconiidae







**CICONIIDAE**

**MYCTERIINI**



wood storks and openbills  
6 species  
(*Mycteria*, *Anastomus*)

**CICONIINI**



'typical' storks  
7 species  
(*Ciconia*)

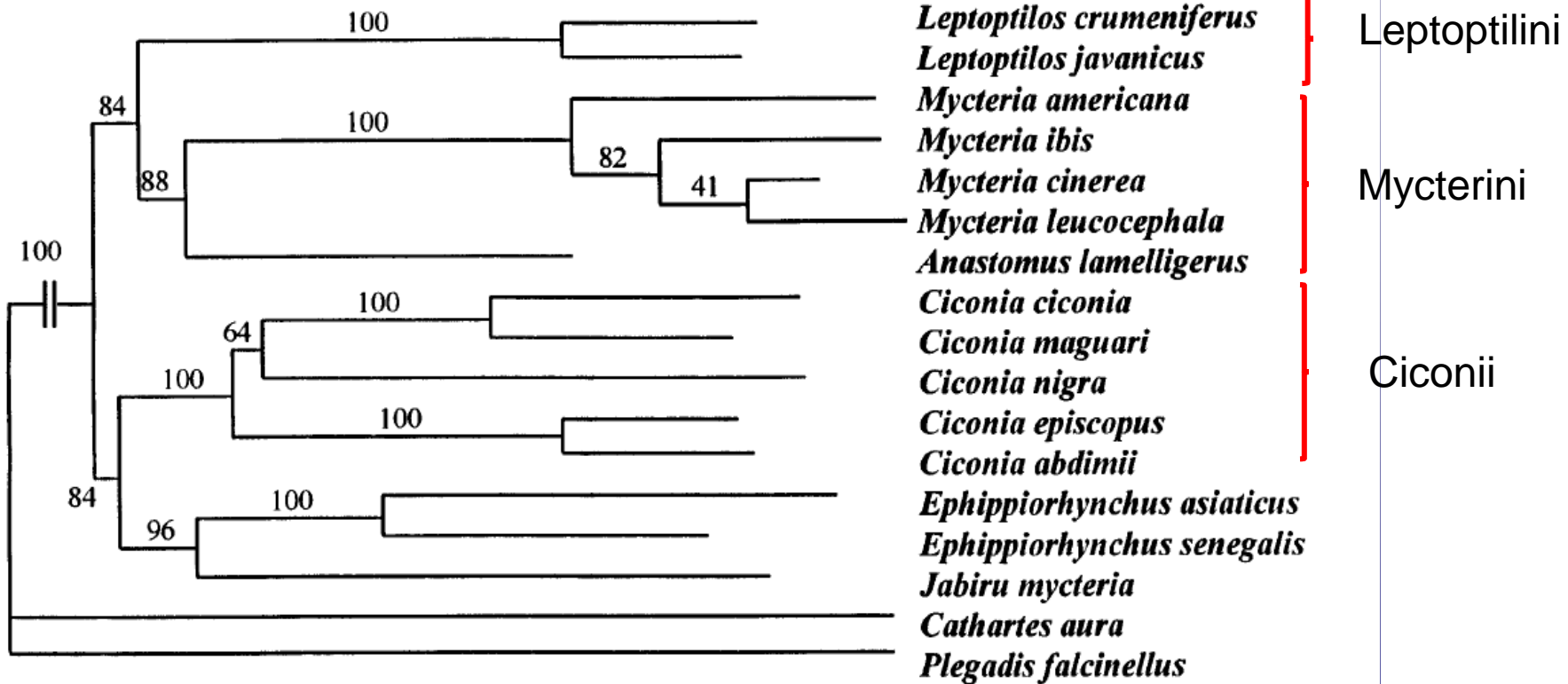
**LEPTOPTILINI**



'giant' storks  
6 species  
(*Ephippiorhynchus*, *Jabiru*,  
*Leptoptilos*)

**FAMILY**

**TRIBE**

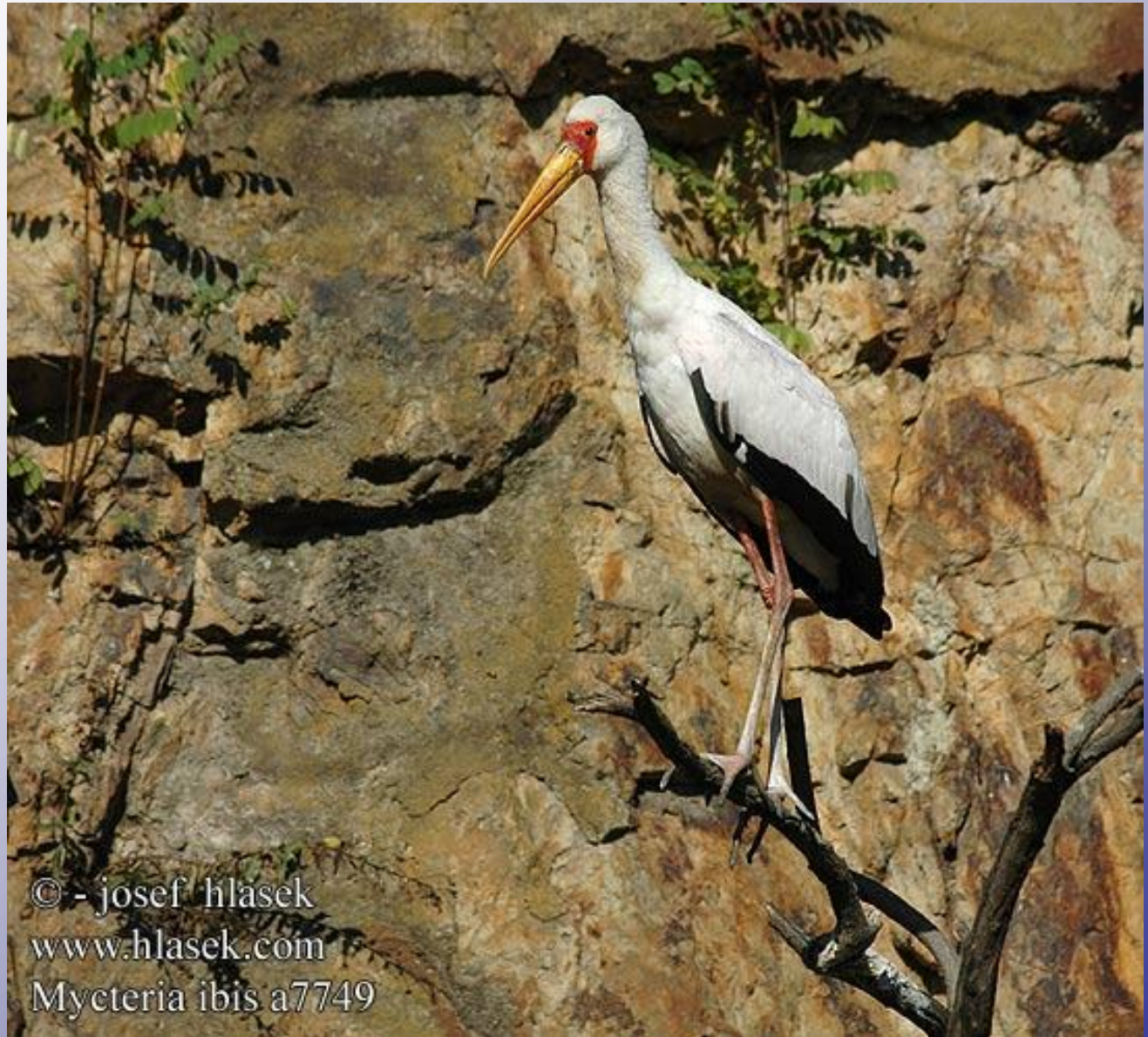


Slikas (1997) – cytochrom b, DNA hybridizace



# **Mycteriini**

# *Mycteria ibis*



Afrika

# *Mycteria ibis*



WWW.NATURALSЦENERY.CZ

# *Mycteria americana*



Nový svět

# *Mycteria leucocephala*



JV Asie

*Anastomus  
oscitans*

Narkotický sekret

JV Asie



# *Anastomus lamelligerus*



Afrika

**Ciconiini**



# *Ciconia ciconia*



Starý svět



© Herminio M. Muñiz

# *Ciconia nigra*

© P. Dubois - 23.IV.2003  
*Ciconia nigra*  
Monfragüe (Espagne)



Starý svět

*Ciconia abdimi*  
- koloniální



Afrika

# *Ciconia maguari* – semikolonie



J. Amerika

# Leptoptilini

# *Ephippiorhynchus asiaticus*



JV Asie, Australie

# *Ephippiorhynchus senegalensis*



Afrika

# *Jabiru mycteria*

ARKive  
www.arkive.org



© Malcolm Schuyt / www.flpa-images.co.uk

J. Amerika



# *Jabiru mycteria*



# *Leptoptilos crumeniferus*



Afrika

**ARKive**  
www.arkive.org



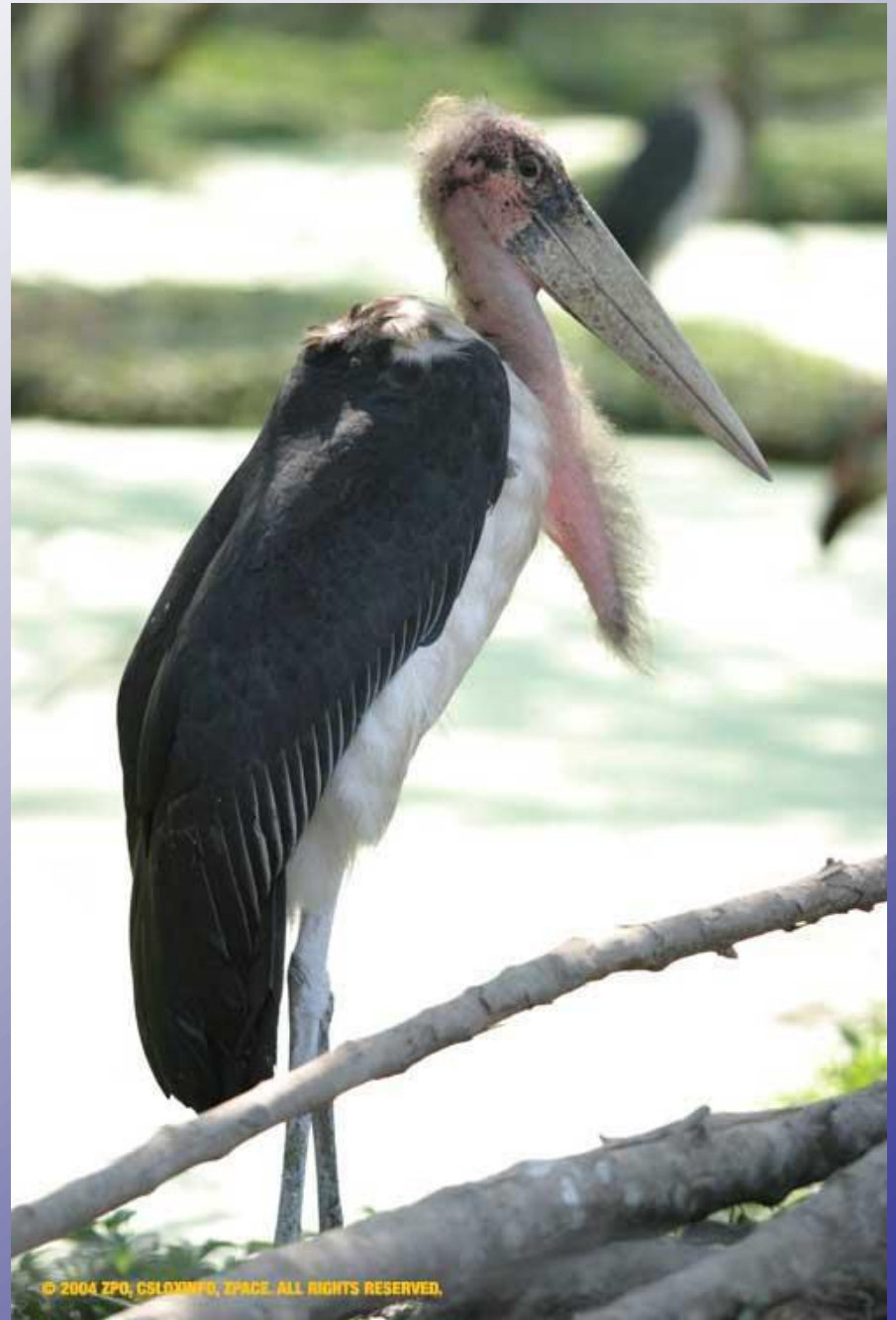
© Justine Pickett / papiliophotos.com

# *Leptoptilos crumeniferus*



*Leptoptilus  
dubius*

JV Asie



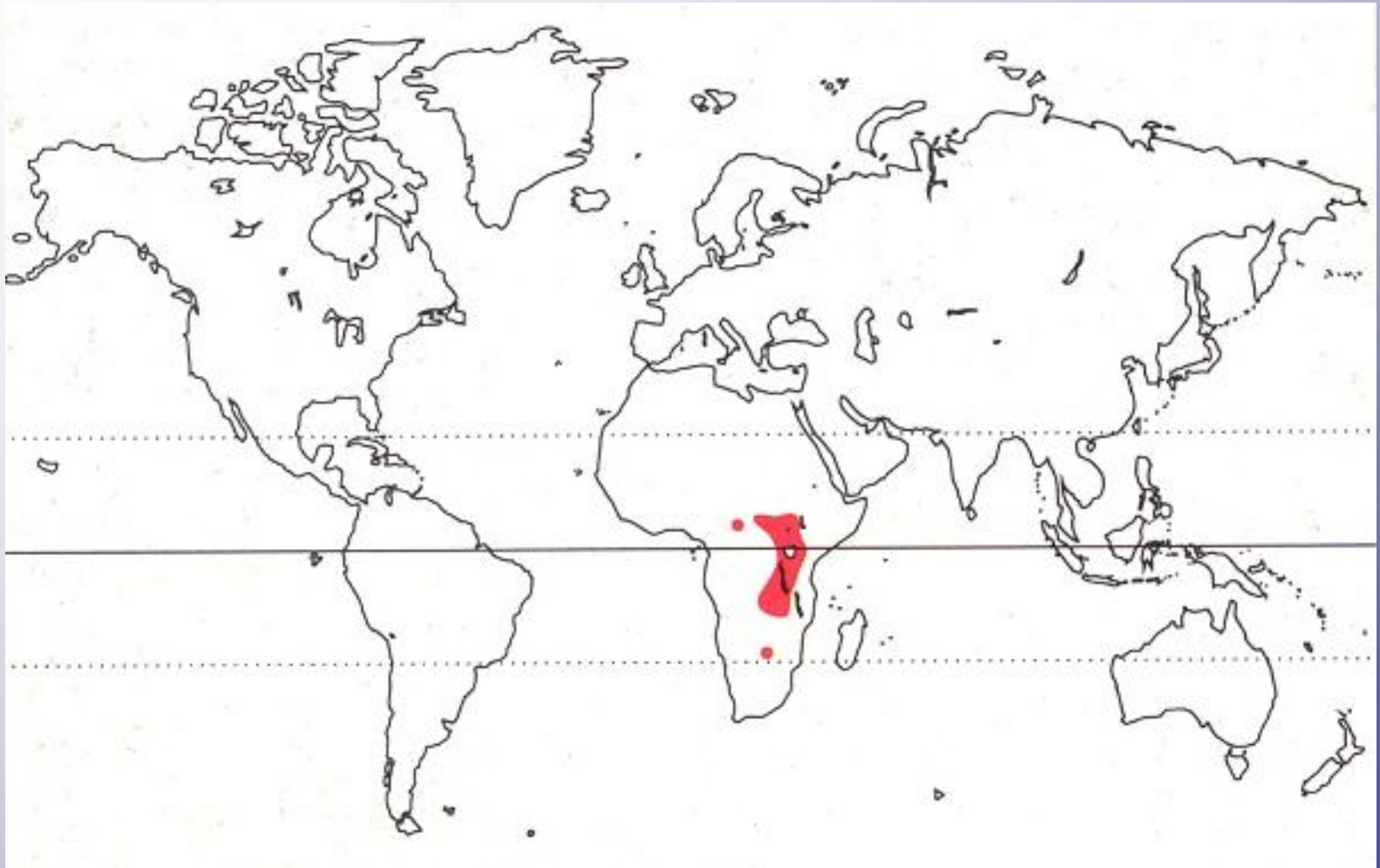
# *Leptoptilos javanicus*



# **Balaenicipitidae**

## **(1/1)**

# Balaenicipitidae





# *Balaeniceps rex*



Afrika

# *Balaeniceps rex*

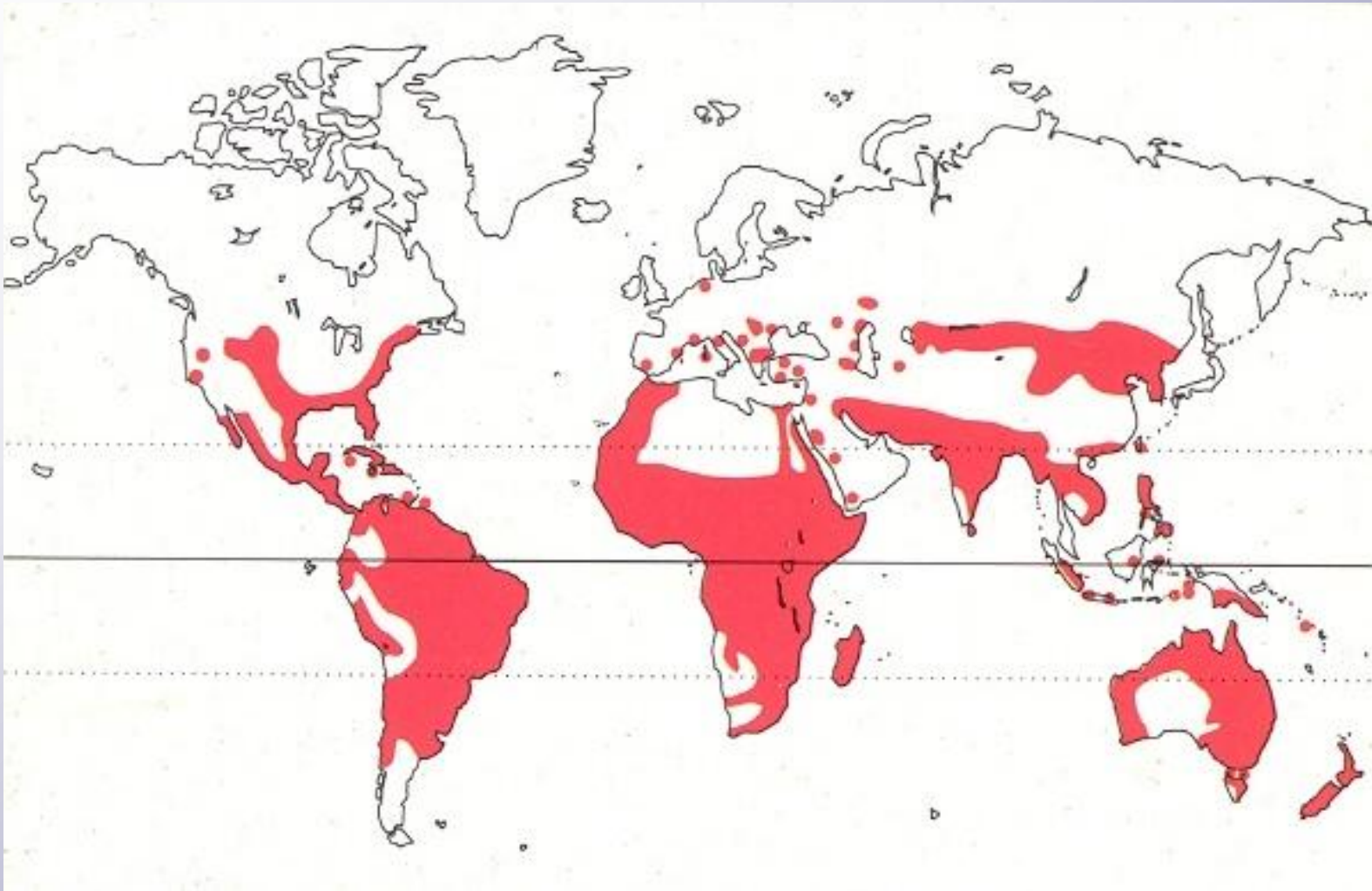


# **Threskiornithidae**

## **(13/32)**

- Threskiornithinae
- Plataleinae

# Threskiornithidae







# Threskiornithinae

*Threskiornis* – Afrika, Indie, Austrálie

*Pseudibis* – JV Asie

*Geronticus* – Afrika

*Nipponia* – Čína

*Bostrychia* – Afrika

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*Theristicus* – J. Amerika

*Cercibis* – J. Amerika

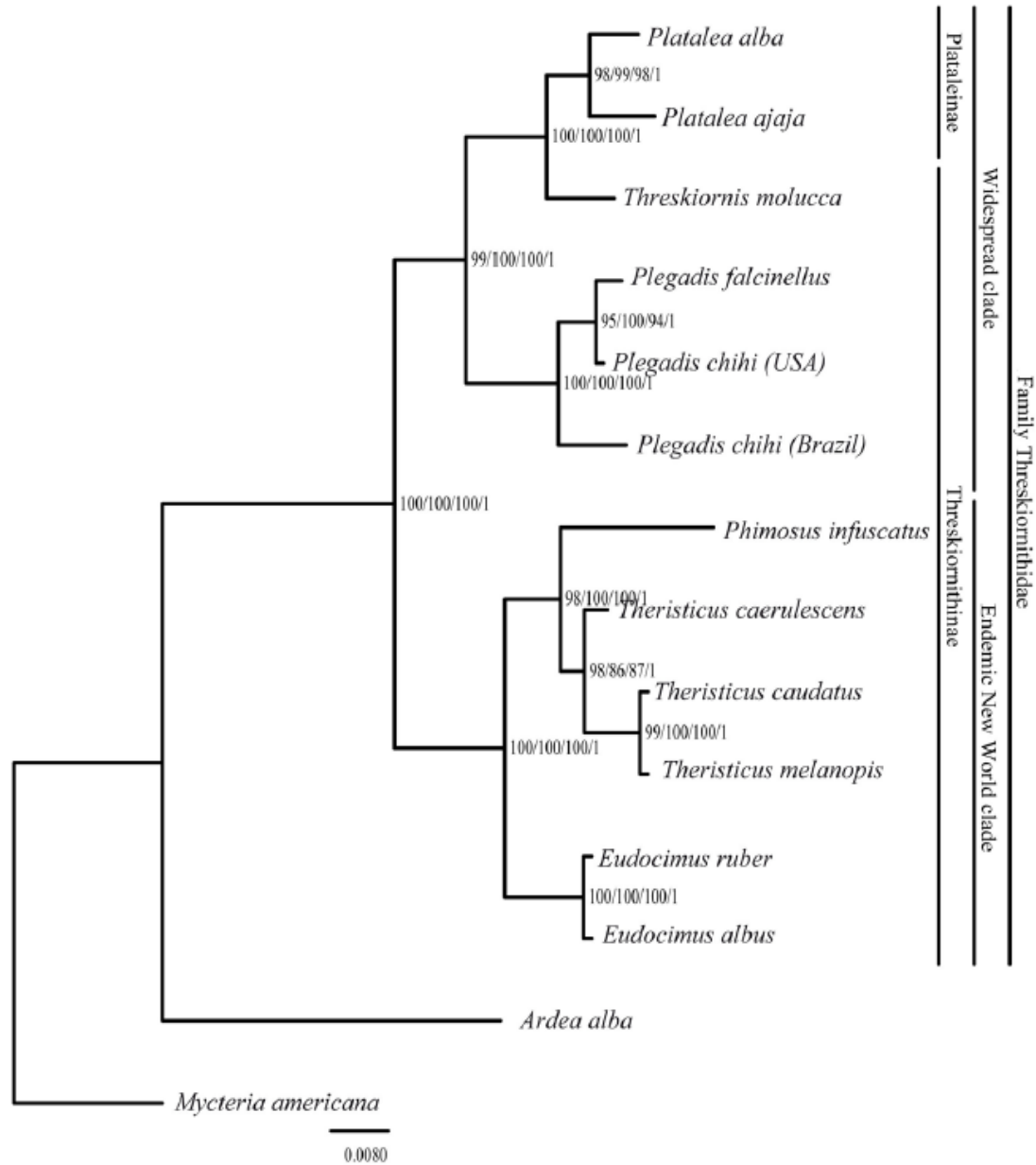
*Mesembrinibis* – J. Amerika

*Phimosus* – J. Amerika

*Eudocimus* – stř. a J. Amerika

*Plegadis* – J. Amerika, *P. falcinellus* kosmopolitní

*Lophotibis* - Madagaskar



Ramirez et al. (2013) – jaderná a mitochondriální DNA



# *Threskiornis aethiopicus*



Afrika

# *Threskiornis molucca*



Australie

# *Threskiornis spinicollis*



Australie

# *Pseudibis papilosa*



Asie

# *Geronticus eremita*



Afrika, Evropa

# *Geronticus calvus*



© Steve Bird, Birdseekers.com

Afrika

# *Bostrychia hagedash*



© Yves Thonnerieux  
www.oiseaux.net

Afrika, mláďata mají drápy v křídlech

# *Theristicus melanopis*



J. Amerika



# *Phimosus infuscatus*



J. Amerika

# *Eudocimus albus*



Nový svět

# *Eudocimus ruber*



[ o ] PHOTOMECAN .EU

J. Amerika

# *Plegadis falcinellus*



Starý svět

# *Lophotibis cristata*



Madagascar

# Plataleinae

# *Platalea leucorodia*



Starý svět

©Jupne

# *Platalea minor*



Copyright © Takashi Koike, All Rights Reserved

Asie



# *Platalea ajaja*



© John Picken

Nový svět

# *Platalea alba*

Afrika

Video: [www.arkive.org](http://www.arkive.org)

