Supporting Information

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Table S1. Oxygen isotope compositions of vertebrate apatites used for this study

Sample N°	Nature	Taxon	Locality Name	Province	Formation	Age	Paleolatitude (°)	$\delta^{18}O_p$ (‰ V-SMOW)	Data source
LJ10	tooth bulk	theropoda	Lujiatun	Liaoning	Yixian	Barremian-Early Aptian	41.9(+6.6/ − 6.6)	13.6	this study
L09	bone	Caudipteryx zoui	Zhang Jia Gou	Liaoning	Yixian	Barremian-Early Aptian	41.9(+6.6/ − 6.6)	15.2	this study
LJ01	tooth enamel	cf. euhelopus sp.	Lujiatun	Liaoning	Yixian	Barremian-Early Aptian	41.9(+6.6/ − 6.6)	10.1	this study
LJ02	tooth enamel	cf. euhelopus sp.	Lujiatun	Liaoning	Yixian	Barremian-Early Aptian	41.9(+6.6/ − 6.6)	12.9	this study
LJ03	tooth enamel	cf. euhelopus sp.	Lujiatun	Liaoning	Yixian	Barremian-Early Aptian	41.9(+6.6/ − 6.6)	14.2	this study
LJ04	tooth enamel	cf. euhelopus sp.	Lujiatun	Liaoning	Yixian	Barremian-Early Aptian	41.9(+6.6/ − 6.6)	10.6	this study
LJ05	tooth enamel	cf. euhelopus sp.	Lujiatun	Liaoning	Yixian	Barremian-Early Aptian	41.9(+6.6/ − 6.6)	12.2	this study
L05	tooth bulk	Jinzhousaurus yangi	Bai Cai Gou	Liaoning	Yixian	Barremian-Early Aptian	41.9(+6.6/ − 6.6)	16	this study
L06	tooth bulk	Jinzhousaurus yangi	Bai Cai Gou	Liaoning	Yixian	Barremian-Early Aptian	41.9(+6.6/ − 6.6)	15.4	this study
LJ08	tooth bulk	jeholosaurus	Lujiatun	Liaoning	Yixian	Barremian-Early Aptian	41.9(+6.6/ − 6.6)	15.3	this study
LJ09	skull bone	jeholosaurus	Lujiatun	Liaoning	Yixian	Barremian-Early Aptian	41.9(+6.6/ − 6.6)	14.7	this study
LJ11	3 bulk teeth	jeholosaurus	Lujiatun	Liaoning	Yixian	Barremian-Early Aptian	41.9(+6.6/ − 6.6)	11.1	this study
LJ06	tooth bulk	hongshanosaurus houi	Lujiatun	Liaoning	Yixian	Barremian-Early Aptian	41.9(+6.6/ − 6.6)	14.9	this study
LJ07	mandible bone	hongshanosaurus houi	Lujiatun	Liaoning	Yixian	Barremian-Early Aptian	41.9(+6.6/ − 6.6)	14.4	this study
L02	shell bone	chelonia	Beipiao	Liaoning	Yixian	Barremian-Early Aptian	41.9(+6.6/ − 6.6)	13	this study
L17	bone	hyphalosaurus	Hejiaxin	Liaoning	Yixian	Barremian-Early Aptian	41.9(+6.6/ − 6.6)	14.3	this study
BDH01	tooth bulk	theropoda	Badaohao	Liaoning	Shahai	Aptian-Albian	42.1(+6.6/ − 6.5)	12.7	this study
BDH02	tooth bulk	theropoda	Badaohao	Liaoning	Shahai	Aptian-Albian	42.1(+6.6/ − 6.5)	10.8	this study
BDH07	tooth bulk	theropoda	Badaohao	Liaoning	Shahai	Aptian-Albian	42.1(+6.6/ − 6.5)	12.9	this study
BDH08	tooth bulk	theropoda	Badaohao	Liaoning	Shahai	Aptian-Albian	42.1(+6.6/ − 6.5)	12.4	this study
BDH09	tooth bulk	theropoda	Badaohao	Liaoning	Shahai	Aptian-Albian	42.1(+6.6/ − 6.5)	12.4	this study
BDH05	tooth bulk	sauropoda	Badaohao	Liaoning	Shahai	Aptian-Albian	42.1(+6.6/ − 6.5)	12.4	this study
BDH06	tooth bulk	sauropoda	Badaohao	Liaoning	Shahai	Aptian-Albian	42.1(+6.6/ − 6.5)	12.8	this study
BDH03	tooth bulk	iguanodontian	Badaohao	Liaoning	Shahai	Aptian-Albian	42.1(+6.6/ − 6.5)	11.4	this study
BDH04	tooth bulk	ceratopsia	Badaohao	Liaoning	Shahai	Aptian-Albian	42.1(+6.6/ − 6.5)	11.4	this study
NH02	tooth bulk	theropoda	Nanhuang #3	Liaoning	Fuxin	Aptian-Albian	42.1(+6.6/ − 6.5)	14.3	this study
NH04	tooth bulk	theropoda	Nanhuang #3	Liaoning	Fuxin	Aptian-Albian	42.1(+6.6/ − 6.5)	11.7	this study
NH06	tooth bulk	theropoda	Nanhuang #3	Liaoning	Fuxin	Aptian-Albian	42.1(+6.6/ − 6.5)	11.4	this study
NH09	tooth bulk	theropoda	Nanhuang #3	Liaoning	Fuxin	Aptian-Albian	42.1(+6.6/ − 6.5)	13.5	this study
NH01	tooth bulk	ankylosauria	Nanhuang #3	Liaoning	Fuxin	Aptian-Albian	42.1(+6.6/ − 6.5)	10.2	this study
NH03	tooth bulk	ankylosauria	Nanhuang #3	Liaoning	Fuxin	Aptian-Albian	42.1(+6.6/ − 6.5)	9.8	this study
NH05	tooth bulk	ankylosauria	Nanhuang #3	Liaoning	Fuxin	Aptian-Albian	42.1(+6.6/ − 6.5)	10.6	this study
NH07	tooth bulk	ankylosauria	Nanhuang #3	Liaoning	Fuxin	Aptian-Albian	42.1(+6.6/ − 6.5)	13.9	this study
NH08	tooth bulk	ankylosauria	Nanhuang #3	Liaoning	Fuxin	Aptian-Albian	42.1(+6.6/ − 6.5)	10.3	this study
NH10	shell bone	chelonia	Nanhuang #3	Liaoning	Fuxin	Aptian-Albian	42.1(+6.6/ − 6.5)	11.5	this study
G06	tooth enamel	theropoda	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	15.5	this study
G07	tooth enamel	theropoda	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	13.2	this study
G08	tooth enamel	theropoda	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	12.6	this study
G22	tooth enamel	theropoda	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	17.1	this study
G09	tooth enamel	sauropoda	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	18.8	this study
G10	tooth enamel	sauropoda	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	18.5	this study
G20	tooth bulk	sauropoda	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	14.8	this study
G21	tooth bulk	sauropoda	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	14.9	this study
G23	tooth enamel	sauropoda	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	17.9	this study
G24	tooth enamel	sauropoda	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	14	this study
G25	tooth enamel	sauropoda	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	15.5	this study
G26	tooth enamel	sauropoda	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	15.9	this study
G11	tooth enamel	ornithopoda	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	13.4	this study
G12	tooth enamel	ornithopoda	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	13.9	this study
G13	tooth enamel	ornithopoda	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	15.3	this study

Sample N°	Nature	Taxon	Locality Name	Province	Formation	Age	Paleolatitude (°)	$\delta^{18}O_p$ (‰ V-SMOW)	Data source
G16	tooth bulk	ornithopoda	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	13.1	this study
G17	tooth bulk	ornithopoda	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	15	this study
G18	tooth bulk	ornithopoda	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	12.8	this study
G19	tooth bulk	ornithopoda	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	15.2	this study
G15	tooth enamel	cf. archaeoceratops	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	18.4	this study
G27	tooth bulk	cf. archaeoceratops	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	17.1	this study
G28	tooth bulk	cf. archaeoceratops	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	16.4	this study
G29	tooth bulk	cf. archaeoceratops	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	18	this study
G04	skull fragment	crocodylia	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	13.1	this study
G05	osteoderm	crocodylia	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	13.4	this study
G14	tooth enamel	crocodylia	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	15.3	this study
G01	shell bone	chelonia	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	14	this study
G02	shell bone	chelonia	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	14.3	this study
G03	shell bone	chelonia	Mazongshan	Gansu	Xinminbao	Aptian-Albian	35.2(+6.4/ − 6.6)	14.4	this study
NP01	tooth bulk	cf. *Prodeinodon*	Liu Bang Cun	Guangxi	Napai	Aptian	21.0(+7.2/ − 7.2)	17.3	Amiot et al.(1)
NP02	tooth bulk	cf. *Prodeinodon*	Liu Bang Cun	Guangxi	Napai	Aptian	21.0(+7.2/ − 7.2)	17.8	Amiot et al.(1)
NP06	tooth bulk	theropoda	Liu Bang Cun	Guangxi	Napai	Aptian	21.0(+7.2/ − 7.2)	17.5	Amiot et al.(1)
NP08	tooth bulk	sauropoda	Liu Bang Cun	Guangxi	Napai	Aptian	21.0(+7.2/ − 7.2)	24.5	this study
NP09	tooth bulk	sauropoda	Liu Bang Cun	Guangxi	Napai	Aptian	21.0(+7.2/ − 7.2)	20.5	this study
NP05	bone	*Fusuisaurus*	Liu Bang Cun	Guangxi	Napai	Aptian	21.0(+7.2/ − 7.2)	19.0	this study
NP04	shell bone	chelonia	Liu Bang Cun	Guangxi	Napai	Aptian	21.0(+7.2/ − 7.2)	14.7	Amiot et al.(1)
KPS14	tooth bulk	theropoda	Khok Pha Suam	Thailand	Khok Kruat	Aptian	24.3(+1.9/ − 1.8)	20.9	this study
KPS15	tooth bulk	theropoda	Khok Pha Suam	Thailand	Khok Kruat	Aptian	24.3(+1.9/ − 1.8)	13.7	this study
KPS02	tooth bulk	sauropoda	Khok Pha Suam	Thailand	Khok Kruat	Aptian	24.3(+1.9/ − 1.8)	24.8	this study
KPS03	tooth bulk	sauropoda	Khok Pha Suam	Thailand	Khok Kruat	Aptian	24.3(+1.9/ − 1.8)	12.7	this study
KPS04	tooth bulk	sauropoda	Khok Pha Suam	Thailand	Khok Kruat	Aptian	24.3(+1.9/ − 1.8)	16.8	this study
KPS12	tooth bulk	sauropoda	Khok Pha Suam	Thailand	Khok Kruat	Aptian	24.3(+1.9/ − 1.8)	14.8	this study
KPS13	tooth bulk	sauropoda	Khok Pha Suam	Thailand	Khok Kruat	Aptian	24.3(+1.9/ − 1.8)	15.3	this study
KPS05	tooth bulk	omithopoda	Khok Pha Suam	Thailand	Khok Kruat	Aptian	24.3(+1.9/ − 1.8)	16.4	this study
KPS06	tooth bulk	omithopoda	Khok Pha Suam	Thailand	Khok Kruat	Aptian	24.3(+1.9/ − 1.8)	15.8	this study
KPS07	tooth bulk	omithopoda	Khok Pha Suam	Thailand	Khok Kruat	Aptian	24.3(+1.9/ − 1.8)	14.9	this study
KPS08	tooth bulk	omithopoda	Khok Pha Suam	Thailand	Khok Kruat	Aptian	24.3(+1.9/ − 1.8)	14.4	this study
KPS09	tooth bulk	omithopoda	Khok Pha Suam	Thailand	Khok Kruat	Aptian	24.3(+1.9/ − 1.8)	14.0	this study
KPS10	tooth bulk	omithopoda	Khok Pha Suam	Thailand	Khok Kruat	Aptian	24.3(+1.9/ − 1.8)	15.2	this study
KPS11	tooth bulk	omithopoda	Khok Pha Suam	Thailand	Khok Kruat	Aptian	24.3(+1.9/ − 1.8)	18.7	this study
KPS01	tooth bulk	crocodylia	Khok Pha Suam	Thailand	Khok Kruat	Aptian	24.3(+1.9/ − 1.8)	15.4	this study
TH002	tooth enamel	crocodylia	Khok Pha Suam	Thailand	Khok Kruat	Aptian	24.3(+1.9/ − 1.8)	14.7	Amiot et al. (2)
TH007	tooth enamel	crocodylia	Khok Pha Suam	Thailand	Khok Kruat	Aptian	24.3(+1.9/ − 1.8)	14.0	Amiot et al. (2)
TH003	shell bone	chelonia	Khok Pha Suam	Thailand	Khok Kruat	Aptian	24.3(+1.9/ − 1.8)	12.8	Amiot et al. (2)
SH05	tooth bulk	tritylodontid	Shiramine	Japan	Kuwajima	Barremian-Early Aptian	43.2(+8.2/ − 7.8)	14.3	this study
SH06	tooth bulk	tritylodontid	Shiramine	Japan	Kuwajima	Barremian-Early Aptian	43.2(+8.2/ − 7.8)	12.7	this study
SH07	tooth bulk	tritylodontid	Shiramine	Japan	Kuwajima	Barremian-Early Aptian	43.2(+8.2/ − 7.8)	12.2	this study
SH08	tooth bulk	tritylodontid	Shiramine	Japan	Kuwajima	Barremian-Early Aptian	43.2(+8.2/ − 7.8)	12.5	this study
SH09	tooth bulk	tritylodontid	Shiramine	Japan	Kuwajima	Barremian-Early Aptian	43.2(+8.2/ − 7.8)	13.0	this study
SH10	tooth bulk	tritylodontid	Shiramine	Japan	Kuwajima	Barremian-Early Aptian	43.2(+8.2/ − 7.8)	12.5	this study
SH02	shell bone	trionychoidea	Shiramine	Japan	Kuwajima	Barremian-Early Aptian	43.2(+8.2/ − 7.8)	12.4	this study
SH03	shell bone	trionychoidea	Shiramine	Japan	Kuwajima	Barremian-Early Aptian	43.2(+8.2/ − 7.8)	12.6	this study
SH04	shell bone	trionychoidea	Shiramine	Japan	Kuwajima	Barremian-Early Aptian	43.2(+8.2/ − 7.8)	13.1	this study
SH11	shell bone	trionychoidea	Shiramine	Japan	Kuwajima	Barremian-Early Aptian	43.2(+8.2/ − 7.8)	12.2	this study
SH12	shell bone	trionychoidea	Shiramine	Japan	Kuwajima	Barremian-Early Aptian	43.2(+8.2/ − 7.8)	12.7	this study
SH13	shell bone	trionychoidea	Shiramine	Japan	Kuwajima	Barremian-Early Aptian	43.2(+8.2/ − 7.8)	12.2	this study

Sample N°	Nature	Taxon	Locality Name	Province	Formation	Age	Paleolatitude (°)	$\delta^{18}O_p$ (‰ V-SMOW)	Data source
SH14	shell bone	trionychoidea	Shiramine	Japan	Kuwajima	Barremian-Early Aptian	43.2(+8.2/ − 7.8)	12.6	this study
SH15	shell bone	trionychoidea	Shiramine	Japan	Kuwajima	Barremian-Early Aptian	43.2(+8.2/ − 7.8)	11.8	this study
SH16	shell bone	trionychoidea	Shiramine	Japan	Kuwajima	Barremian-Early Aptian	43.2(+8.2/ − 7.8)	12.5	this study
SH17	shell bone	trionychoidea	Shiramine	Japan	Kuwajima	Barremian-Early Aptian	43.2(+8.2/ − 7.8)	12.5	this study
PP-01	tooth enamel	theropoda	Phu Phok	Thailand	Sao Khua	Barremian?	24,3(+1,9/ − 1,8)	14.0	this study
PP-07	tooth enamel	theropoda	Phu Phok	Thailand	Sao Khua	Barremian?	24,3(+1,9/ − 1,8)	19.2	Amiot et al. (3)
PP-08	tooth enamel	theropoda	Phu Phok	Thailand	Sao Khua	Barremian?	24,3(+1,9/ − 1,8)	18.7	Amiot et al. (3)
KK-04	tooth enamel	theropoda	Khok Kong	Thailand	Sao Khua	Barremian?	24,3(+1,9/ − 1,8)	21.1	Amiot et al. (3)
PW-06	tooth enamel	sauropoda	Phu Wiang1Thai	Thailand	Sao Khua	Barremian?	24,3(+1,9/ − 1,8)	19.8	Amiot et al. (3)
PP-02	tooth enamel	crocodylia	Phu Phok	Thailand	Sao Khua	Barremian?	24,3(+1,9/ − 1,8)	13.7	Amiot et al. (3)
PP-03	tooth enamel	crocodylia	Phu Phok	Thailand	Sao Khua	Barremian?	24,3(+1,9/ − 1,8)	15.8	Amiot et al. (3)
KK-01	tooth enamel	crocodylia	Khok Kong	Thailand	Sao Khua	Barremian?	24,3(+1,9/ − 1,8)	14.7	Amiot et al. (3)
KK-02	tooth enamel	crocodylia	Khok Kong	Thailand	Sao Khua	Barremian?	24,3(+1,9/ − 1,8)	16.8	Amiot et al. (3)
PW-07	shell bone	chelonia	Phu Wiang1Thai	Thailand	Sao Khua	Barremian?	24,3(+1,9/ − 1,8)	14.5	Amiot et al. (3)
PW-08	shell bone	chelonia	Phu Wiang1Thai	Thailand	Sao Khua	Barremian?	24,3(+1,9/ − 1,8)	14.7	Amiot et al. (3)

1 Amiot R, et al. (2010) Oxygen isotope evidence for semi-aquatic habits among spinosaurid theropods. *Geology* 38:139–142

2 Amiot R, et al. (2006) Oxygen isotopes from biogenic apatites suggest widespread endothermy in Cretaceous dinosaurs. *Earth Planet Sc Lett* 246:41–54

3 Amiot R, et al. (2009) Late Paleozoic and Mesozoic continental ecosystems in SE Asia. *Geological Society London Special Publications* Eds. Buffetaut E, et al. (The Geological Society, London), 271–283.