Ancestral character estimations of endochondral bone presence (character 4)

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Data and package

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## Loading required package: Rcpp
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Running the ancestral character estimation (ACE)

Here we run the ancestral character estimation with an equal rates (ER) and all rates different (ARD) on a random parsimony tree and a random resolution (dichotomous) of the Bayesian consensus tree.

Extracting the models informations

Extracting the AICs, logged likelihood (global) and the scaled likelihood for each state at the node of interest (MRCA between *Mininjinia* and *Helodus*) for all the ancestral character estimations.s

Result tables

Displaying the results into a table

Table 1: Tree distribution (100) ancestral states estimation results. ER = Equal rates model; ARD = All Rates Different model. The columns AIC and log.lik represent the median AIC and log.lik across the 100 parsimony and bayesian trees (for both models). The columns Absent and Present represent the median scaled likelihood for the endochondral bone state. The 2.5%, 25%, 75% and 97.5% represent the confidence intervals values for each estimated parameter (log.lik, AIC, Present and Absent endochondral bone).

Trees	Model	Median	2.5%	25%	75%	97.5%
Parsimony Implied Weights		log.lik.				
	ER	-30.6	-30.61	-30.6	-30.57	-30.54
	ARD	-27.52	-27.53	-27.53	-27.52	-27.51
		AIC				
	ER	63.2	63.08	63.14	63.2	63.21
	ARD	59.04	59.03	59.04	59.05	59.05
		Absent				
	ER	0.92	0.92	0.92	0.92	0.93

Trees	Model	Median	2.5%	25%	75%	97.5%
	ARD	0.38	0.38	0.38	0.4	0.42
		Present				
	ER	0.08	0.07	0.08	0.08	0.08
	ARD	0.62	0.58	0.6	0.62	0.62
Parsimony Equal Weights		log.lik.				
	ER	-30.8	-30.95	-30.85	-30.74	-30.7
	ARD	-27.51	-27.61	-27.56	-27.48	-27.47
		AIC				
	ER	63.59	63.4	63.48	63.7	63.9
	ARD	59.01	58.94	58.96	59.11	59.21
		Absent				
	ER	0.78	0.77	0.78	0.78	0.79
	ARD	0.2	0.19	0.2	0.2	0.21
		Present				
	ER	0.22	0.21	0.22	0.22	0.23
	ARD	0.8	0.79	0.8	0.8	0.81
Bayesian Partitioned		log.lik.				
	ER	-32.72	-36.28	-33.74	-31.83	-30.44
	ARD	-29.61	-33.61	-30.42	-28.71	-27.49
		AIC				
	ER	67.43	62.88	65.67	69.48	74.57
	ARD	63.21	58.98	61.41	64.83	71.22
		Absent				
	ER	0.84	0.12	0.58	0.99	1
	ARD	0.26	0.01	0.05	0.81	1
		Present				
	ER	0.16	0	0.01	0.42	0.88
	ARD	0.74	0	0.19	0.95	0.99
Bayesian Unpartitioned		log.lik.				
	ER	-32.55	-35.58	-33.49	-31.75	-30.2
	ARD	-29.22	-32.66	-30.35	-28.59	-26.58
		AIC				
	ER	67.1	62.39	65.5	68.97	73.16
	ARD	62.44	57.15	61.19	64.71	69.33
		Absent				
	ER	0.73	0.05	0.38	0.98	1
	ARD	0.14	0	0.04	0.79	1
		Present				
	ER	0.27	0	0.02	0.62	0.95
	ARD	0.86	0	0.21	0.96	1

Table 2: Tree distribution (100) ancestral states estimation results. ER = Equal rates model; ARD = All Rates Different model. The columns AIC and log.lik represent the median AIC and log.lik across the 100 parsimony and bayesian trees (for both models). The columns Absent and Present represent the median scaled likelihood for the endochondral bone state.

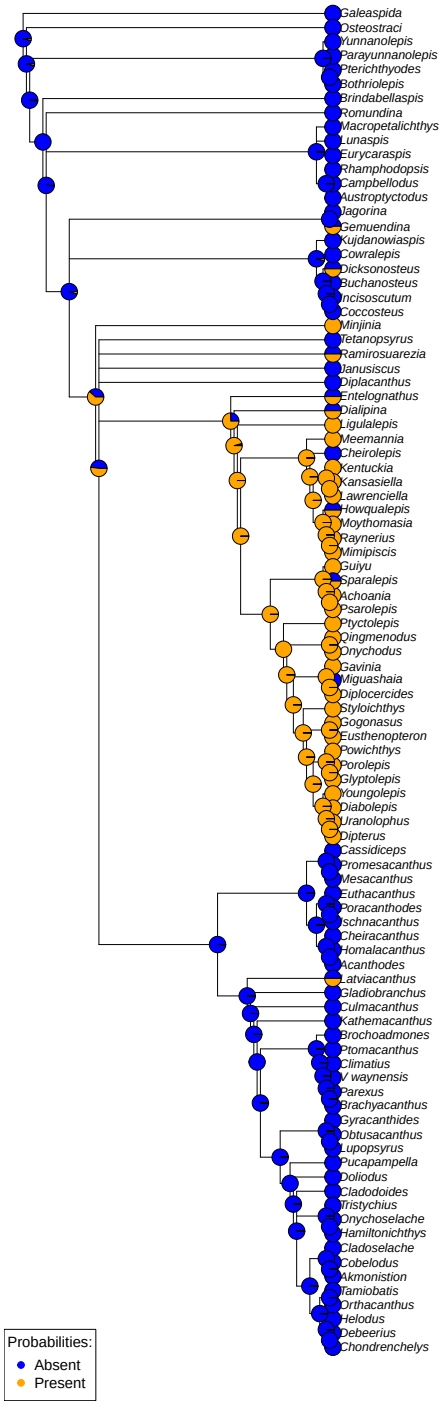
Trees	Model	log.lik.	log.ratio	AIC	Absent	Present
Parsimony Implied Weights	ER	-30.6	6.16	63.2	0.92	0.08
	ARD	-27.52		59.04	0.38	0.62

Trees	Model	log.lik.	log.ratio	AIC	Absent	Present
Parsimony Equal Weights	ER	-30.8	6.58	63.59	0.78	0.22
	ARD	-27.51		59.01	0.2	0.8
Bayesian Partitioned	ER	-32.72	6.22	67.43	0.84	0.16
	ARD	-29.61		63.21	0.26	0.74
Bayesian Unpartitioned	ER	-32.55	6.66	67.1	0.73	0.27
	ARD	-29.22		62.44	0.14	0.86

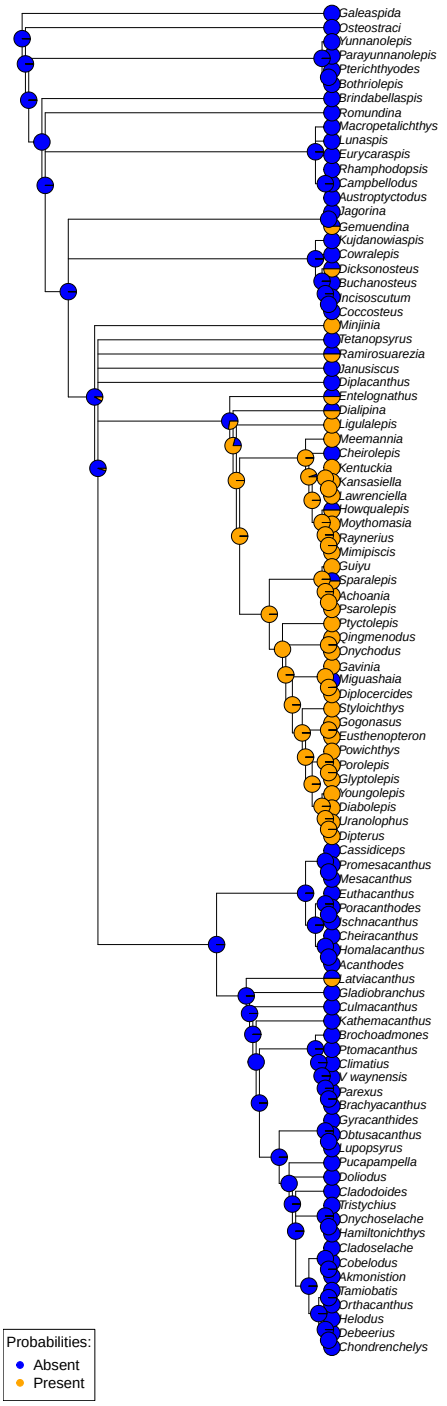
Visualisation on the consensus trees

We can then visualise all the results on the consensus trees

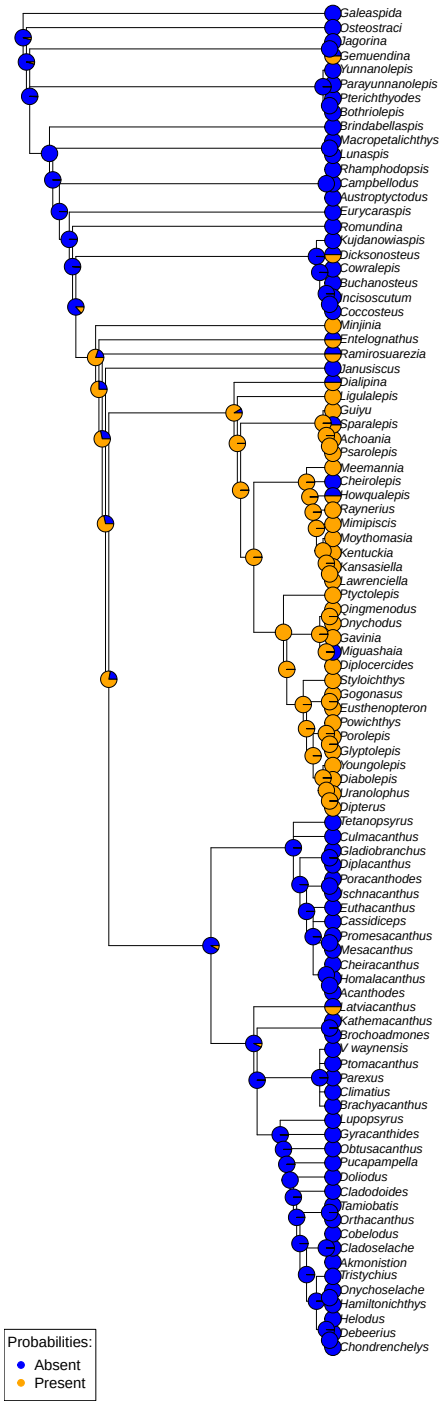
Endochondral bone estimation
(parsimony implied weights − ARD)



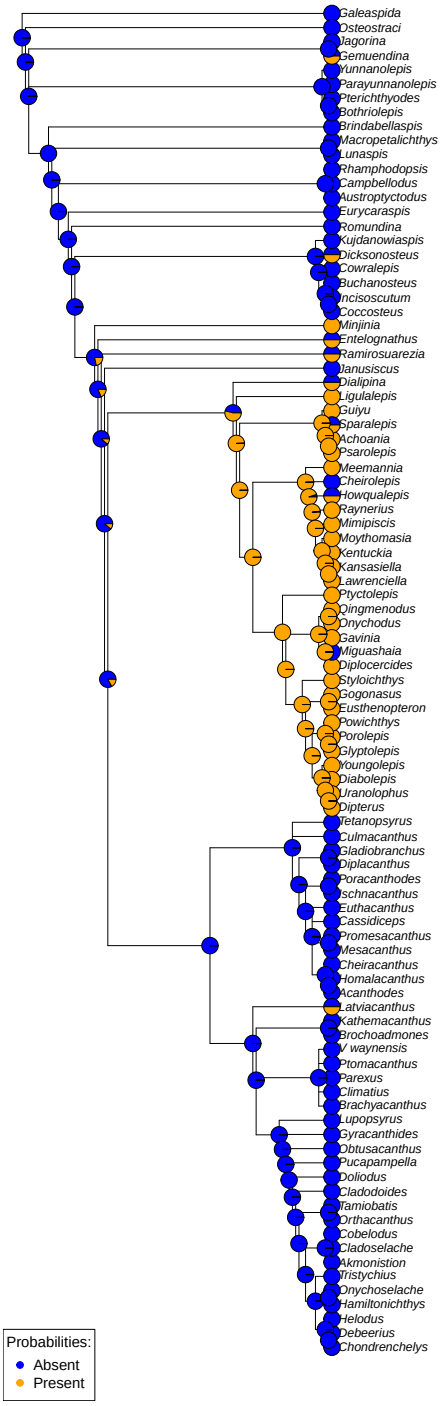
Endochondral bone estimation
(parsimony implied weights − ER)



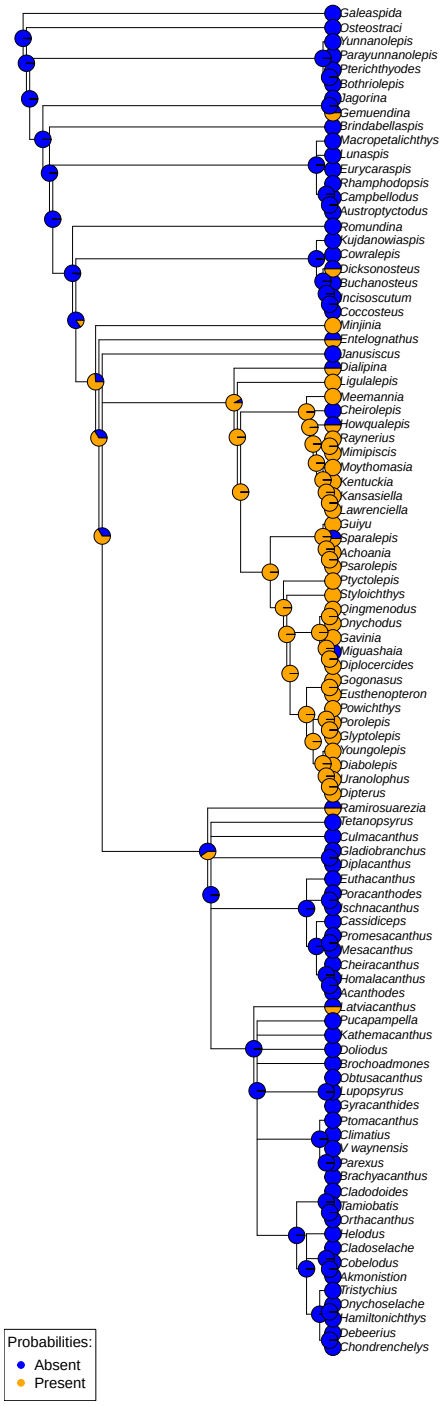
Endochondral bone estimation
(parsimony unweighted − ARD)



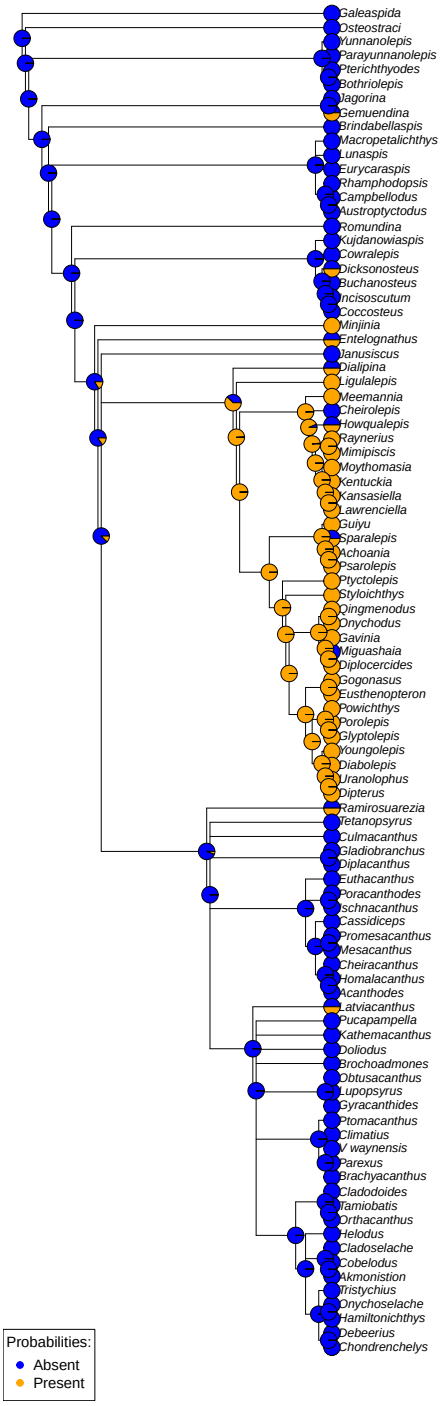
Endochondral bone estimation
(parsimony unweighted − ER)

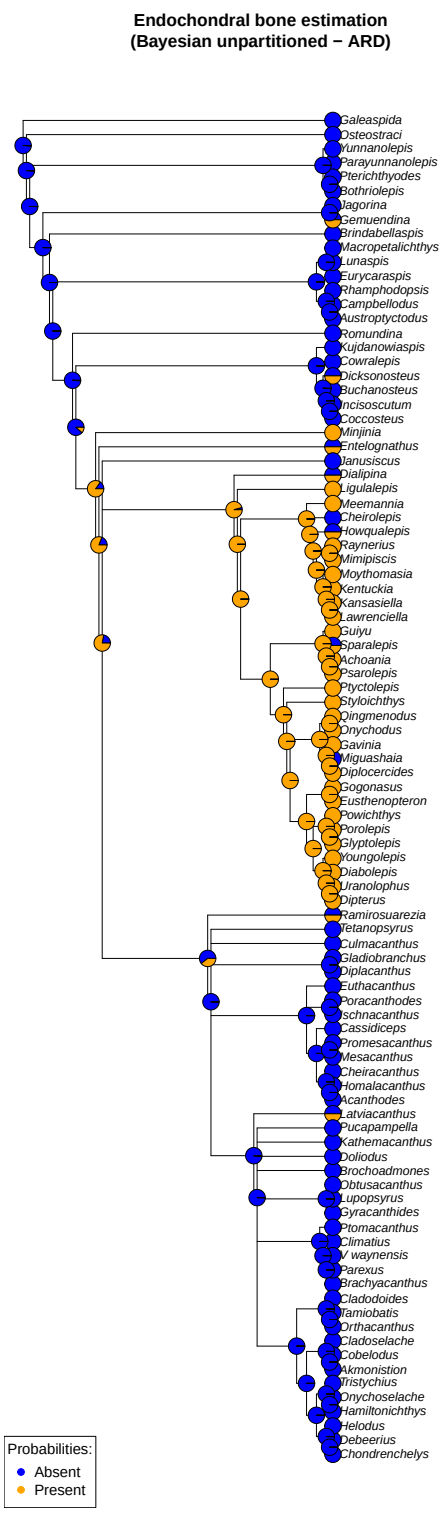


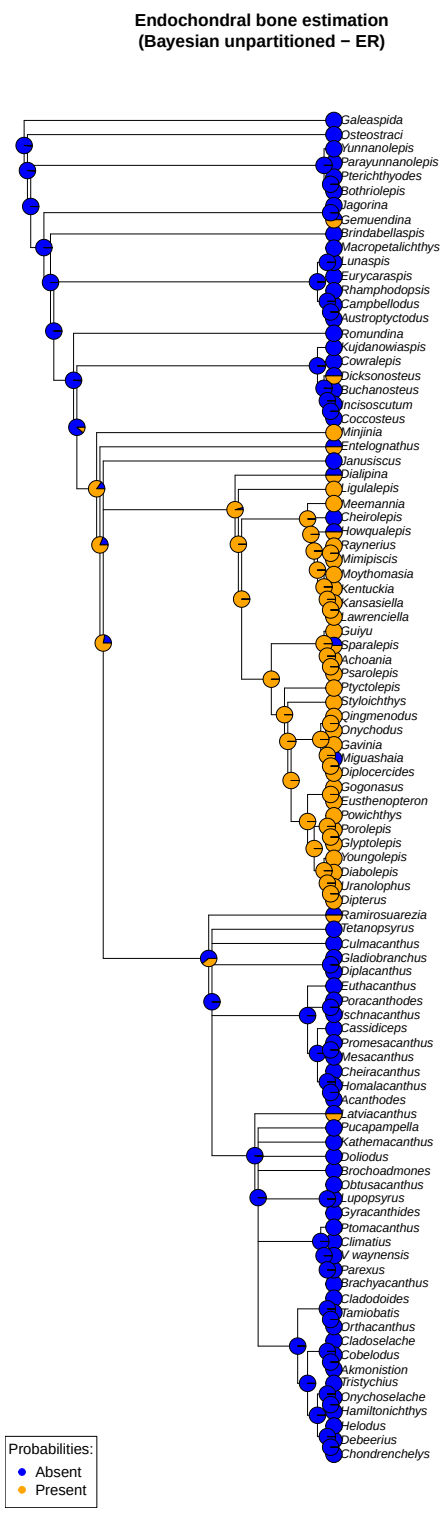
Endochondral bone estimation
(Bayesian partitioned − ARD)



Endochondral bone estimation
(Bayesian partitioned − ER)




Endochondral bone estimation
(Bayesian unpartitioned − ARD)
Galeaspida
Osteostraci
Yunnanolepis
Parayunnanolepis
Pterichthyoides
Bothriolepis
Jagorina
Gemuendina
Brindabellaspis
Macropetalichthys
Lunaspis
Eurycaraspis
Rhamphodopsis
Campbellodus
Austroptyctodus
Romundina
Kujdanowiaspis
Cowralepis
Dicksonosteus
Buchanosteus
Incisoscutum
Coccosteus
Minjinia
Entelognathus
Janusiscus
Dialipina
Ligulalepis
Meemannia
Cheirolepis
Howqualepis
Raynerius
Mimipiscis
Moythomasia
Kentuckia
Kansasiella
Lawrenciella
Guiyu
Sparalepis
Achoania
Psarolepis
Ptyctolepis
Styloichthys
Qingmenodus
Onychodus
Gavinia
Miguashaia
Diplocercides
Gogonasus
Eusthenopteron
Powichthys
Porolepis
Glyptolepis
Youngolepis
Diabolepis
Uranolophus
Dipterus
Ramirosuarezia
Tetanopsyrus
Culmacanthus
Gladiobranchus
Diplacanthus
Euthacanthus
Poracanthodes
Ischnacanthus
Cassidiceps
Promesacanthus
Mesacanthus
Cheiracanthus
Homalacanthus
Acanthodes
Latviacanthus
Pucapampella
Kathemacanthus
Doliodus
Brochoadmones
Obtusacanthus
Lupopsyrus
Gyracanthides
Ptomacanthus
Climatius
V waynensis
Parexus
Brachyacanthus
Cladodoides
Tamiobatis
Orthacanthus
Cladoselache
Cobelodus
Akmonistion
Tristychius
Onychoselache
Hamiltonichthys
Helodus
Debeerius
Chondrenchelys
Probabilities:
Absent
Present


Endochondral bone estimation
(Bayesian unpartitioned − ER)
Galeaspida
Osteostraci
Yunnanolepis
Parayunnanolepis
Pterichthyoides
Bothriolepis
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Lunaspis
Eurycaraspis
Rhamphodopsis
Campbellodus
Austroptyctodus
Romundina
Kujdanowiaspis
Cowralepis
Dicksonosteus
Buchanosteus
Incisoscutum
Coccosteus
Minjinia
Entelognathus
Janusiscus
Dialipina
Ligulalepis
Meemannia
Cheirolepis
Howqualepis
Raynerius
Mimipiscis
Moythomasia
Kentuckia
Kansasiella
Lawrenciella
Guiyu
Sparalepis
Achoania
Psarolepis
Ptyctolepis
Styloichthys
Qingmenodus
Onychodus
Gavinia
Miguashaia
Diplocercides
Gogonasus
Eusthenopteron
Powichthys
Porolepis
Glyptolepis
Youngolepis
Diabolepis
Uranolophus
Dipterus
Ramirosuarezia
Tetanopsyrus
Culmacanthus
Gladiobranchus
Diplacanthus
Euthacanthus
Poracanthodes
Ischnacanthus
Cassidiceps
Promesacanthus
Mesacanthus
Cheiracanthus
Homalacanthus
Acanthodes
Latviacanthus
Pucapampella
Kathemacanthus
Doliodus
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Cladodoides
Tamiobatis
Orthacanthus
Cladoselache
Cobelodus
Akmonistion
Tristychius
Onychoselache
Hamiltonichthys
Helodus
Debeerius
Chondrenchelys
Probabilities:
Absent
Present

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