Supplementary Information (SI) for:

A Triassic averostran-line theropod from Switzerland and the early evolution of dinosaurs

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Extended phylogenetic discussion

1. *Notatesseraeraptor frickensis* gen. et sp. nov. and the monophyly of the Dilophosauridae

Holtz (2012) mentions two primitive branches of early neotheropods, the Coelophysoidea and the Dilophosauridae. But, the monophyly of the clades and the members, respectively, are still controversially discussed. Our study as well, can not conclusively clarify this debate but nonetheless makes an important contribution to it.

As mentioned in the main paper, we started our investigations regarding the phylogenetic position of the Swiss theropod material with a reduced analysis, where we excluded all of the 23 scored taxa with less than 40% of the available characters, both cranial and total (cranial + postcranial) (= '40%-rule analysis'). Additionally, to render an exhaustive search possible, all averostrans were also excluded from this first analysis (Supplementary Table S1). The '40%-rule analysis' was the starting point for all further analyses where we added additional coelophysoid and dilophosaurid taxa as well as averostrans. We have always used all 285 features. The single most parsimonious tree (MPT) resulting from the '40%-rule analysis' is shown in figure S1.

In accordance with most recent work on early dinosaur relationships (e.g. Smith *et al.* 2007, Nesbitt *et al.* 2009, Ezcurra 2012, Ezcurra & Brusatte 2011, Sues *et al.* 2011, You *et al.* 2014, Nesbitt & Ezcurra 2015, Martill *et al.* 2016, Ezcurra 2017, Martínez & Appaldetti 2017) *Dilophosaurus* + *Cryolophosaurus* are recovered in all our analyses as representatives of a lineage, leading to Averostra. However, it remains unclear whether these two taxa and probably other taxa form together a monophyletic 'dilophosaur clade' (=Dilophosauridae) as depicted by our reduced '40%-rule analysis' (Fig. S1), as well as the '40%-rule analysis' + *Piatnitzkysaurus* (Supplementary Table S2a) and also by Yates 2005, Smith *et al.* 2007, Ezcurra 2012, Langer *et al.* 2014, or whether instead they are successive sister-taxa ancestral to Averostra (e.g. Nesbitt *et al.* 2009, You et al. 2014, Martill *et al.* 2016, Ezcurra

2017, Martínez & Appaldetti 2017). In this study the latter hypothesis is supported as soon as averostran taxa other than *Piatnitzkysaurus* are added to the phylogenetic analysis (e.g. Fig.2 and corresponding table of synapomorphies S2b). Regardless ofnon-averostran taxa-choice, the stepwise addition of *Allosaurus*, *Ceratosaurus* and *Eustrptospondylus* to our dataset leads to a dichotomy at the base of neotheropoda formed by the Coelophysoidea (*sensu* Sereno 2005) and the averostran-line neotheropods. Within the averostran-line, all the potential dilophosaurids recovered in the '40%-rule analysis' (*Cryolophosaurus*, *Dilophosaurus*, *Dracovenator, and Notatesseraeraptor,* see main paper and Supplementary Figure S1) as well as *Zupaysaurus* form successive sister-taxa to Averostra (Fig. 2).

In several phylogenetic studies *Dracovenator regenti* and the Chinese taxon *Sinosaurus triassicus* (not included in this study) are found to be closely related to *Dilophosaurus* and *Cryolophosaurus* (e.g. Smith et al. 2007, Yates 2005, Ezcurra 2012, Xing 2012) and hence might be members of the Dilophosauridae, too. Nonetheless, previous authors hesitated to use the term Dilophosauridae as the monophyly of this theropod-clade is controversial and some of the corresponding taxa have historically been classified mostly as Coelophysoidea (Ezcurra & Brusatte 2011, Holtz 2012). In this debate, the discovery of *Notatesseraeraptor frickensis* gen. et sp. nov. is of great interest because at least some of our analyses (e.g. Fig. S1) support the hypothesis of a monophyletic Dilophosauridae with *N. frickensis* gen. et sp. nov. as the probably most basal member of the clade. Referring to Holtz (2012) and our own results, we refer to *Cryolophosaurus, Dilophosaurus, Dracovenator, Notatesseraeraptor* gen. nov. as 'potential dilophosaurids'.

Recent work also suggests that dilophosaurids were more closely related to Averostra than to Coelophysidae and that they share with the former clade several derived features, including a promaxillary fenestra; a pneumatic opening into the upper corner of the lacrimal; and a reduced total number of maxillary teeth (Holtz 2012). *N. frickensis* gen. et sp. nov. possesses also a promaxillary foramen as well as a maxillary fossa that is congruent with the maxillary fenestra of more derived theropods. However, due to insufficient preservation it can

not be determined with certainty wheter the lacrimal of *N. frickensis* gen. et sp. nov. is pneumatized, but it looks very much like this is the case. The maxillary tooth count seems to be similar to that of *Zupaysaurus*.

In our '40%-rule analysis', the monophyly of the Dilophosauridae is further supported by three unambiguous synapomorphies of the articular (150.1; 151.1; 155.1), seven additional synapomorphies under DELTRAN (5.2; 6.1; 8.1; 14.1; 28.1; 131.1; 250.1), whereof four are observable on the premaxilla, as well as two synapomorphies under ACCTRAN optimization (76.1; 278.1). As already mentioned in the main paper, the fragmentary specimen *Dracovenator* shares at least seven of these characters and we thus suppose it, in case the Dilophosauridae is a natural clade, to be a member of the dilophosaur clade as well. The synapomorphies under DELTRAN optimization are unknown for the sister-taxon *Zupaysaurus*, and thus it is impossible to decide whether these character states represent synapomorphies of a clade that also includes *Z. rougieri* and wether the latter taxon would be also a dilophosaurid. This uncertainty is also reflected in the comparatively low Bootstrap and Bremer support values figured in the main paper (Fig. 2). Apart from that, the taxon is not always found in the same phylogenetic position in other studies on early dinosaurs. In the work of Nesbitt *et al.* (2009), Ezcurra (2012), Langer *et al.* (2014) and Martínez & Appaldetti (2017), it stands at the base of the averostran-line neotheropods, while it is considered a basal coelophysoid in the phylogenetic tree figured by Ezcurra 2007 and You *et al.* 2014. Ezcurra & Brusatte (2011) finally recovered it in a polytomy together with *Liliensternus*, the Coelophysoids and the averostrans-line neotheropods.

After Hendrickx *et al*. 2015, Dilophosauridae is phylogenetically defined as: "The most-inclusive clade containing *Dilophosaurus wetherilli* but not *Coelophysis bauri*, *Ceratosaurus nasicornis* and *Passer domesticus*". However, no diagnosis was ever made for this clade. As at least two of our cladistic analyses support the monophyly of Dilophosauridae, it is not possible to rule out that the dilophosaurs are a natural group. Therefore, we suggest

diagnosing the Dilophosauridae as a group of medium-sized neotheropods with the following combination of characters:

- Two erect, tab-like dorsal processes on the articular – the dorsomedial and the dorsolateral process. One is situated immediately posterior to the opening of the corda tympanic foramen (dorsomedial process), the other on the anterolateral margin of the posterodorsal fossa of the retroarticular process (dorsolateral process).
- Presence of a third process on the articular that is ventromedially directed.
- A transversally concave attachment area of the m. depressor mandibulae on the retroarticular process of the mandible.

The Dilophosauridae can be further distinguished from Coelophysoidea by:

- Multiple neurovascular foramina on the lateral surface of the premaxillary body.
- An anteroventrally orientated «circular» foramen in the anteroventral corner of the premaxilla.
- An oval to slot-shaped foramen at the base of the nasal process (= dorsal process).
- Procumbent teeth in the premaxilla.
- Longitudinal ridges on the medial surface of the anteromedial process (= palatal process) of the maxilla.
- A separated or at least partially subdivided foramen for the exit of the trigeminal nerve (= cranial nerve V) and the mid-cerebral vein.
- A posterior exit of cranial nerves X and XI through a foramen/through foramina located lateral to the exit of cranial nerve XII and the occipital condyle.

The Dilophosauridae share with Averostra:

- A promaxillary fenestra (Holtz 2012).
- A pneumatic opening into the upper corner of the lacrimal (Holtz 2012).
- A reduced total number of maxillary teeth (Holtz 2012).

Interestingly, the dorsal processes of the articular and the slot-shaped foramen at the base of the nasal process were already suggested by Smith *et al*. 2007 to support a clade, composed of *Cryolophosaurus*, *Dilophosaurus*, *Dracovenator* and *Sinosaurus*. But, because he found only three unambiguous synapomorphies that were mainly related to cranial ornamentation, he did not name this group.

However, dilophosaurids seem to represent a global radiation of the first large dinosaur predators (Holtz 2012), and the juvenile to subadult specimen of *Notatesseraeraptor frickensis* gen. et sp. nov., found in Triassic rocks of Frick, Switzerland, was possibly one of the first of them.

Supplementary Table S1: Percentage of the available character states for each taxon. Taxa used for the '40%-rule analysis' are underlain by grey color. Averostran theropods were excluded from the '40%-rule analysis', to render the exhaustive search option possible.

Taxon	% of available skull data from 155 characters	% of total available data (skull + post-cranium) from 285 characters	% of available postcranial data from 130 characters
Allosaurus fragilis	100	99.3	98.46
BP/1/5278	25.16	13.68	0
Ceratosaurus	92.26	89.47	86.15
Coelophysis bauri	86.45	90.53	95.38
Coelophysis rhodesiensis	97.42	96.14	94.62
Cryolophosaurus ellioti	54.84	46.32	36.16
Dilophosaurus wetherilli	74.19	81.75	90.77
Dracovenator regenti	20.65	11.23	0
Eodromaeus murphy	36.13	57.54	83.08
Eoraptor lunensis	78.06	78.25	78.46
Herrerasaurus ischigualastensis	85.81	90.88	96.92
Liliensternus liliensterni	20	40	56.92
Lophostropheus airelensis	0	9.12	19.99
Panguraptor lufengensis	45.16	40.70	35.38
Procompsognathus triassicus	0	7.02	15.39
Segisaurus halli	0	13.33	29.22
"*Syntarsus*" *kayentakatae*	92.26	78.6	62.32
Tawa hallae	63.23	60.7	57.69
Zupaysaurus rougieri	73.55	50.53	23.09
Notatesseraeraptor frikensis gen. et sp. nov.	**85.81**	**74.74**	**61.54**

Supplementary Table S2. Synapomorphies that support specific averostran-line neotheropod clades. Characters in bold are found in all our analyses, independent which further taxa are included to the '40%-rule analysis'. Z = *Zupaysaurus*, N = *Notatesseraeraptor* gen. nov., Di = *Dilophosaurus*, Cry = *Cryolophosaurus*, A = Averostra.

a) '40 % analysis' + *Piatnitzkysaurus* as the only Averostra.

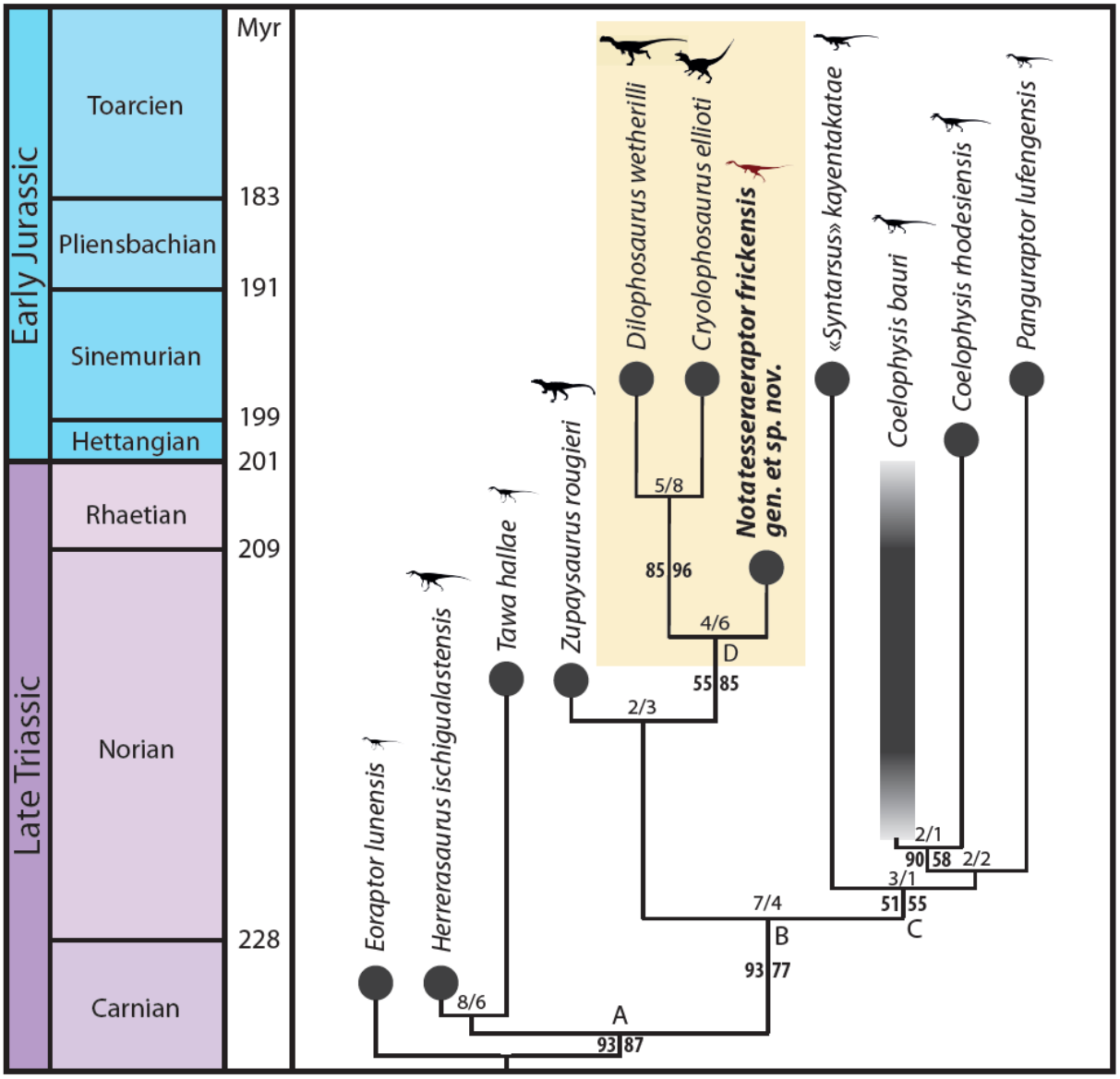
In this analysis a monophyletic Dilophosauridae is supported. The Coelophysidae (*Coelophysis*, "*Syntarsus*", *Panguraptor, Segisaurus, Procompsognathus*) is found to be the sister-clade of the clade composed of *Z*., *N*., *Di*. and *Cry*. *Piatnitzkysaurus* is recovered as the sister-taxon to both of the former clades.

clade	unambiguous	DELTRAN	ACCTRAN
Z+(N+(Di+Cry))	43.1, **58.1**, 66.1		**5.2**, 6.1, 8.1, 14.1
N+(Di+Cry)	91.2, 150.1, 151.1, **155.1**	**5.2**, 6.1, 8.1, 14.1	

b) '40%-rule analysis' + *Segisaurus* + 4 Averostra (*Allosaurus*, *Ceratosaurus*, *Eustreptospondylus, Piatnitzkysaurus*).

This analysis is chosen as it well represents the main results of our phylogenetic investigations. It contains amongst the averostrans mostly the taxa also used in the '40%-rule analysis'. *Segisaurus* was added because a close relationship to the Swiss theropod was suggested in a much earlier analysis when the skull (SMF 09-2) of the skeleton was not yet found (Hugi & Unterrassner 2008/2009). The corresponding phylogenetic tree (single MPT) is figured in the main paper (Fig. 2).

clade	unambiguous	DELTRAN	ACCTRAN
Z+(N+(Di+(Cry(+ A))	**58.1**		**5.2**, 28.1, 131.1
N+(D+(A))	**155.1**	**5.2**, 28.1, 131.1	59.1, 171.1, 278.1, 132.1



Supplementary Figure S1. Phylogenetic relationships of *Notatesseraeraptor frickensis* gen. et sp. nov. Time-scaled single most-parsimonious tree (MPT) resulting from the '40% -rule analysis' using the whole data set* (155 cranial, 130 postcranial characters) respectively the analysis using only the cranial characters** (tree length 370 resp. 220 steps, Consistency Index (CI) = 0.5946 resp. 0.5636, Retention Index (RI) = 0.5268 resp. 0.5052). Bold numbers on the branches indicate bootstrap support when above 50%, regular numbers indicate Bremer support indices, numbers on the left are derived from the analysis* and those on the right from the analysis**. **A** Theropoda (after Sereno *et al.* 2012, *Eoraptor* is not considered a theropod), **B** Neotheropoda, **C** Coelophysoidea (after Sereno 2005), **D** Dilophosauridae (after Hendrickx *et al.* 2015). Silhouettes by Julio Garza (*Dilophosaurus*, "*Syntarsus*"), Scott Hartmann (*Allosaurus*, *Coelophysis, Dilophosaurus*, *Eodromaeus, Eoraptor, Eustreptospondylus*, *Panguraptor*, *Piatnitzkysaurus, Segisaurus*, *Tawa)* Brad Mc Feeters (*Ceratosaurus*, *Cryolophosaurs*), and Iain Raid (*Zupaysaurus*) from Phylopic, used with permission (https://creativecommons.org/licenses/by/3.0/).

2. Taxa scoring of the 23 used taxa

Allosaurus fragilis

12002 01000 20002 00010 01000 10112 21200 20122 00200 10001 11100 01111 21002 10130 02111 21001 02010 11111 20001 11111 00120 01120 01000 21011 21010 01111 01110 10110 11011 01100 12011 10111 10001 10204 11200 00110 11111 00020 01001 10201 10100 01200 10223 11011 21111 00111 102- - 21012 11001 10102 11001 10101 11130 21101 12022 00101 22002

BP/1/5278

??01? 0?011 20?01 ?0000 0??11 0???1 ?1211 21021 10?01 ???00 10??? ????? ????? ????? ????? ????? ????? ????? ????? ????? ????? ????? ????? ????? ????? ????1 ????0 ?1??? ?????

Ceratosaurus

01102 ?1000 20000 00000 00000 10101 01100 20120 00011 11101 20011 01111 2110? 00030 0?112 101?1 02110 11000 20001 1111/20 00020 00000 12010 21?11 11000 01??? ??010 10110 10201 00000 02?0? 10111 11000 00203 21110 01110 ?1001 111/220 10101 10100 10111 00110 00??1 ??010 01??0 01101 10121 21??1 ????? ?11/202 12000 10111 11020 20111 1101/22 01101 2?01?

Coelophysis bauri

10011 00011 20&1101 11110 10111 01?01 0120&11 21100 11001 10000 10110 01020 11010&1 00010 11010 ?0011 0?010 00001 1?00? 200?2 0010&11 00111 0?011 ?0?1? ?00?? ?1??? ?0111 0003? ?11&201 0?000 00000 00000 02?11&2 00112 01011 21020 ?1000&1 11220 0?110 11000 01101 01200 100/111 11010 11100 011?1 ?0131 21111 11?01 01210 02110 11010 20011 100&10&11 01111&2 11010 01111

Coelophysis rhodesiensis

11011 01011 20101 11110 10111 01001 01211 21100 110?0 10000 10110 01020 111010 00010 11010 00011 02010 00001 11001 20112 10101 00021 01021 10011 10012 11101 00110 ??030 ?1201 00000 00000 00000 ?2011&2 ?0112 01011 1&21020 01001 11221 00100 11100 0110? 00100 10111 11010 111?0 01111 00121 21111 11001 01210 02110 11010 00011 101?1 11111 11010 11111

Cryolophosaurus ellioti

????? ????? ????? ????? ????? ???1? 0???? 11??? ????? ?0100 ?1201 01111 21002 1?130 ?011? ?0011 ??010 111?1 21001 211?1 03120 00120 11020 11011 20100 ????? ????? ????? ???11 1?101 12011 ????? ???01&2 ?0?14 ??001 011??

?1?01 0?0?0 00??1 0?00? ????? ????0 ?0??? ????? ????? ????? ????? ?????
????? ?02?0/1 ?00?? 0?1/20? ??00/2? 10101 1?01? ?0111 1????

Dracovenator regenti

??012 12111 20011 00000 ???0? ????? 0???? 21??? ????? 1????? ????? ?????
????? ????? ????? ????? ????? ????? ????? ????? ????? ????? ????? ?????
????? ????? ????? ????? ????1 0?1?1 10011 ????? ????? ????? ????? ?????
????? ????? ????? ????? ????? ????? ????? ????? ????? ????? ????? ?????
????? ????? ????? ????? ????? ????? ????? ????? ?????

Dilophosaurus wetherilli

1?012 11110 1/2?111 10??? 00111 01100/1 011?1 20?210 1111? 1??00 ??2??
?1??? 21002 11130 020110 2?1?? ????? ?1110 ?0000 21212 ?1120 01011 ?1110
11?11 1001? 01101 11?1&21 ?0010 ??011 10111 12011 00000 10001&2 0?103
1?001 11?10 01001 ?1?20 01110 10200 001?? 00100 10121 11010 11100 0?110
00111 20111 ?1001 0?210 01010 12200 21021 10101 11011 0?110 11?02

Eodromaeus murphi

??011 ??0?? 1?001 00000 0?00? ????3 112?0 11010 0??10 1???0 ?01?? ?????
???11 00??? 1???? ????? ????? ????? ????? ????? ????? ????? ??0?1 ?????
????? 01??? ???00 00?0? ????0 0?00? ?1000 01000 11000 00111/2 ??00? 10021
0?000 0?01? ??00? ??0?0 0?101 01100 10210 0?010 01000 00100 00120 00001
110?1 001?0 0?0?0 00010 212?1 10000 01000 01??? 0000?

Eoraptor lunensis

01001 01010 01?01 00010 01011 1??03 00201 11000 00000 1?000 10110 ?1000
20010 000?1 10000 ?00?? ??0?1 00111 10100 20010 ?01?1 00000 ??0?1 ?0???
????? 00??? ??010 00?1? ?0200 01100 00000 ????? ?0002 ?01?0 ???01 10000
11000 ?001? 0?0?0 10000 0?000 ?1000 10202 ??010 11000 ?0100 ?0120 11100/1
10001 0?101 01000 02200 00001 100?0 0?001 ?00?? 00?01

Eustreptospondylus oxoniensis

1?012 ?11?? 20?01 000?? ??000 1?1?3 ?1100 ?0111 11??? ???0? ????? ?1110
210?? ????? ??1?? ?0001 ???1? ?10?0 000?0 11??? ????? ????? ?2000 1????
1100? 0110? ???11 ?000/1? ????? ????? ?0011 101?1&2 1020? 1?2?0
0&10110 ?1001 ???20 000?1 11/2?00 2??1? ???10
10??? ????? ????? ????? ????? ????? ????? ??101 1100? 00001 1?131 20??1
1202? 0?101 2??0?

Herrerasaurus ischigualastensis

11000 00000 01?01 0?000 01000 0??03 00000 00000 00011 10000 1010? ?0000
00112 11130 ?1000 100?1 00010 00001 21001 1120? 0111? 01120 01110 11110
101?0 00??? ???10 0??1? ?0401 01010 02100 00110 00000 00000 ??000 00010

11000 00&1100 00010 10?01 2010? 00200 00322 01010 00100 10000 00111 11100 10001 10100 00000 00001 10001 00000 00000 00000 00000

Liliensternus liliensterni

????? ????? ½???? ????? ??1?? ????? ?1??? 21??? ????? 1???? ????? ????? ???01 0??3? ?1??? ????? ????? ?0??? ?000? ?020? ????? ????1 01110 ????? 10??? ????? ??1?1 0?12? ???0? ????? ????? ????? 000101 00111 0?001 111?0 01001 ????0 00120&11 ?2??0 0?10? 01000 102?? ??01? ???0? 11??1 ????? ????? ??00? 0?200/1 0101? ?2200 200/1?1 10010 01111 01010 0??1?

Lophostropheus airelensis

????? ?????????? ????? ????? ????? ????? ????? ?0?11&2 00112 ??1?? 11??? ?1??0&1 ????0 ?01?? ?0??? ????? ????? ?0??? ????? ???0? ????? ????? ????? ????? ????? ??2?? 000?? ????? ?10? ????? ????? ????? ?????

***Notatesseraeraptor frickensis* gen. et sp. nov.**

11012 1111? 1/20111 10011 00111 11112 11201 21021 110/111 10000 1011? 01?1/20 21?01 1?030 0101? ????? 00020 01101 21000 20/101? 10/1100 00011 0?120 21011 1001? 10101 1??01 0?11/2? 11201 00??1 10001 ????? ????? ????? ?1?01 2100/20 1?001 ???21 210?1 00210 0111? 01100 1?201 1?010 01110 01111 00121 211?1 1100? 0?211 02010 ?1200 2002? ????? ????? ????? ?????

Panguraptor lufengensis

10??? ????? ????? ????? ????? ????1 0121? 21120 ??001 1/2/3?000 ????0 ?1?1/20 11?1? 0001/30 11010 ??0?1 0?0?? ?0000 0?000 210?1 ?0010 01?21 0?0?0 ????? ????? ????? ????? ?0??? 10201 ?0??? ????? ?0??0 ?0??? ?0112 ?1?1? 10&1000 0??1? ????? ????? ????0 0011? ???0? ????1 ??0?? ?1??? ??111 ?0121 2??10/1 1000? ????? ???0? ??1/2?? ????? 10??? ????? ????? 0??11

Piatnizkysaurus floresi

????? ????? ????? ????? ?1??? 111?1/2 01000 00011 00??? 1???? ????? ????? ????? ????? ????? ?0011 0???? ????? ????? ????? ????? ????? ????1 11?0? 01101 1???0 ??1?? ????? ????? ????? 00000 10101&2 10203/4 1?0?0 00110 11101 10020 ?10?1 1??00 1?11? 01200 10??? ????? ????? ????? ????? ????? ????? ?01?2 ??00? 10001 210?1 21101 12022 0???? ???0?

Procompsognathus triassicus

????? ?1??? ??11? ??011 21???

????0&1 ????? ????? ????? ???0? ????? ????1 ??0?? ????? 0???? ????? ????1 ????1 ????? ????? ???10 ?00?? ????? ????? ????? ????1

Segisaurus halli

????? ?0?1? ??0?? ????? ????? ??1?1 10??1 1111? 0120? 1???? ????? ????? ????? ????? ????? ??00? ?12?? 0011? ?001? ?001/21 ????? 11??? 1???? ?1??1

Sinraptor dongi

02002 11000 10001 00000 ?1000 00112/3 01200 20122 1021? ?0001 11111 01111 21102 11031 02111 ?1011 0?0?0 11010 20000 11111 00120 00?20 01020 21010 21000 0110? 01120 00110 112/301 01100 12011 1?1?1 10101&2 10204 1?200 00110 11111 00020 ?0001 121/200 10101 0???? ????1 ??01? ????? 01111 1011? ?1??? ??00? 10202 11001 10101 2113? 21101 12122 00101 22002

„Syntarsus“ kayentakatae

11011 01011 20101 11100 10111 1?002 01211 21020 11001 ?0000 10210 01020 21011 00031 1101? ?0011 02010 01001 11000 20021 02100 00100 011?1 ?1011 10021 ?1101 0?101 01??2 1?301 00010 ?0000 10000 ?2011&2 ??112 0101? ??0?? ?1??1 1???2 011?? ???00 0111? 011?0 ?0??1 ??010 ????0 0??1? 00111 ????1 ??00? 0121? ?2??0 ?1010 ?00?1 10111 11112 11010 11112

Tawa hallae

?0011 ???01 ?10?0 11?00 ???11 11??3 ?1000 00000 0??11 ?0?00 ????? ?0000 ?0002 01221 02000 1?0?? ????? ?0000 ??00? ?110? ?120? 01121 0?021 ????? 00??? 01100 ?0?00 0002? ??201 0000? 011?? ????? ?00?? 0??11/2 ?10?? ????? 0???? 0??0? ????? ????1 1101? ???00 10221 00010 0000? 0?00? ?0100 ?1000 11001 1010? 01?0? ??0/111 2?2?1 00100 00??? 000?? 00001

Zupaysaurus rougieri

?1??? ????? ????? ????? ????? 01?12 11201 21121 1?100 ?0000 1?1?0 01120 21001 11030 01010 00011 12010 00000 10000 20021 02110 00001 110?1 ?1011 10010 ???01 ???11 01??? ?1201 00110 01000 ?10?0 11101&2 0011? 010?? ????? ????? ????? ????? ????? ???1? ?1??? ????? ????? ????? ????? ????? ????? ??00? 0???? ????? ????? ????? ??1?1 ??111 ?1011 0????

3. Character List

1. Skull length (anterior most extension of premaxilla to quadrate condyle) versus skull height (quadrate condyle to dorsal most extension of parietal): 1.5 to 2.06 (0); 2.43 to 2.61 (1) (Ezcurra 2012: character 5; *Panguraptor lufengensis* after You et al. 2014: 237, Tab. 1, ratio calculated from information on p. 237 and skull height at mid-orbital level in Tab. 1: 2.6, *Ceratosaurus* after Gilmore 1920: Fig. 17.1, ratio 2.2, Fig. 17.2, ratio 1.94, Fig. 18.2, ratio 2.09, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Fig. 5, estimated ratio 2.83, *Sinraptor dongi* after Currie & Zhao 1993: calculateted from skull reconstruction in Fig. 3B, ratio 2.17; Swiss theropod: estimated ratio 2.7; for character history see Ezcurra 2012).
2. Height of cranium at the posterior margin of the external naris in relation to the height of the cranium in the middle of the orbit: 0.38 to 0.49 (0), 0.53 to 0.60 (1), 0.75 (2) (Ezcurra 2012: character 6; *Panguraptor lufengensis* after You et al. 2014: 237, Fig. 2, Tab. 1, ratio estimated from Tab. 1 and Fig. 2: 0.29, *Ceratosaurus* after Gilmore 1920: Fig. 17.1, ratio 0.67, Fig. 18.2, ratio 0.63, *Sinraptor dongi* after Currie & Zhao 1993: calculateted from skull reconstruction in Fig. 3B, ratio 0.72; Swiss theropod: estimated ratio 0.64; for character history see Ezcurra 2012).
3. Shape of premaxillary body: longer than high, or approximately as long as high (0); significantly higher than long (1) (Rauhut 2003: character 1; Yates 2005: character 1; *Tawa hallae* after Nesbitt et al. 2009: Fig. 1; *Eodromaeus murphi* after Martinez et al. 2011: Fig. 1B, BP/1/5278 after Yates 2005: Fig. 8, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 9, Fig. 6, *Sinrptor dongi* after Currie & Zhao 1993: 2040/2041, Fig. 4A and D; for character history see Rauhut 2003).
4. Premaxillary body in front of external nares: shorter than body below the nares (0); longer than body below the nares to completely anterior to external nares (1) (modified from Rauhut 2003: character 2, and Yates 2005: character 2, *Tawa hallae* after Nesbitt et al. 2009: Fig. 1, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 1B, BP/1/5278 after Yates 2005: Fig. 8 and BP/1/5278, *Eustreptospondylus oxoniensis* after Carrano et al. 2012: character 6; for character history see Rauhut 2003).
5. Neurovascular foramina in the lateral surface of the premaxillary body: absent (0); one foramen, usually located above the second or third premaxillary tooth (1); several foramina (2) (Ezcurra 2012: character 14; *Ceratosaurus* after Tykoski 2005: character 7, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 9, Fig. 6A and D, *Sinraptor dongi* after Currie & Zhao 1993: 2040, Fig. 3B and 4A; for character history see Ezcurra 2012).
6. Anteroventral orientated «circular» foramen in the anteroventral corner of the premaxilla: absent (0); present (1) (Ezcurra 2012: character 16; *Sinraptor dongi* after Currie & Zhao 1993: 2040, Fig. 4A).
7. NEW: Foramina configuration above the second alveolus of the premaxilla: no foramen (0); one or more pits or foramina without channel (1); one or more pits or foramina with channel penetrating the alveolar margin (2) (*Eoraptor lunensis*, *"Syntarsus" kayentakatae*, *Coelophysis bauri*, *Coelophysis rhodesiensis* after Tykoski 2005: character 7, *Herrerasaurus ischigualastensis* after Sereno & Novas 1994: Fig. 1 - 3, *Dracovenator regenti* after Yates 2005: 107, Fig. 2, *Dilophosaurus wetherilli* after Welles 1984: 144, Fig. 4 and Yates 2005; *Ceratosaurus* after Madsen & Welles 2000: Pl. 1 + 9, *Allosaurus fragilis* after Tykoski 2005: character

7, and Witmer 1997: 29A, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Fig. 6A and D, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 4B).

8. Oval to slot-shaped foramen at the base of the nasal process (= dorsal process): absent (0); present (1) (modified from Ezcurra 2012: character 15; *Ceratosaurus* and *Sinraptor dongi* after Smith et al. 2007: character 13, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Fig. 6A and D); for character history see Ezcurra 2012).
9. Premaxilla, posterior extent of nasal process relative to posterior tip of posterolateral process (= subnarial process): anterior or equal (0); posterior (1) (modified from Ezcurra 2012: character 21; *Ceratosaurus* and *Sinraptor dongi* after Smith et al. 2007: character 14; for character history see Ezcurra 2012).
10. Shape of the nasal process of the premaxilla: conspicuously curved along its axis (0); straight or slightly curved (1) (modified from Ezcurra 2012: character 23; *Ceratosaurus* after Madsen & Welles 2000: Pl. 1 + 9, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3B, 4A and D; for character history see Ezcurra 2012).
11. Posterolateral process (= subnarial process) of premaxilla: wide, plate-like, broadly contacting the nasals and excluding the maxilla from the external nares (0); strongly reduced in width, but still contacting the nasals (1); strongly reduced process does not contact the nasals, and the maxilla forms part of the posteroventral border of the external nares (2) (Ezcurra 2012: character 28; *Eoraptor lunensis* after Sereno et al. 2012: Fig. 3, *Ceratosaurus* and *Sinraptor dongi* after Rauhut 2003: character 6; *Dilophosaurus wetherilli*, *Liliensternus liliensterni* after Yates 2005: character 6 and Smith et al. 2007: character 10, *Eustreptospondylus oxoniensis* after Smith et al. 2007: character 10 and Sadleir et al. 2008: character 10 of Holtz 2000; for character history see Ezcurra 2012).
12. Anteroposterior length of the posterolateral process (= subnarial process) of the premaxilla: less or subequal to the anteroposterior length of the premaxillary body (0); longer than anteroposterior length of the premaxillary body (1) (Ezcurra 2012: character 27; *Ceratosaurus* after Madsen & Welles 2000: Pl. 1 + 9, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Fig. 6, *Sinraptor dongi* after Currie & Zhao 1993: 2041, Fig. 3B, 4A and D; for character history see Ezcurra 2012).
13. Ventral process (= posteroventral flange) at posterior end of premaxillary body: absent (0); present (1) (Ezcurra 2012: character 30; *Ceratosaurus* and *Sinraptor dongi* after Rauhut 2003: character 4; for character history see Ezcurra 2012).
14. NEW: Procumbent teeth in premaxilla: absent (0); present (1) (*Eoraptor lunensis* after Sereno et al. 1993: Fig. 1, Martinez et al. 2011: Fig. 1A and Sereno, Martinez & Alcober 2012: Fig. 11 to 13 and 35, *Herrerasaurus ischigualastensis* after Sereno & Novas 1994: Fig. 2, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 1B, *Dracovenator regenti* after Yates 2005: 108, Fig. 2, *Dilophosaurus wetherilli* after Tykoski 2005: Fig 9, *"Syntarsus" kayentakatae* after Tykoski 2005: 8, *Coelophysis bauri* after Colbert 1989: Figs. 28, 33, 36, *Coelophysis rhodesiensis* after QG 202, BP/1/5278 after Yates 2005: Fig. 8 and BP/1/5278, *Ceratosaurus* after Madsen & Welles 2000: Pl. 9, *Allosaurus fragilis* after Madsen 1976: Plate 1, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Fig. 6B. E, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3B, 4A and D).
15. Number of premaxillary teeth: 3 (0); 4 (1); 5 (2) (Ezcurra 2012: character 35; *Ceratosaurus* and *Sinraptor dongi* after Rauhut 2003: character 5,

Eustreptospondylus oxoniensis after Sadleir et al. 2008: character 3 of Holtz 2000; for character history see Ezcurra 2012).

16. Caudal end of premaxillary tooth row: ventral to external naris (0); anterior to external naris (1) (Smith et al. 2007: character 9, *Tawa hallae* after Nesbitt et al. 2009: Fig. 1, *Eodromaeus murphi* after Martinez et al. 2011: Fig 1B, *Dracovenator regenti* after Yates 2005: Fig. 2; for character history see Smith et al. 2007).
17. Serrations on premaxillary tooth crowns: present (0); absent (1); (Rauhut 2003: character 84; *Tawa hallae*, *Eodromaeus murphi*, *Dracovenator regenti*, *"Syntarsus" kayentakatae* and BP/1/5278 after Ezcurra 2012: character 40, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008:18, Fig. 6E and F and Smith 2007: character 17, *Sinraptor dongi* after Smith 2007: character 17; for character history see Ezcurra 2012.
18. Cross-section of premaxillary tooth crowns: all labiolingually flattened (= elliptical) (0); anteriormost teeth subcircular (1); all “D”-shaped (asymmetrical) (2) (Ezcurra 2012: character 41; *Ceratosaurus* after Madsen & Welles: 4 and Smith et al. 2007: character 18, *Eustreptospondylus oxoniensis* after Smith et al. 2007: character 18, *Sinraptor dongi* after Currie & Zhao 1993: 2042 and Smith et al. 2007: character 18; for character history see Ezcurra 2012).
19. Size of premaxillary tooth crowns with respect to the largest maxillary tooth crowns: distinctively smaller (0); of equal size or larger (1) (Ezcurra 2012: character 37; *Ceratosaurus* after Madsen & Welles 2000: Pl. 1, 9, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3B, 4).
20. NEW: Apicobasal length of the largest premaxillary tooth crown: shorter than or subequal to the minimal dorsoventral height of the antero-central portion of the dentary (0); distinctly longer than the minimal dorsoventral height of the antero-central portion of the dentary (1) (*Eoraptor lunensis* after PVSJ 512, Sereno et al. 1993: Fig. 1 and Sereno, Martinez & Alcober 2012: Fig. 3 and 11, *Herrerasaurus ischigualastensis* after Sereno & Novas 1994: Fig. 1A, 1B and 2, *Tawa hallae* after Nesbitt et al. 2009: Fig. 1, *Eodromaeus murphi* after Martinez et al. 2011: Fig 1B, *Dracovenator regenti* after Yates 2005: Fig. 2 and 4, *"Syntarsus" kayentakatae* after Rowe 1989: Fig. 1, Tykoski 1998: Fig. 1 and 2, 2005: Fig. 10C, *Coelophysis bauri* after NMMNH P-50529 and P-50530, Colbert 1989: Figs. 24, 28, 29 and Ezcurra 2007: Fig. 9, Rowe et al. 2009: Fig. 82A, *Coelophysis rhodesiensis* after Raath 1977: Pl. 7, BP/1/5278 after BP/1/5278 and Yates 2005: Fig. 8, *Ceratosaurus* after Gilmore 1920: 53 and Madsen & Welles 2000: Fig. 1, 2, 13A and B, *Allosaurus fragilis* after Madsen 1976: Pl. 1, 9D, 6C, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 4A + D, 11A +B).
21. Long axis of anterior most premaxillary tooth crowns: recurved (0); nearly straight (1) (modified from Ezcurra 2012: character 38; *Dilophosaurus wetherilli*, *Ceratosaurus*, *"Syntarsus" kayentakatae*, *Coelophysis bauri*, *Coelophysis rhodesiensis* after Tykoski 2005: character 97; for character history see Ezcurra 2012).
22. Premaxilla-maxilla suture: uninterrupted (0); interrupted by a subnarial foramen (1) (Tykoski 2005: character 18; *Sinraptor dongi* after Currie & Zhao 1993: 2041; for character history see Ezcurra 2012: character 43).
23. Transverse constriction between articulated premaxillae and maxillae in dorsal view: absent (0), present (1) (Ezcurra 2012: character 48; *Ceratosaurus* and *Sinraptor dongi* after Rauhut 2003: character 8, *Eustreptospondylus oxoniensis* after Smith et al. 2007: character 21; for character history see Ezcurra 2012).

24. Subnarial diastema (toothless region between premaxillary and maxillary contact): absent (0), present (1) (Ezcurra 2012: character 31; *Dracovenator regenti, Ceratosaurus* and *Sinraptor dongi* after Yates 2005: character 230, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Fig. 5; for character history see Ezcurra 2012).
25. Alveolar margins of premaxilla and maxilla at premaxilla-maxilla junction: continuous, ventral margins level with each other (0); bent upwards, creating a gap in the upper tooth row (= «subnarial gap» of Welles 1984, Rauhut 2003, Yates 2005) (1), (modified from Ezcurra 2012: character 32; *Ceratosaurus* and *Sinraptor dongi* after Rauhut 2003: character 9, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: character 11 of Holtz 2000; for character history see Ezcurra 2012).
26. Anterior process of maxilla: continuous with anterodorsal border of maxilla (0); offset, prominent concave inflexion at the base of the ascending process (1) (modified from Ezcurra 2012: character 63; *Tawa hallae* after Nesbitt et al. 2009: Fig. 1, BP 15278 after BP 15278, *Coelophysis bauri*, *Coelophysis rhodesiensis*, *Zupaysaurus rougieri, Ceratosaurus, Piatnitzkysaurus floresi*, *Eustreptospondylus oxoniensis* and *Sinraptor dongi* after Rauhut 2003: character 11 and Smith et al. 2007: character 24; for character history see Ezcurra 2012).
27. Anteromedial process (= palatal process) of maxilla: short, hardly visible in lateral view (0); dorsoventrally low and anteroposteriorly long, well visible in lateral view (1); high and long, platelike, visible in lateral view (2) (modified from Ezcurra 2012: character 96; *Ceratosaurus* after Madsen & Welles 2000: Pl. 2,10, Rauhut 2003: Fig. 10B, and Tykoski 2005: character 37, *Dilophosaurus wetherilli* after Tykoski 2005: Fig. 23B, C, 24A, character 37, *Piatnizkysaurus* after Carrano et al. 2012: Fig. 17A, Rauhut 2007: Fig. 3Aand Bonaparte 1986: Fig. 6, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 4B,C, and Ezcurra & Novas 2007: character 23*;* for character history see Ezcurra 2012).
28. Medial surface of the anteromedial process (= palatal process) of the maxilla: smooth (0); bears longitudinal ridges (1) (Ezcurra 2012: character 97; *Ceratosaurus*, *Dilophosaurus wetherilli*, *"Syntarsus" kayentakatae* and *Eustreptospondylus oxoniensis* after Tykoski 2005, character 38, *Sinraptor dongi* after Carrano 2012: character 15, and Currie & Zhao 1993: Fig. 4C; for character history see Ezcurra 2012).
29. Suture between the ascending process of the maxilla and the anterior process of the lacrimal: straight (0); forked (V-shaped) (1) (Ezcurra 2012: character 68; *Dilophosaurus wetherilli*, *Ceratosaurus* and *Sinraptor dongi* after Ezcurra & Novas 2007: character 27; for character history see Ezcurra 2012).
30. Ratio of dorsoventral height of maxilla at level of anterior margin of antorbital fossa to height of horizontal ramus of maxilla at level of first alveolus posterior to anterior border of internal antorbital fenestra: 1.02 (0); 1.26-1.50 (1); 1.64-1.77 (2); 2.01-2.70 (3) (Ezcurra 2012: character 58; *Panguraptor lufengensis* after You et al. 2014, Fig. 2: estimated 1.27, *Ceratosaurus* after Madsen & Welles 2000, Pl. 10: 1.34, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008, Fig. 5 and Pl.1, fig. 1: estimated 2.07 – 2.29, *Piatnizkysaurus* after Rauhut 2007: Fig. 3A (~1.57), Novas 2009: Fig. 3.19E, Carrano et al. 2012: Fig. 17A (~1.7), *Sinraptor dongi* after Currie & Zhao 1993: Fig. 4B: 1.345, : 1.69; for character history see Ezcurra 2012).
31. Dorsal and ventral margins of posterior process (= horizontal process) of maxilla: taper posteriorly (0); run parallel (1); diverge posteriorly (2) (Ezcurra 2012: character 95; *Panguraptor lufengensis* after You et al. 2014: character 26;

Ceratosaurus after Madsen & Welles 2000: Pl. 1 and 10, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3B, 4B + C; for character history see Ezcurra 2012)

32. Maxillary antorbital fossa: deep, and with sharp margins (0); shallow, margins formed by low ridges, a sharp rim may be present only in front of the premaxillary foramen (1) (Ezcurra 2012: character 79; *Panguraptor lufengensis* after You et al. 2014: Fig. 2; *Eoraptor lunensis*, *Herrerasaurus ischigualastensis* and *Ceratosaurus* after Rauhut 2003: character 12, *Eustreptospondylus oxoniensis* and *Sinraptor dongi* after Smith et al. 2007: character 25; for character history see Ezcurra 2012).
33. Extent of maxillary antorbital fossa in front of internal antorbital fenestra: extremely short, represented only by a semilunar fossa along the anterior margin of the internal antorbital fenestra (0); short (1); long, occupying the major part of the region anterior to the internal antorbital fenestra (2) (Ezcurra 2012: character 70; *Panguraptor lufengensis* after You et al. 2014: Fig. 2, *Ceratosaurus* after Madsen & Welles 2000: Plate 1; BP/1/5278 after Munyikwa & Raath 1999: 1, Yates 2005: Fig. 8 and BP/1/5278, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Fig. 5, Pl. 1, figs. 1, 3, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3B, 4B + C; for character history see Ezcurra 2012).
34. Anterior end of maxillary antorbital fossa: posterior to external naris (0); ventral to posterior end of external naris (1) (Ezcurra 2012: character 71; *Panguraptor lufengensis* after You et al. 2014: Fig. 2; *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Fig. 5, Pl. 1, fig. 2 and Carano et al. 2012: character 25, *Ceratosaurus, Sinraptor dongi, Piatnitzkisaurus* after Carrano et al. 2012: character 25; for character history see Ezcurra 2012).
35. Anterior border of maxillary antorbital fossa: rounded or triangular (pointed) (0); squared, with angular antroventral corner and nearly straight anterior border, the quadrangular condition is the crucial state if the character shows intraspecific variation (1) (modified from Ezcurra 2012: character 74 and Tykoski 2005: character 32; *Dilophosaurus wetherilli* after Carrano et al. 2012: character 23 and Tykoski 2005: figure 13, *Sinraptor dongi* after Ezcurra & Novas 2007: character 30 and Carrano et al. 2012: character 23; for character history see Ezcurra 2012).
36. Medial wall of the maxillary antorbital fossa on the lateral surface of the horizontal process of the maxilla: does not reach the posteroventral corner of the internal antorbital fenestra (0); extends through the entire ventral border of the internal antorbital fenestra as a narrow lamina, dorsoventral depth of fossa less or equal to the depth below the antorbital fossa (1); extends along the major part of the ventral border of the internal antorbital fenestra as a broad lamina, dorsoventral depth of fossa significantly higher than depth below fossa (2) (Ezcurra 2012: character 76; *Panguraptor lufengensis* after You et al. 2014: character 25, character 317, *Ceratosaurus* and *Sinraptor dongi* after Ezcurra & Novas 2007: character 31; for character history see Ezcurra 2012).
37. Dorsoventrally compressed horizontal ridge (= alveolar ridge of Rowe 1989) above the ventral border of the maxillary antorbital fossa: absent (0); present (1) (modified from Ezcurra 2012: character 78; *Panguraptor lufengensis* after You et al. 2014: character 24, *Ceratosaurus* and *Sinraptor dongi* after Rauhut 2003: character 15, *Eustreptospondylus oxoniensis* after Smith et al. 2007: character 28; for character history see Ezcurra 2012).
38. Lateral surface of maxillary antorbital fossa at the base of the ascending process: smooth (0); with deep, large, and subcircular or oval blind pocket/s (border/s of structure/s not well-defined, in contrast to the maxillary fossa or fenestra) (1)

(modified from Ezcurra 2012: character 81; *Panguraptor lufengensis* after You et al. 2014: character 318, the additional fenestra should be interpreted as a «pocket» rather than a «fenestra», H.-L. You, pers. comm. 2014, *Ceratosaurus* and *Sinraptor dongi* after Ezcurra & Novas 2007: character 35, *Eustreptospondylus oxoniensis* after Tykoski 2005: character 35; for character history see Ezcurra 2012).

39. Promaxillary foramen or fenestra in the maxillary antorbital fossa: absent (0); small depression in same anatomical position which does not perforate the maxilla (1); present, perforating the maxillary antorbital fossa (2) (Ezcurra 2012: character 85; *Ceratosaurs* after Tykoski 2005: 103, character 34, *Sinraptor dongi* after Holtz 2000: character 16, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: character 16 of Holtz 2000; for character history see Ezcurra 2012).
40. Maxillary fenestra (border of structure well-defined, in contrast to the blind pocket/s of maxilla): absent (0); present, as a fossa (1); present, as a perforation of the antorbital fossa (2) (Ezcurra 2012: character 88; *"Syntarsus" kayentakatae* after Tykoski 1998: Fig. 4, 2005: 22B & C and MNA V2623, holotype, *Panguraptor lufengensis* after You et al. 2014: 237, Fig. 2, the additional fenestra should be interpreted as a «pocket» rather than a «fenestra», H.-L. You, pers. comm. 2014, *Ceratosaurus* after Rauhut 2003: character 17, *Eustreptospondylus oxoniensis* and *Sinraptor dongi* after Carrano et al. 2012: character 26; for character history see Ezcurra 2012).
41. Orientation of anterior tip of maxillary alveolar margin: approximately horizontal (0); dorsally curved (1) (modified from Tykoski 2005: character 25; *Tawa hallae* after Nesbitt et al. 2009,: Fig. 1, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 1B, BP/1/5278 after Yates 2005: Fig. 8C and BP/1/5278, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 4B, 4D, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Pl. 1, figs. 1-4; for character history see Tykoski 2005).
42. Orientation of first maxillary tooth: First alveolus opens: ventrally (0); anteroventrally (1) (Tykoski 2005: character 26; BP/1/5278 after Yates 2005: Fig. 8A, 8C and BP/1/5278, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Pl. 1, figs. 2-4 and Carrano 2012: character 13, *Sinraptor dongi* and *Piatnitzkysaurus* after Carrano et al. 2012: character 13; for character history see Tykoski 2005).
43. Maxillary tooth row caudal extension: extends behind anteror border of orbit (0); ends before or at the anterior rim of the orbit (1); completely antorbital, ends rostral to the vertical strut of the lacrimal (2) (Ezcurra 20112: character 103; *Panguraptor lufengensis* after You et al. 2014: character 18, *Ceratosaurus* and *Sinraptor dongi* after Ezcurra & Novas 2007: character 39; for character history see Ezcurra & Novas 2007).
44. One or more teeth of the anterior half of the maxillary tooth row with fang-like crowns: absent, all crowns are subequal or shorter than the height of the dentary immediately below them (0); present, fang-like crowns are distinctively longer than the other maxillary teeth (1) (modified from Ezcurra 2012: character 402; *Panguraptor lufengensis* after You et al. 2014: Fig. 2, *Ceratosaurus* after Gilmore 1920: Fig. 54, Pl. 17.2, 18.2, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3, 4, 11A, B).
45. Apicobasal height of the longest maxillary tooth crowns versus the height of the maxillary region anterior to the internal antorbital fenestra in the middle of its anteroposterior length: 35,2 to 44,54% (0); 52,94 to 81,97% (1) (Ezcurra 2012: character 403; *Coelophysis rhodesiensis* after QG 205, 42,68% and 30,23%, *Panguraptor lufengensis* after You et al. 2014: Fig. 2, estimated 54,55%,

Ceratosaurus after Gilmore 1920: Fig. 54, Pl. 17.2, 18.2, 56,82%, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 4B + D, 42.1-44.4%, Frick theropod: estimated 69,57%; for character history see Ezcurra 2012).

46. Serrations of maxillary and dentary teeth: completely absent (0); absent at the base of the mesial margin (1); present along the entire distal margin but completely absent at the mesial margin (2); present at both the entire mesial and distal margins (3) (Ezcurra 2012: character 417; *Panguraptor lufengensis* after You et al. 2014: character 108, *Ceratosaurus* after Glut 1997: figured teeth on page 270 and Gilmore 1920: 92; for character history see Ezcurra 2012).
47. Nasals in subadults or adults: unfused (0); entirely fused (1) (Ezcurra 2012: character 105; *Ceratosaurus* and *Sinraptor dongi* after Carrano et al. 2012: character 35; for character history see Ezcurra 2012).
48. Shape of nasal in dorsal view: transversally expanded posteriorly, resulting in diverging lateral margins (0); lateral margins parallel over the entire length of the nasal (1) (Ezcurra 2012: character 108; *Zupaysaurus rougieri* after Ezcurra 2007: 191 and Fig. 3B, *Panguraptor lufengensis* after You et al. 2014: 238, *Ceratosaurus* after Rauhut 2003: character 21 and Madsen & Welles 2000: Pl. 3B, 3D, *Sinraptor dongi* after Rauhut 2003: character 21 and Currie & Zhao 1993, Fig. 3A, 5 A; for character history see Ezcurra 2012).
49. Dorsal surface of the nasals: smooth (0); rugose (1) (Rauhut 2003: 18; Yates 2005: character 18; Carrano et al. 2012: character 34; *Tawa hallae* after Nesbitt et al. 2009: Fig. 1; *Eodromaeus murphi* after PVSJ 560 - 562; *Cryolophosaurus ellioti* after Smith et al. 2007: Fig. 6; *Panguraptor lufengensis* after You et al. 2014: 238, Fig. 2; BP/1/5278 after Munyikwa & Raath 1999: 1, Yates 2005: Fig. 8 and BP/1/5278).
50. Pneumatic foramen in the nasals: absent (0); present (1) (Ezcurra 2012: character 112; *Ceratosaurus* and *Sinraptor dongi* after Rauhut 2003: character 19; *Panguraptor lufengensis* after You et al. 2014: 238; for character history see Ezcurra 2012).
51. Lateral surface of anterior end of the nasal along the margin of the external naris: relatively flat (0); with a concave fossa (1); with laterally convex hood covering the caudal part of the external naris (2) (Ezcurra 2012: character 109; *Ceratosaurus* and *Sinraptor dongi* after Smith et al. 2007: character 41; for character history see Ezcurra 2012).
52. Dorsal extent of antorbital fossa: dorsal rim of antorbital fossa below nasal suture, or formed by this suture (0); antorbital fossa extending onto the lateroventral side of the nasals (1) (Ezcurra 2012: character 82; *Ceratosaurus* and *Sinraptor dongi* after Rauhut 2003: character 20 and Currie & Zhao 1993: 2045; for character history see Ezcurra 2012).
53. Nasal and lacrimal with pronounced dorsolateral margins or crests: absent (0); arranged as low and laterally projected «crests» slightly extending over the maxillae (1); arranged as a well-developed dorsally projected pair of parasagittal crests (2) (modified from Ezcurra 2012: character 118; *Ceratosaurus* and *Sinraptor dongi* after Ezcurra & Novas 2007: character 44; for character history see Ezcurra 2012).
54. Nasal with a small posterolateral process that envelops part of the anterior ramus of the lacrimal: absent (0); present (1) (Ezcurra 2012: character 115; *Coelophysis bauri* after Smith et al. 2007: character 45, AMNH 7241 and CM 31374, *Ceratosaurus* after Martinez et al. 2011: character 19 and Madsen & Welles 2000:

Pl. 3B, *Sinraptor dongi* after Smith et al. 2007: character 45; for character history see Ezcurra 2012).

55. Shape of the posterior suture of the nasals: medial portion subequal or extends further posteriorly than the lateral parts (= straight, respectively convex) (0); lateral portions extend further posteriorly than the medial part (= concave) (1) (Ezcurra 2012: character 116; *Cryolophosaurus ellioti* after Smith et al. 2007: Fig. 6, *Panguraptor lufengensis* after You et al. 2014: character 31, *Ceratosaurus* after Madsen & Welles 2000: Pl. 3B and 3D, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3A and 5; for character history see Ezcurra 2012).
56. Position of the posteriormost nasal-frontal contact in relation to the highest point of the orbit: anterior (0); above highest point (1) (Ezcurra 2012: character 123; *Ceratosaurus* after Madsen & Welles 2000: Pl. 1, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3A; for character history see Ezcurra 2012).
57. Lacrimal shape: block-shaped or roughly triangular in lateral view (0); with well-defined inverted L-shape in lateral view (1) (modified from Ezcurra 2012: character 124; *Panguraptor lufengensis* after You et al. 2014: Fig. 1 and 2, character 35, *Ceratosaurus* after Rauhut 2003: character 28, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 11, Fig. 5, Pl. 1, figs. 5, 6, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3B and 6D,E and Rauhut 2003: character 28; for character history see Ezcurra 2012).
58. Lacrimal antorbital pneumatic recess into central body of lacrimal: absent (0); present (1) (modified from Ezcurra 2012: character 127; *Ceratosaurus* after Rauhut 2003: character 31, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 11, Fig. 5, Pl. 1, fig. 5, character 33, *Sinraptor dongi* after Currie & Zhao 1993: 2045, Fig. 6E and Rauhut 2003: character 31; for character history see Ezcurra 2012).
59. Anterior ramus of lacrimal: strongly reduced (0); slightly shorter or nearly equal to the height of the vertical ramus (1); equal or longer than the height of the vertical ramus (2) (Ezcurra 2012: character 132, *"Syntarsus" kayentakatae* after Tykosky 2005: character 55, *Ceratosaurus* after Madsen & Welles 2000: Pl. 1 and 2, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 11 and Carrano et al. 2012: character 50, *Sinraptor dongi* after Currie & Zhao 1993: 2045, Fig. 6D-E; for character history see Ezcurra 2012).
60. Lacrimal horn: absent (0); present (1) (modified from Ezcurra 2012: character 131; *Panguraptor lufengensis* after You et al. 2014: character 38, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Pl. 1, figs. 5, 6, *Ceratosaurus* and *Sinraptor dongi* after Smith et al. 2007: character 52; for character history see Ezcurra 2012).
61. Lateral lamina of lacrimal: covering most of the bone (0); restricted to the caudal margin of the vertical ramus and not interrupting the lacrimal antorbital fossa (1); strongly expanded anteriorly and partly covering the internal antorbital fenestra (2) (modified from Ezcurra 2012: character 136; *Panguraptor lufengensis* after You et al. 2014: character 319, *Ceratosaurus* after Madsen & Welles 2000: Pl. 1 and 2, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Pl. 1, fig. 5 and Carrano et al. 2012: character 44, *Sinraptor dongi* after Carrano et al. 2012: character 44; for character history see Ezcurra 2012).
62. Orientation of long axis of vertical ramus of lacrimal: strongly sloping anterodorsally (0); nearly vertical (1); strongly sloping posterodorsally (2) (Ezcurra 2012: character 141; *Panguraptor lufengensis* after You et al. 2014: character 37, *Ceratosaurus, Eustreptospondylus oxoniensis* and *Sinraptor dongi* after Smith et al. 2007: character 60; for character history see Ezcurra 2012).

63. Vertical ramus of lacrimal: expanded ventrally, distal end nearly twice as wide anteroposteriorly as proximal base of process (0); roughly the same width throughout the whole ramus or with constriction in the middle of the shaft, but distal end less than 1.75 the width of proximal base (1) (modified from Ezcurra 2012: character 138; *Coelophysis rhodesiensis* after QG1, *Ceratosaurus* after Madsen & Welles 2000: Pl. 1 and 2, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Pl. 1, figs.5, 6 , *Sinraptor dongi* after Currie & Zhao 1993: 2045, Fig. 6D-E; for character history see Ezcurra 2012).
64. Lateral longitudinal ridge traversing rostral and caudal processes of jugal: absent (0); present (1) (Ezcurra 2012: character 149; *Liliensternus liliensterni*, *Ceratosaurus* after Tykoski 2005: character 71, *Panguraptor lufengensis* after You et al. 2014: Fig. 1 and2, character 57, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 6F; for character history see Ezcurra 2012).
65. Anterior process of jugal: more or less continuously tapering anteriorly (0); bluntly squared anteriorly (1); well expanded anteriorly (2) (Ezcurra 2012: character 150; *Ceratosaurus* after Rauhut 2003: character 23, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 6F-G; for character history see Ezcurra 2012).
66. NEW: Sublacrimal part of jugal: dorsal margin of anterior process of jugal straight (0); dorsal margin of anterior process of jugal with a bulge forming a distinct initial lacrimal process (1) (*Eoraptor lunensis* after PVSJ 512 and Sereno et al. 1993: Fig. 1, Sereno, Martinez & Alcober 2012: Fig. 3A, 11 and Tykoski 2005: Fig. 29B, *Herrerasaurus ischigualastensis* after Sereno & Novas 1994: Fig 1A, 1B, 2, 7A, 8A and 9, *Tawa hallae* after Nesbitt et al. 2009: Fig. 1, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 1B, *Zupaysaurus rougieri* after Arcucci & Coria 2003: 2A, 2B and 2E, Ezcurra & Novas 2007: Fig. 1 and 14B, *Dilophosaurus wetherilli* after UCMP 37302, Welles 1984: Fig. 4 and Tykoski 2005: Fig. 20, *Cryolophosaurus ellioti* after Smith et al. 2007: Fig. 4 and 5, *Liliensternus liliensterni* after MB.R.2175.1.5 and Huene 1934: Pl. 13 Figs. 5, 12 and 13, *"Syntarsus" kayentakatae* after Tykoski 1998: Fig. 1, 2 and Tykoski 2005: Fig. 29C, *Coelophysis bauri* after CM 31374, CM C-3-82 and NMMNH P-42200, *Coelophysis rhodesiensis* after Raath 1977: Fig. 4u and Bristowe 2004: Fig. 6, 16 and 17, *Panguraptor lufengensis* after You et al. 2014: Fig. 1 and 2, *Ceratosaurus* after Gilmore 1920: Pl. 17.1, 18.2 and Madsen & Welles 2000: Pl. 1, 12G, 12H, *Allosaurus fragilis* after Madsen 1976: Pl. 4D, 4E and Ezcurra & Novas 2007: Fig. 14D, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 6F-G).
67. Contribution of the anterior process of the jugal to the internal antorbital fenestra: entirely excluded from the margin of the fenestra (0); contributes to the posteroventral margin of the fenestra (1) (modified from Ezcurra 2012: character 151; *Panguraptor lufengensis* after You et al. 2014: character 53, *Ceratosaurus, Sinraptor dongi* after Currie & Zhao 1993: 2048, Fig. 3B and Rauhut 2003: character 24; for character history see Ezcurra 2012).
68. Minimal height of the jugal below the orbit versus maximal height of the orbit: 7,55 - 21,67% (0); 26,98 - 36,67% (1); 49,06 - 50,00% (2) (Ezcurra 2012: character 155; *Panguraptor lufengensis* after You et al. 2014: Fig. 2, estimated 6,25%, *Ceratosaurus* after Madsen & Welles 2000: Pl. 1, ca. 17,31%, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3B, ca. 14.5%, Frick theropod: ca. 14,5%; for character history see Ezcurra 2012).
69. Posterior process (= quadratojugal process) of jugal: acute, undivided (0); forked, both prongs of nearly equal length (1); forked, dorsal prong longer than ventral

prong (2); forked, ventral prong longer than dorsal prong (3) (Ezcurra 2012: character 159; *Panguraptor lufengensis* after You et al. 2014: Fig. 2, character 54 (extend), *Ceratosaurus* after Tykoski 2005: character 70, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 6F-G; for character history see Ezcurra 2012).

70. Ventral border of infratemporal fenestra: mostly constituted by the jugal or equal participation of both jugal and quadratojugal (0); mostly constituted by the quadratojugal (1) (Ezcurra 2012: character 202; *Coelophysis bauri* after CM 31374, *Panguraptor lufengensis* after You et al. 2014: Fig. 1 and 2, *Ceratosaurus* and *Sinraptor dongi* after Ezcurra & Novas 2007: character 58; for character history see Ezcurra 2012).
71. Angle between ascending process and posterior process of jugal: right or obtuse (0); acute, with a posterodorsally oriented ascending process (1) (Ezcurra 2012: character 158; *Panguraptor lufengensis* after You et al. 2014: character 321, *Ceratosaurus* after Madsen & Welles 2000: Pl. 1, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 6F-G; for character history see Ezcurra 2012).
72. Ventral margin of jugal posterior to anterior process: more or less straight to gently convex (0); slightly sigmoidal (1); strongly convex (2) (modified from Ezcurra 2012: character 156; *Panguraptor lufengensis* after You et al. 2014: Fig. 1 and 2, *Cryolophosaurus ellioti* after Smith et al. 2007: Fig. 5, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 6F-G; for character history see Ezcurra 2012).
73. Shape of orbit: subcircular (0); elongated, with or without ventral constriction (1) (modified from Ezcurra 2012: character 161; *Panguraptor lufengensis* after You et al. 2014: 237, Fig. 1 and 2, character 89, *Ceratosaurus* Madsen & Welles 2000: Pl. 1, 2 and Gilmore 1920: Pl. 17.2, 18.2, *Zupaysaurus rougieri, Eustreptospondylus oxoniensis* and *Sinraptor dongi* after Smith et al. 2007: character 1; for character history see Ezcurra 2012).
74. Horizontal diameter of orbit in subadults or adults: subequal or longer than the length of the internal antorbital fenestra (0); shorter than the length of the internal antorbital fenestra (1) (Ezcurra 2012: character 162; *Eoraptor lunensis* after Sereno et al. 1993: Fig. 1 and Sereno, Martinez & Alcober 2012: Fig. 3A and 11, *Panguraptor lufengensis* after You et al. 2014: 237, Fig. 1 and 2, Tab. 1, *Ceratosaurus* Madsen & Welles 2000: Pl. 1 and 2, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3B; for character history see Ezcurra 2012).
75. Prefrontal: considerably participating in the anterodorsal rim of the orbit in lateral view (0); slightly participating in the anterodorsal rim of the orbit in lateral view, being displaced posteriorly and/or medially (1); not participating in the anterior margin of the orbit in lateral view, being displaced posteriorly and/or medially (2) (modified from Ezcurra 2012: character 165; *Panguraptor lufengensis* after You et al. 2014: 237, Fig. 1 and 2, *Ceratosaurus* and *Sinraptor dongi* after Rauhut 2003: character 34, and Currie & Zhao 1993: Fig. 3B; for character history see Ezcurra 2012).
76. Prefrontal posterior process: elongate, prefrontal total length equal to anteroposterior orbit diameter in subadults or adults (0); short (1); absent (2) (Ezcurra 2012: character 167; *Ceratosaurus* after Madsen & Welles 2000: Pl. 4A, D, E and Sanders & Smith 2005: 611, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3B, 6A-C; for character history see Ezcurra 2012).
77. Paired frontals shape: subrectangular, longer than wide (0); squared, as wide as long or wider than long (1) (Ezcurra 2012: character 177; *Ceratosaurus* after Rauhut 2003: character 36 & Smith et al. 2007: character 63¸ *Eustreptospondylus*

oxoniensis after Sadleir et al. 2008: Fig. 7, Pl. 2, figs.1, 2 and Smith et al. 2007: character 63, *Piatnitzkisaurus* after Novas 2009: 117 & Smith et al. 2007: character 63, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3A & Smith et al. 2007: character 63; for character history see Ezcurra 2012).

78. Contribution of the frontal in the dorsal margin of the orbit: present (0); absent, excluded by the contact between lacrimal and postorbital (1) (modified from Ezcurra 2012: character 178; *Panguraptor lufengensis* after You et al. 2014: Fig. 1 and 2, *Ceratosaurus* after Sanders & Smith 2005: 611, Madsen & Welles 200: Pl.4D and Gilmore 1920: Pl. 18.1, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 12, Fig. 5, 7, *Sinraptor dongi* and *Piatnitzkisaurus* after Carrano et al. 2012: character 67, Rauhut 2004: 1116, Rauhut 2003: charcter 39; for character history see Ezcurra 2012).
79. Anterior edge of associated frontals: rectangular (0); triangular, wedge-shaped (1) (Ezcurra 2012: character 179, *Ceratosaurus* and *Eustreptospondylus oxoniensis* after Smith et al. 2007: character 62; for character history see Ezcurra 2012).
80. Participation of frontal in supratemporal fossa: absent (0); present (1) (modified from Ezcurra 2012: character 187; *Panguraptor lufengensis* after You et al. 2014: Fig. 1 and 2, *Ceratosaurus* after Madsen & Welles 2000: 6, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Fig. 7, Pl. 2, fig.1, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3A, 7D; for character history see Ezcurra 2012).
81. Frontals and parietals in subadults and adults: separate (0); fused (1) (Ezcurra 2012: character 190; *Panguraptor lufengensis* after You et al. 2014: Fig. 1 and 2, *Ceratosaurus* after Madsen & Welles 2000: 6, *Sinraptor dongi* after Currie & Zhao 1993: 2045, Fig. 3A and 7D; for character history see Ezcurra 2012).
82. Medial suture between parietals: present over the whole length of the bones (0); partially closed (1); absent, parietals fused at midline (2) (Ezcurra 2012: character 242; *Ceratosaurus* after Madsen & Welles 2000: 6; for character history see Ezcurra 2012).
83. Supratemporal fossae: separated by a horizontal plate formed by the parietals (0); contact each other posteriorly, but separated anteriorly by an anteriorly widening triangular plate formed by the parietals (1) (Ezcurra 2012: character 226; *Panguraptor lufengensis* after You et al. 2014: Fig. 1 and 2, character 48, *Ceratosaurus* and *Sinraptor dongi* after Rauhut 2003: character 43 (supratemporal fenestrae); for character history see Ezcurra 2012).
84. NEW: Participation of parietal in supratemporal fossa: absent (0); present, along the entire lateral margin (1); present, but restricted to the posterior half of the bone (2) (*Herrerasaurus ischigualastensis* after Sereno & Novas 1994: Fig. 4, 7B, 8B, *Zupaysaurus rougieri* after Ezcurra 2007: Fig. 6, *Cryolophosaurus ellioti* after Smith et al. 2007: Fig. 6, *"Syntarsus" kayentakatae* after MNA V2623, Rowe 1989: Fig. 1C, D and Tykoski 1998: Fig. 5, *Coelophysis bauri* after CM 31374 and Colbert 1989: Fig. 41, 42A, *Coelophysis rhodesiensis* after QG194, Raath 1977: Fig. 3b and Colbert 1989: Fig. 42B, *Ceratosaurus* after BYUVP 12893 and Madsen & Welles 2000: 6, Pl. 4A, D, *Allosaurus fragilis* after Madsen 1976: Pl. 2A, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 13).
85. Posterior margin of articulated parietals in dorsal view: forming an obtuse angled «V» (0); forming an acute angled «V» (1). (Ezcurra 2012: character 248; *Ceratosaurus* after Gilmore 1920: Pl. 18.1, *Sinraptor dongi* after Currie & Zhao 1993: 2045, Fig. 3A and 7D; for character history see Ezcurra 2012).

86. Tongue-like process of parietals overlapping the supraoccipital knob: absent (0); present (1) (Ezcurra 2012: character 246; *Ceratosaurus* and *Sinraptor dongi* after Smith et al. 2007: character 77; for character history see Ezcurra 2012).
87. Anterior process of postorbital: sharply upturned (0); projected anteriorly, at about the same level as posterior process, resulting in a «T»-shaped postorbital (1) (Ezcurra 2012: character 204; *Panguraptor lufengensis* after You et al. 2014: Fig. 2, *Ceratosaurus* after Madsen & Welles 2000: Pl. 1, 2, 5A to C, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 14, Pl. 2, fig. 5, 6 Tykoski 2006:character 66, *Sinraptor dongi* after Currie & Zhao 1993: 2045, Fig. 8 A-B; for character history see Ezcurra 2012).
88. Length of anterior postorbital process: longer than or as long as posterior process of postorbital (0); shorter than posterior process of postorbital (1) (Ezcurra 2012: character 206; *Panguraptor lufengensis* after You et al. 2014: Fig. 2; *Ceratosaurus* after Madsen & Welles 2000: Pl. 1, 2, 5B and D, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Pl. 2, fig. 5, 6, *Sinraptor dongi* after Currie & Zhao 1993: 2045, Fig. 8 A-B; for character history see Ezcurra 2012).
89. Anterior end of anterior process of postorbital: tapering (0); rounded (1) (Ezcurra 2012: character 207; *Panguraptor lufengensis* after You et al. 2014: Fig. 2; *Ceratosaurus* after Madsen & Welles 2000: Pl. 1, 2, 5B and D, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Pl. 2, fig. 5, 6, *Sinraptor dongi* after Currie & Zhao 1993: 2045, Fig. 8 A-B; for character history see Ezcurra 2012).
90. Orbit border confined by postorbital: continuously concave (0); with a convexity at the base of the anterior process (1) (Ezcurra 2012: character 213; *Panguraptor lufengensis* after You et al. 2014: Fig. 1 and 2, *Ceratosaurus* after Madsen & Welles 2000: Pl. 1, 2, 5B and D, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Fig. 5, Pl. 2, fig. 5, *Sinraptor dongi* after Currie & Zhao 1993: 2045, Fig. 8 A-B; for character history see Ezcurra 2012).
91. Participation of postorbital in supratemporal fossa: present, restricted to anterior process (0); present, restricted to posterior process (1); present, both processes participate (2); absent (3). (Ezcurra 2012: character 225; *Panguraptor lufengensis* after You et al. 2014: 239, Fig. 1 and 2, extended character 324, *Ceratosaurus* after Madsen & Welles 2000: Pl. 2 and 5D, Carrano et al. 2012: character 60, *Eustreptospondylus oxoniensis* and *Sinraptor dongi* after Carrano et al. 2012: character 60; for character history see Ezcurra 2012).
92. Depression above ventral process (= jugal process) of postorbital: absent (0); present (1) (Ezcurra 2012: character 212; *Ceratosaurus* after Madsen & Welles 2000: Pl. 1, 2, 5B and D, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Pl. 2, fig. 5, *Sinraptor dongi* after Currie & Zhao 1993: Fig.8B; for character history see Ezcurra 2012).
93. Posterior margin of ventral process (= jugal process) of postorbital: convex (0); slightly concave or straight (1) (Ezcurra 2012: character 214; *Panguraptor lufengensis* after You et al. 2014: Fig. 1 and 2, *Ceratosaurus* after Madsen & Welles 2000: Pl. 1, 2, 5B and D, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Pl. 2, figs. 5, 6, *Sinraptor dongi* after Currie & Zhao 1993: Fig.8A-B; for character history see Ezcurra 2012).
94. Postorbital bar: jugal and postorbital participate in nearly equal proportions (0); mostly composed by the postorbital (1) (Nesbitt et al. 2009: character 51; *Coelophysis rhodesiensis* after Raath 1977: Fig. 3a and Colbert 1989: Fig. 40A,

Panguraptor lufengensis after You et al. 2014: character 5, 1, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3; for character history see Nesbitt et al. 2009).

95. Orientation of the upper temporal bar formed by the posterior process of the postorbital and the anterior process of the squamosal: horizontally (0); strongly posteroventrally oriented (1) (modified from Ezcurra 2012: character 220; "*Syntarsus" kayentakatae* after Tykoski 1998: Fig. 1, 2 and 6, *Panguraptor lufengensis* after You et al. 2014: Fig. 1 and 2, *Ceratosaurus* after Madsen & Welles 2000: Pl. 1, 2, 5B and D, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Fig. 5, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3; for character history see Ezcurra 2012).
96. Orientation of the ventral process of the squamosal in regard to the anteroposterior axis of the postorbital portion of the cranium: mainly posteroventrally (0); mainly vertically (1); mainly anteroventrally (2) (Ezcurra 2012: character 231; *Panguraptor lufengensis* after You et al. 2014: Fig. 2, *Ceratosaurus* after BYUVP 12893 and Madsen & Welles 2000: Pl. 1, 2, 5E and F, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Fig. 5, Pl. 2, figs. 7, 8, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3, 8D and F; for character history see Ezcurra 2012).
97. Ventral process of squamosal: tapering distally, distal end pointed or rounded (0); quadrangular, keeps consistent depth (1); expanded distally (2) (Ezcurra 2012: character 229; *Panguraptor lufengensis* after You et al. 2014: character 322; *Ceratosaurus, Sinraptor dongi* after Rauhut 2003: character 45, Currie & Zhao 1993: Fig. 3, 8D and F, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Fig. 5, Pl. 2, figs. 7, 8; for character history see Ezcurra 2012).
98. Maximal width of squamosal ventral process versus its maximal length: 0.11 to 0.33 (0); 0.41 to 0.60 (1); 0.77 to 1.00 (2) (Ezcurra 2012: character 228; *Panguraptor lufengensis* after You et al. 2014: character 47, *Ceratosaurus* after Rauhut 2003: Text-Fig. 7C and Henderson 1998: Fig. 1, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 8D and F: 0.43 to 0.486, Frick theropod: ≤ 0.36, estimated; for character history see Ezcurra 2012).
99. Posterior process of the squamosal: short, does not extend posterior to the quadrate head (0); long, does extend posterior to the quadrate head but is shorter than the anterior process of the squamosal (1); extends far posteriorly and is longer than the anterior process of the squamosal (2) (Ezcurra 2012: character 236; *Ceratosaurus* after BYUVP 12893 and Madsen & Welles 2000: Pl. 1, 2, 5E and F, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3B, 8D and F ; for character history see Ezcurra 2012).
100. Squamosal-quadratojugal contact: at tips (0); broad (1); absent (2) (Ezcurra 2012: character 235; *Panguraptor lufengensis* after You et al. 2014: character 323, *Ceratosaurus* after Rauhut 2003: character 46, Text-Fig. 7C and Henderson 1998 and Fig. 1, *Sinraptor dongi* after Carrano et al. 2012: character 75; for character history see Ezcurra 2012).
101. Anteroposterior length of supratemporal fenestra in respect to anteroposterior maximal breadth of infratemporal fenestra: shorter (0); longer (1) (Ezcurra 2012: character 194; *Ceratosaurus* after USMN 4735, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3A and B; for character history see Ezcurra 2012).
102. Shape of the posterior margin of the infratemporal fenestra, respectively participation of the ventral process of squamosal and the dorsal process of quadratojugal in the posterior margin: subvertical or largely convex anteriorly (0); ventral process of squamosal distinctly projecting towards the infratemporal

fenestra (1); both processes are orientated anteriorly forming a triangular projection towards the infratemporal fenestra (2); triangular projection completely divides the infratemporal fenestra into two openings (3) (Ezcurra 2012: character 201; *Panguraptor lufengensis* after You et al. 2014: Fig. 1 and 2, *Ceratosaurus* after BYUVP 12893 and Madsen & Welles 2000: Pl. 5E, F, 11A, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3B; for character history see Ezcurra 2012).

103. Shape of infratemporal fenestra: dorsal half nearly as wide anteroposteriorly as ventral half (0); dorsal half much narrower anteroposteriorly than ventral half (1) (Ezcurra 2012: character 198; *Panguraptor lufengensis* after You et al. 2014: 237, Fig. 2, *Ceratosaurus* after Madsen & Welles 2000: Pl. 1, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3 B; for character history see Ezcurra 2012).
104. Maximal anteroposterior width of the ventral half of the infratemporal fenestra in respect to the maximal anteroposterior width of the orbit in subadults and adults: 0.31 to 0.54 (0); 0.67 to 0.77 (1); 0.98 to 1.21 (2) (Ezcurra 2012: character 197; *Panguraptor lufengensis* after You et al. 2014: Tab. 1, ratio 0.77, *Ceratosaurus* after Madsen & Welles 2000: Pl. 1, value 1.0, *Sinraptor dongi* after Currie & Zhao 1993: estimated from Fig. 3B, Frick theropod: estimated < 0.55; for character history see Ezcurra 2012).
105. Position of the infratemporal fenestra: entirely posterior to or approximately at same level as the posterior border of orbit (0); partially below orbit (1) (Ezcurra 2012: character 199; *Panguraptor lufengensis* after You et al. 2014: Fig. 1 and 2, *Ceratosaurus* after Madsen & Welles 2000: Pl. 1, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3B; for character history see Ezcurra 2012).
106. Quadratojugal: hook-shaped, without posterior process (0); inverted T-shaped, with a posterior process (1) (Ezcurra 2012: character 252; *Cryolophosaurus ellioti* after Smith et al. 2007: character 84; *Panguraptor lufengensis* after You et al. 2014: Fig. 1 and 2, *Ceratosaurus* and *Sinraptor dongi* after Rauhut 2003: character 47; for character history see Ezcurra 2012).
107. Quadratojugal dorsal process: longer than the anterior process (0); same length as or shorter than anterior process (1) (Ezcurra 2012: character 250; *Panguraptor lufengensis* after You et al. 2014: Fig. 1 and 2, *Ceratosaurus* after Madsen & Welles 2000: Pl. 11A, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3B; for character history see Ezcurra 2012).
108. Anteroposterior width of dorsal process of quadratojugal: narrow, similar to the anterior process (0); broad (1) (Ezcurra 2012: character 251; *Ceratosaurus* after Madsen & Welles 2000: Pl. 11A and Smith et al. 2007: character 83, *Dilophosaurus wetherilli* after UCMP 37302, *Zupaysaurus rougieri* after PULR 076; for character history see Ezcurra 2012).
109. Angle between anterior process and dorsal process of quadratojugal: 51 to 57° (0); 63 to 66° (1); 76 to 83° (2); 143 to 149° (3) (Ezcurra 2012: character 253; *Panguraptor lufengensis* after You et al. 2014: Fig. 2, estimated 72° to 77°, *Ceratosaurus*: 42°, after Madsen & Welles 2000: Pl. 11A, *Sinraptor dongi* 76° estimatet after reconstruction of Currie & Zhao 1993: Fig. 3B, Swiss theropod: 66°; for character history see Ezcurra 2012).
110. Anterior most extension of articulation between jugal and quadratojugal: well posterior to the posterior margin of the dorsal process of the jugal (0); at the same level or anterior to the posterior margin of the dorsal process of the jugal (1) (Ezcurra 2012: character 258; *Panguraptor lufengensis* after You et al. 2014:

character 52, *Ceratosaurus* after Madsen & Welles 2000: Pl. 12H, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3B; for character history see Ezcurra 2012).

111. Quadratojugal fused to quadrate in subadults and adults: absent (0); present, at least partially (1) (Ezcurra 2012: character 255; *Panguraptor lufengensis* after You et al. 2014: Fig. 2, *Ceratosaurus* after Nesbitt et al. 2009: character 52, *Sinraptor dongi* after Smith et al. 2007: character 85; for character history see Ezcurra 2012).
112. Quadrate foramen: developed as a distinct opening between the quadrate and quadratojugal (0); almost entirely enclosed in the quadrate (1); absent (2) (Ezcurra 2012: character 265; *Ceratosaurus, Sinraptor dongi* and *Liliensternus liliensterni* after Rauhut 2003: character 49, *Eustreptospondylus oxoniensis* after Carrano et al. 2012: character 81; for character history see Ezcurra 2012).
113. NEW: Lateral ala of quadrate: narrow and of more or less continuous anteroposterior width over its whole dorsoventral extension (0); well expanded anteriorly in its dorsal half forming a wing-like structure (1) (*Eoraptor lunensis* after PVSJ 512 and Sereno et al. 1993: Fig. 1 and Sereno, Martinez & Alcober 2012: 3A and 26, *Herrerasaurus ischigualastensis* after PVSJ 407 and Sereno & Novas 1994: Fig. 8C ,*Tawa hallae* after Nesbitt et al. 2009: Fig 1, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 1B, *Zupaysaurus rougieri* after PULR 076, Arcucci & Coria 2003: Fig. 2 and Ezcurra 2007: Fig. 1, *Dilophosaurus wetherilli* after UCMP 37302 and Welles 1984: Fig. 5, *Cryolophosaurus ellioti* after Smith et al. 2007: Fig. 4A and B, 9A and B, 10A and B, *Liliensternus liliensterni* after MB.R.2175.1.13, MB.R.2175.1.14 and Huene 1934: Pl. 13 Fig. 8a to 8d, *"Syntarsus" kayentakatae* after MNA V2623, Tykoski 1998: Fig. 5 and Tykoski 2005: Fig. 31, *Coelophysis bauri* after CM 31374, *Coelophysis rhodesiensis* after Raath 1977: Fig. 4j and Bristowe 2004: Fig. 20, *Panguraptor lufengensis* after You et al. 2014: Fig. 2, *Ceratosaurus* after Madsen & Welles 2000: Pl. 3F and H, *Allosaurus fragilis* after Madsen 1976: Pl. 3D to F, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Fig. 5, Pl. 2, fig. 10, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 8G; for character history see Ezcurra 2012).
114. NEW: Pterygoid ala (= medial ala) of quadrate: anterior margin more or less continuously convex, maximal anteroposterior width in the mid-portion of the wing (symmetrically shaped) (0); anterior margin discontinuously convex, maximal anteroposterior width in the dorsal portion of the wing (asymmetrically shaped, shortest side of «triangle» dorsally orientated) (1); anterior margin discontinuously convex, maximal anteroposterior width in the ventral portion of the wing (asymmetrically shaped, shortest side of «triangle» ventrally orientated) (2) (*Herrerasaurus ischigualastensis* after PVSJ 407 and Sereno & Novas 1994: Fig. 8C, *Tawa hallae* after Nesbitt et al. 2009: Fig 1, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 1B, *Zupaysaurus rougieri* after PULR 076, Arcucci & Coria 2003: Fig. 2 and Ezcurra 2007: Fig. 1, *Dilophosaurus wetherilli* after UCMP 37302 and Welles 1984: Fig. 5, *Cryolophosaurus ellioti* after Smith et al. 2007: Fig. 4A and B, 9A and B, 10A and B, *Liliensternus liliensterni* after MB.R.2175.1.13, MB.R.2175.1.14 and Huene 1934: Pl. 13 Fig. 8a to 8d, *"Syntarsus" kayentakatae* after MNA V2623, Tykoski 1998: Fig. 5 and Tykoski 2005: Fig. 31, *Coelophysis bauri* after CM C-3-82 and Ezcurra 2007: Fig. 9, *Coelophysis rhodesiensis* after Raath 1977: Fig. 4j and Bristowe 2004: Fig. 20, *Ceratosaurus* after Madsen & Welles 2000: Pl. 3F and H, *Allosaurus fragilis* after Madsen 1976: Pl. 3D to F, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Fig. 5, Pl. 2, fig. 10, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 8G, I).

115. Posterior curvature of the proximal end of quadrate: absent or slight, proximal half of quadrate almost straight (0); present, with quadrate head caudodorsally oriented (1) (Ezcurra & Novas 2007: character 76; *Tawa hallae* after Nesbitt et al. 2009: Fig 1, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 1B, *Cryolophosaurus ellioti* after Smith et al. 2007: Fig. 4A and B, 9A and B, *Panguraptor lufengensis* after You et al. 2014: Fig. 2, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Fig. 5, Pl. 2, fig. 10, 11; for character history see Ezcurra & Novas 2007).
116. Form of articulation surface of distal condyles of quadrate: two convex condyles of subequal size and separated by a sulcus (0); two convex condyles separated by a sulcus, medial larger than lateral one (1); two convex condyles separated by a sulcus, lateral larger than medial one (2); one single convex condyle (3) (Ezcurra 2012: character 269; *Ceratosaurus* after Madsen & Welles 2000: Pl. 3E to H, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 15, Pl. 2, fig. 13, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3D and 7A; for character history see Ezcurra 2012).
117. Articulation of the mandible: approximately straight below or anterior to the quadrate head (0); significantly posterior to the quadrate head (1) (Ezcurra 2012: character 272; *Ceratosaurus* and *Sinraptor dongi* after Rauhut 2003: character 51; for character history see Ezcurra 2012).
118. Shape of the supraoccipital: at least as high as wide (0); wider than high (1) (Ezcurra 2012: character 277; *Sinraptor dongi* after Currie & Zhao 1993: Fig. 7A; for character history see Ezcurra 2012).
119. Medial vertical crest of the supraoccipital: absent (0); present (1) (modified from Ezcurra 2012: character 280; *Ceratosaurus* after BYUVP 12893, *Sinraptor dongi* after Currie & Zhao 1993: 2049, Fig. 3D and 7A; for character history see Ezcurra 2012).
120. Participation of the supraoccipital in the dorsal margin of the foramen magnum: present (0); absent (1) (modified from Ezcurra 2012: character 283; *Ceratosaurus* after BYUVP 12893, *Sinraptor dongi* after Currie & Zhao 1993: 2049, Fig. 3D and 7A; for character history see Ezcurra 2012).
121. Paroccipital process in caudal view: straight, directed laterally or dorsolaterally (0); directed slightly ventrolaterally (1); directed strongly ventrolaterally, with distal end entirely below the level of the foramen magnum (2) (Rauhut 2003: character 52; *Tawa hallae* after Nesbitt et al. 2009: character 74, *Cryolophosaurus ellioti, Eustreptospondylus oxoniensis, "Syntarsus" kayentakatae* and *Zupaysaurus rougieri* after Smith et al. 2007: character 90; for character history see Ezcurra 2012: character 284).
122. Ventral rim of the basis of the paroccipital processes: above or level with the dorsal border of the occipital condyle (0); situated at mid-height of occipital condyle or lower (1) (Ezcurra 2012: character 285; *Ceratosaurus, Sinraptor dongi and Liliensternus liliensterni* after Rauhut 2003: character 54, *Eustreptospondylus oxoniensis* after Carrano et al. 2012: character 85; for character history see Ezcurra 2012).
123. Paroccipital process: slender, dorsal and ventral margin nearly parallel (0); robust, margins diverging distally, distal end bent downwards and/or expanded (1) (Ezcurra 2012: character 286; *Ceratosaurus* after Madsen & Welles 2000: Pl. 4, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 22, Fig. 10C, 13C, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 7A; for character history see Ezcurra 2012).

124. Angle formed by the paroccipital processes in ventral or dorsal aspect: 77 to 94° (0); 101 to 122° (1); 136° (2) (Ezcurra 2012: character 288; *Ceratosaurus* after Gilmore 1920: Pl. 18.1, around 92°, *Sinraptor dongi* 68° after Currie & Zhao 1993: Fig. 7D, E, and Carabajal & Currie: Fig. 1B, *Eustreptospondylus oxoniensis* 92° after Sadleir et al. 2008: Fig. 13F, Frick theropod: around 105°, estimated from reconstruction; for character history see Ezcurra 2012).
125. Position of occipital condyle: anterior to craniomandibular joint (0); at same level as craniomandibular joint (1); posterior to craniomandibular joint (2) (Ezcurra 2012: character 301; *Ceratosaurus* after Gilmore 1920: Pl. 17 and 18, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3A-C; for character history see Ezcurra 2012).
126. Parabasisphenoid between basal tubera and basipterygoid processes: approximately as wide as long or wider (0); significantly elongated, at least 1.5 times longer than wide (1) (Ezcurra 2012: character 315; *Ceratosaurus* and *Sinraptor dongi* after Rauhut 2003: character 56, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 25, Fig. 12B, 13F; for character history see Ezcurra 2012).
127. Basisphenoid recess: absent or poorly developed (0); deep, well developed (1) (Rauhut 2003: character 57; *Tawa hallae*, *Eodromaeus murphi*, *Zupaysaurus rougieri*, *Cryolophosaurus ellioti* and *"Syntarsus" kayentakatae* after Ezcurra 2012: character 319, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 25, Fig. 12B, 13F, and Carrano et al. 2012: character 96; for character history see Ezcurra 2012).
128. Basisphenoid lateral surface: not excavated by fossa (0); excavated by anterior tympanic recess (1) (Ezcurra 2012: character 298; *Ceratosaurus* and *Sinraptor dongi* after Rauhut 2003: character 59, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 24, Fig. 10A, B; for character history see Ezcurra 2012).
129. Number of foramina for passage of hypoglossal nerve (XII): two (0); one (1) (Ezcurra 2012: character 307; coding of *Tawa hallae*, *Dilophosaurus wetherilli* not verified but deduced from coding of Ezcurra 2012: character 308; *Allosaurus fragilis* and *Sinraptor dongi* after Carabajal & Currie 2012: 95, Tab. 1, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 24, Fig. 10C, 13C); for character history see Ezcurra 2012.
130. Relative position of exits of hypoglossal nerve (XII): aligned approximately anteroposteriorly (0); aligned subvertical (1) (Ezcurra 2012: character 308; for character history see Ezcurra 2012).
131. Exit of cranial nerves X and XI: laterally through metotic (= jugular) foramen (0); posteriorly through foramen/foramina lateral to the exit of cranial nerve XII and the occipital condyle (1) (Ezcurra 2012: character 336; *Allosaurus* after Rauhut 2003: character 60, *Cryolophosaurus* after A. Marsh, personal communication, 2018, *Sinraptor dongi* after Carabajal & Currie 2012: 95, Fig. 4; for character history see Ezcurra 2012).
132. Foramen for the exit of the trigeminal nerve [cranial nerve V] and the mid-cerebral vein: combined, not subdivided (0); separated or at least partially subdivided (1) (modified from Ezcurra 2012: character 337; *Ceratosaurus* after Rauhut 2003: character 61, *Sinraptor dongi* after Carabajal & Currie 2012: 93, 6A, C; for character history see Ezcurra 2012).
133. Ventral surface of ectopterygoid: without fossa (0); with a deep depression, groove or foramen (1) (modified from Ezcurra 2012: character 354; *Ceratosaurus* and *Sinraptor dongi* after Carrano et al. 2012: character 116; for character history see Ezcurra 2012).

134. Relation between the maximal height of the alveolar portion and the maximal length of the dentary: 0,11 to 0,13 (0); 0,16 to 0,21 (1); 0,23 to 0,25 (2) (Ezcurra 2012: character 367; *Ceratosaurus* after USMN 4735, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Fig. 5, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 11B, Frick theropod: < 0,11; for character history see Ezcurra 2012).
135. Dorsal expansion of the anterior part of the dentary in lateral view: absent (0); present (1) (Ezcurra 2012: character 369; *Ceratosaurus* after Madsen & Welles 2000: Pl. 13A and B, *Eustreptospondylus oxoniensis* and *Sinraptor dongi* after Carrano et al. 2012: character 120; for character history see Ezcurra 2012).
136. Posterior end of dentary: notched by external mandibular fenestra (0); straight or slightly concave (1) (Ezcurra 2012: character 383; *Ceratosaurus* after Gilmore 1920: Fig. 54, Pl. 17.2, 18.2, *Sinraptor dongi* after Carrano et al. 2012: character 126; for character history see Ezcurra 2012).
137. Posteroventral process of dentary: extending further posteriorly than the posterodorsal process (0); subequal to the length of the posterodorsal process (1) (Ezcurra 2012: character 382; *Syntarsus kayentakatae* after Tykoski 2005: character 89, MNA V2623, *Panguraptor lufengensis* after You et al. 2014: character 137, *Dilophosaurus wetherilli* after Smith et al. 2007: character 123 and Tykoski 2005: character 89), *Ceratosaurus* after Gilmore 1920: Fig. 54, Pl. 17.2, 18.2, Ezcurra & Novas 2007: character 100, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 3B, Ezcurra & Novas 2007: character 100, *Eustreptospondylus oxoniensis* after Tykoski 2005: character 89; for character history see Ezcurra 2012).
138. Position of the Meckelian groove in the anterior half of the dentary: dorsoventrally centered (0); restricted to the ventral border (1) (Ezcurra 2012: character 379; *Ceratosaurus* after Madsen & Welles 2000: Pl. 13A, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Fig. 9C, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 11B; for character history see Ezcurra 2012).
139. Number of dentary teeth in adults: 11 to 12 (0); 14 to 17 (1); 20 to 23 (2); 25 to 27 (3) (Ezcurra 2012: character 407; *Ceratosaurus* after Colbert 1989: tab. 4, 15 teeth, *Sinraptor dongi* after Currie & Zhao 1993: 2052, 16 alveoli, *Eustreptospondylus oxoniensis,* subadult after Sadleir et al. 2008: 18, at least 13 teeth, Swiss theropod, subadult: at least 17 teeth; for character history see Ezcurra 2012). Comment: As shown by Colbert 1989, Tab. 3, the differences in tooth count between animals of different ontogenetic stages are not necessarily higher than those coused by intaspecific variation. *E. oxoniensis* and *N. frickensis* are only represented by subadult individuals and possibly slightly more dentary teeth were present in the adult condition. Hence, we assume state (0) or (1) for *E. oxoniensis*, respectively (1) or (2) for *N. frickensis*.
140. Anterior margin of splenial: with a single anterior projection (0); anteroventral process longer than anterodorsal process (1); both anterior processes of equal length (2); anterodorsal process longer than anteroventral process (3) (Ezcurra 2012: character 431; *Ceratosaurus* after Madsen & Welles 2000: Pl. 13A, *Sinraptor dongi* after Currie & Zhao 1993: 2054, Fig. 11 C and D; for character history see Ezcurra 2012).
141. Mylohyoid foramen in the ventral part of the splenial: absent (0); present (1) (Ezcurra 2012: character 433; *Panguraptor lufengensis* after You D et al. 2014: character 105, *Ceratosaurus* and *Sinraptor dongi* after Currie & Zhao 1993: Fig. 11C and Rauhut 2003: character 78; for character history see Ezcurra 2012).

142. Posterolateral process of splenial wraps around the ventral margin of the dentary and is exposed in lateral view: present (0); absent (1) (Ezcurra 2012: character 429; *Panguraptor lufengensis* after You et al. 2014: conclusion from coding of character 105, *Ceratosaurus* after Smith et al. 2007: character 129, Madsen & Welles 2000: Pl. 13G and Gilmore 1920: Fig. 55, Pl. 26.2, *Sinraptor dongi* after Curry & Zhao 1993: 2054; for character history see Ezcurra 2012)
143. Maximal length of external mandibular fenestra versus total anteroposterior length of mandible: 7,23 to 7,64% (0); 9,42 to 10,22% (1); 12,17 to 14,55% (2); 17,12 to 17,61% (3); 23,43% (4) (Ezcurra 2012: character 397; *Coelophysis bauri* after Ezcurra 2012 and CM 31374*, Panguraptor lufengensis* after You et al. 2014: 239, Fig. 2, Tab. 1, estimated from Fig. 2 and authors comments on pp. 237 and 239: 12.9%, *Ceratosaurus* after Gilmore 1920: Fig. 55:12.195%, Pl. 17.2: 12.67%, reconstruction Pl. 18.2: 13.55, Pl. 26.2: 14.05%, *Sinraptor dongi* after Curry & Zhao 1993: 2052, Fig. 3B: 17.07 %, 11A, F: around 14.85, Swiss theropod: < 14,41%, but at least 12,17%; for character history see Ezcurra 2012).
144. Anterior portion of the surangular: less than half the height of the mandible at the level of the mandibular fenestra (0); equal to or more than half the height of the mandible at the level of the mandibular fenestra (1) (modified from Smith 2007: character 132; *Tawa hallae* after Nesbitt et al. 2009: Fig 1, *Panguraptor lufengensis* after You et al. 2014: Fig. 2; for character history see Ezcurra 2012: character 430).
145. Lateral surangular shelf anteroventral to the glenoid fossa: absent (0); present (1) (modified from Ezcurra 2012: character 435; *Panguraptor lufengensis* after You et al. 2014: 239, Fig. 2, *Ceratosaurus* after Gilmore 1920: Fig. 54, Pl. 17.2, 18.2, *Sinraptor dongi* after Curry & Zhao 1993: 2054, Fig. 11E; for character history see Ezcurra 2012).
146. Lateral groove along posterior end of surangular, just dorsal to articulation with posterior process of angular: absent (0); present (1) (Ezcurra 2012: character 436; *Ceratosaurus* after Gilmore 1920: Fig. 54, Pl. 17.2, 18.2 and Smith et al. 2007: character 135, *Sinraptor dongi* after Smith t al. 2007: character 135; for character history see Ezcurra 2012).
147. Anterior and/or posterior surangular foramen/foramina: absent (0); present (1) (modified from Ezcurra 2012: character 437; *Panguraptor lufengensis* after You et al. 2014: Fig. 2, *Ceratosaurus* after Gilmore 1920: 90, Fig. 54, Pl. 17.2, 18.2, *Sinraptor dongi* after Curry & Zhao 1993: 2054, Fig. 11E; for character history see Ezcurra 2012).
148. Pronounced anterior and posterior lips (=walls) of mandibular glenoid, resulting in an at least weakly U-shaped lateral glenoid fossa in lateral view: absent (0); present (1) (Ezcurra 2012: character 439; *Coelophysis bauri* after AMNH 7242, CM 31374 and Colbert 1989: Fig. 40A, *Allosaurus fragilis* after Smith et al. 2007: character 136 and Carrano et al. 2012: character 134, *Ceratosaurus* after Gilmore 1920: Fig. 55, Pl. 26.2, *Sinraptor dongi* after Curry & Zhao 1993: Fig. 11E and Smith et al. 2007: character 136; for character history see Ezcurra 2012).
149. Posterior extension of angular: moderate, surangular participates in the ventral margin of the mandible in lateral view (0); extends far posteriorly, excluding the surangular from the ventral margin of the mandible in lateral view (1) (Ezcurra 2012: character 440; *Ceratosaurus* after Gilmore 1920: Fig. 54, Pl. 17.2, 18.2, comment of the authors: the lateral visible prearticular portion in the skull reconstruction by Gilmore 1920: Pl. 18.2 belongs most probably to the surangular;

Sinraptor dongi after Curry & Zhao 1993: 2054, Fig. 10C, 11E, F; for character history see Ezcurra 2012).

150. Erect, tab-like dorsal processes on the articular, one immediately posterior to the opening of the corda tympanic foramen (medial) and the other on the anterolateral margin of the posterodorsal fossa of the retroarticular process: absent (0); present (1) (Ezcurra 2012: character 442; *Ceratosaurus* and *Sinraptor dongi* after Yates 2005: character 241; for character history see Ezcurra 2012).
151. Ventromedially directed process of the articular: absent (0); present (1) (Ezcurra 2012: character 444; *Ceratosaurus* and *Sinraptor dongi* after Yates 2005: character 240; for character history see Ezcurra 2012).
152. Retroarticular process of the mandible: much longer anteroposteriorly than broad mediolaterally (0); moderately long, slightly longer than broad or subequal to its breath (1); short and broad, as wide mediolaterally as long anteroposteriorly or wider than long (2) (Ezcurra 2012: character 445; after Yates 2005: Fig. 6A, B, 7A, B, character 73, *Ceratosaurus* after Smith et al. 2007: character 139, *Sinraptor dongi* after Curry & Zhao 1993: Fig. 10D and Smith et al. 2007: character 139; for character history see Ezcurra 2012).
153. Shape of the retroarticular process of the mandible in lateral view: straight or gently curved, resulting in a sub-rectangular outline (0); robust and strongly curved dorsally, resulting in a semilunar outline (1) (Ezcurra 2012: character 446, *Sinraptor dongi* after Curry & Zhao 1993: Fig. 11E; for character history see Ezcurra 2012).
154. Attachment of the m. depressor mandibulae on retroarticular process of the mandible: facing dorsally (0); facing posterodorsally or posteriorly (1) (Ezcurra 2012: character 447; *Ceratosaurus* and *Sinraptor dongi* after Ezcurra & Novas 2007: character 113; for character history see Ezcurra 2012).
155. Attachment area of the m. depressor mandibulae on the retroarticular process of the mandible: transversally convex (0); transversally concave (1) (Ezcurra 2012: character 448; *Sinraptor dongi* after Yates 2005: character 242; for character history see Ezcurra 2012).
156. Axis intercentrum length versus axis centrum length: 25 to 40% (0); 40 to 70% (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 70; *Eodromaeus murphi, Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 458, *Ceratosaurus* and *Sinraptor dongi* after Ezcurra & Novas 2007: character 118 and Madsen & Welles 2000: Fig. 14B, 61%; for character history see Ezcurra 2012).
157. Shape of axial neural spine: broad and blade-like (0); transversally compressed, anteroposteriorly reduced and rod-like (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 71; *Eodromaeus murphi*, *Zupaysaurus rougieri, Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 474, *Panguraptor lufengensis* and *Ceratosaurus* after You et al. 2014: character 119, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: character 140 of Holtz 2000; for character history see Ezcurra 2012).
158. Axial diapophysis: absent (0); present (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 72; *Eodromaeus murphi*, *Zupaysaurus rougieri, Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 465, *Ceratosaurus* and *Sinraptor dongi* after Ezcurra & Novas 2007: character 125, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: character 143; for character history see Ezcurra 2012).

159. Axial parapophysis: strongly reduced or absent (0); well developed (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 73; *Eodromaeus murphi, Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 464, *Ceratosaurus* after Ezcurra & Novas 2007: character 124, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: character 142 of Holtz 2000; for character history see Ezcurra 2012).
160. Axial pleurocoels (the term «pleurocoel» can substitute the terms «pneumatic foramen» or «fossa»): absent (0); present (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 74; *Eodromaeus murphi*, *Zupaysaurus rougieri*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 463, *Panguraptor lufengensis* after You et al. 2014: 239, *Ceratosaurus* after Ezcurra & Novas 2007: character 122, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: character 145 of Holtz 2000; for character history see Ezcurra 2012).
161. Anterior articular facet of anterior cervical vertebrae: approximately as high as wide or higher (0); significantly wider than high (1) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 75; *Eodromaeus murphi*, *Zupaysaurus rougieri*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 499, *Ceratosaurus* and *Sinraptor dongi* after Ezcurra & Novas 2007: character 136, *Eustreptospondylus oxoniensis* after Smith et al 2007: character 154; for character history see Ezcurra 2012).
162. Length of mid-cervical centra (3 to 6) in relation to height of anterior articular surface: ≤ 3 (0); 3 < 4 (1); > 4 (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 77; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphi*, *Zupaysaurus rougieri*, *Liliensternus liliensterni*, *Lophostropheus airelensis*, *Procompsognathus triassicus*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 501, *Panguraptor lufengensis* after You et al. 2014: Fig. 1, 3 value 2.83, *Ceratosaurus* and *Sinraptor dongi* after Ezcurra & Novas 2007: character 138, *Eustreptospondylus oxoniensis* after after Sadleir et al. 2008: Pl. 3 Fig. 9.10, Pl. 4 Fig. 1, 2 and Tykoski 2005: character 128; for character history see Ezcurra 2012).
163. Ventromedial keel of postaxial anterior cervical centra: present (0); absent (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 78; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphi*, *Zupaysaurus rougieri*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 495, *Panguraptor lufengensis* after You et al. 2014: 51, *Ceratosaurus* after Madsen & Welles 2000: 25 and 26 and Carrano et al. 2012: character 171, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 27 and Carrano et al. 2012: character 171, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 13G and Carrano et al. 2012: character 171; for character history see Ezcurra 2012).
164. Ventral lamina, from the diapophyses to the ventral rim of the caudal end of the vertebral centra in cervical centra: absent (0); present (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 79; *Eoraptor lunensis*, *Eodromaeus murphi*, *Coelophysis rhodesiensis, "Syntarsus" kayentakatae, Zupaysaurus rougieri*, *Cryolophosaurus ellioti*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 512, *Ceratosaurus* after Ezcurra & Cuny 2007: character 79; for character history see Ezcurra 2012).
165. Lamina protracted from the diapophyses in cervical vertebrae: absent (0); posterior postzygodiapophyseal lamina, reaches the postzyapophyses (1); centrodiapophyseal lamina, reaches the dorsocaudal corner of the centrum (2)

(after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 80; *Eoraptor lunensis*, *Eodromaeus murphi*, *Coelophysis bauri, Zupaysaurus rougieri*, *Cryolophosaurus ellioti*, *Liliensternus liliensterni*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 510 and 511, *Ceratosaurus* after Ezcurra & Cuny 2007: character 78, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 27-28, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 14C; for character history see Ezcurra 2012).

166. Prezygapophyses in anterior cervicals: transverse distance between prezygapophyses less than width of neural canal (0); prezygapophyses situated lateral to the neural canal (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 84; *Tawa hallae*, *Eodromaeus murphi*, *Zupaysaurus rougieri*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 508, *Ceratosaurus, Eustreptospondylus oxoniensis* and *Sinraptor dongi* after Carrano et al. 2012: character 176; for character history see Ezcurra 2012).
167. Prezygapophyses in anterior postaxial cervicals: straight (0); anteroposteriorly convex, flexed ventrally anteriorly (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 85; *Eoraptor lunensis*, *Eodromaeus murphi*, *Zupaysaurus rougieri*, *Cryolophosaurus ellioti* and *Allosaurus fragilis* after Ezcurra 2012: character 494 and Rauhut: Fig. 24D, *Panguraptor lufengensis* after You et al. 2014: 239, *Ceratosaurus* after Gilmore 1920: Pl. 20, Madsen & Welles 2000: 6A, 6B, 6D, 6E, 6G and 6H, *Eustreptospondylus oxoniensis* after after Sadleir et al. 2008: Pl. 3 figs. 1, 2, *Piatnitzkysaurus floresi* after Novas 2009: Fig. 3.19H, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 13H; for character history see Ezcurra 2012).
168. Epipophyses in anterior cervical vertebrae: absent or short and low (0); long, extending beyond the postzygapophyses and low (1); pronounced, strongly overhanging the postzygapophyses and dorsally expanded (2) (after Hugi 2008, Unterrassner 2009 and Ezcurra 2012, modified from Hugi 2008: character 86 and 87, and Ezcurra 2012: character 513 and 514; *Eoraptor lunensis*, *Eodromaeus murphi* and *Zupaysaurus rougieri* after Ezcurra 2012: character 513 and 514; *Panguraptor lufengensis* after You et al. 2014: character 126, *Ceratosaurus* after Gilmore 1920: Pl. 20, Madsen & Welles 2000: Pl. 6B, Tykosky 2005: character 110 and Smith et al. 2007: character 159, *Allosaurus fragilis* after Tykoski 2005: Fig. 42B, charcter 110 and Rauhut 2003: Fig. 24D, *Eustreptospondylus oxoniensis* after after Sadleir et al. 2008: 27, Tykoski2005: character 110 and Smith et al. 2007: character 159, *Piatnitzkysaurus floresi* after Currie & Zhao 1993: 2057 and Novas 2009: Fig. 3.19H, *Sinraptor dongi* after Currie & Zhao 1993: 2057, Fig. 13G-I and Smith et al. 2007: character 159; for character history see Ezcurra 2012).
169. Height of postaxial cervical neural spines: dorsoventrally tall (0); extremely short (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 89; *Tawa hallae*, *Eodromaeus murphi*, *Zupaysaurus rougieri*, *Cryolophosaurus ellioti* and *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 518, *Panguraptor lufengensis* after You et al. 2014: Fig. 1 and 3, *Ceratosaurus* after Madsen & Welles 2000: Pl. 6 and Gilmore 1920: Pl. 20, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: character 154 of Holtz 2000, Pl. 3, figs. 2, 3, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 13H, I, and Holtz 2000: character 154; for character history see Ezcurra 2012.
170. Pneumatization of postaxial cervical centra: absent (0); present by a single pair of fossae that not pierce the centra (1); present by two pairs of fossae that not pierce the centra (2); present by two pairs of foramina that pierce the centra (3); present

by a single pair of foramina that pierce the centra (4) (Ezcurra & Novas 2007: character 129; *Tawa hallae* after Nesbitt et al. 2009: 1532 and Nesbitt et al. 2013: 179, *Eodromaeus murphi* after Martinez et al. 2011: 206 and Yates et al. 2012: 96, *Cryolophosaurus ellioti* after Smith et al. 2007: characters 147 to 149, *Lophostropheus airelensis* after Ezcurra & Cuny 2007: character 69, *Panguraptor lufengensis* after You et al. 2014: 239 (the term «foramina» used by the authors is interpreted as «fossae» in the present paper), Fig. 3, characters: 128 and 129, Frick theropod after Unterrassner 2009 and Hugi 2008: character 69, coding changed; for character history see Ezcurra & Novas 2007).
Pi as foramina (EZ&NE2010)

171. Interior pneumatic spaces in cervicals: absent (0); present, structure camerate (1); present structure camellate (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 92; *Zupaysaurus rougieri*, *Coelophysis bauri* and *Coelophysis rhodesiensis* after Ezcurra 2012: character 491, *Dilophosaurus wetherilli*, *Ceratosaurus* and *Allosaurus fragilis* after Ezcurra & Cuny 2007: character 130, *Eustreptospondylus oxoniensis, Piatnitzkysaurus floresi* and *Sinraptor dongi* after Smith et al. 2007: character 152; for character history see Ezcurra 2012). S07 152
172. Cervical ribs: stout and short, extending posteriorly less than three times the length of the centrum of their origin (0); very thin and moderately to extremely long (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 93; *Tawa hallae* and *Allosaurus fragilis* after Ezcurra 2012: character 529, *Zupaysaurus rougieri* after Arcucci & Coria 2003: 223, *Panguraptor lufengensis* after You et al. 2014: 239, Fig. 3, character 133, *Ceratosaurus* after You et al. 2014: character 133; for character history see Ezcurra 2012).
173. Bodies of cervicals and anterior dorsals: platyan (platycoelous = acoelous) or amphicoelous (0); slightly opisthocoelous (1); strongly opisthocoelous, having ball-like articulations (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 76; *Tawa hallae*, *Eodromaeus murphi*, *Zupaysaurus rougieri*, *Cryolophosaurus ellioti, Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 498, *Ceratosaurus* after Ezcurra & Novas 2007: character 135, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 27, Pl. 3-6, *Sinraptor dongi* after Currie & Zhao 1993: 2057, Fig. 13 F-I, 14; for character history see Ezcurra 2012).
174. Transverse process shape of caudal cervical and/or anterior dorsal vertebrae in dorsal view: mainly laterally directed, subrectangular (0); with strongly backswept anterior margin, subtriangular (1) (after Hugi 2008, Unterrassner 2009 and Tykoski 2005, modified from Hugi 2008: character 88, and Tykoski 2005: character 139; *Eoraptor lunensis*, *Allosaurus fragilis* and *Sinraptor dongi* after Ezcurra & Novas 2007: character 141, *Eodromaeus murphi* after Martinez et al. 2011: character 53, *Segisaurus halli* after Tykoski 2005: character 139, *Ceratosaurus* after Tykoski 2005: Fig. 49B, character 139, *Cryolophosaurus ellioti* after Smith et al. 2007: 397, Fig. 12A to 12D, 12G and 12I, *Panguraptor lufengensis* after You et al. 2014: 239, Frick theropod after Unterrassner 2009 and Hugi 2008: character 88, coding changed, compare Hugi 2008: Fig. 10; for character history see Ezcurra & Novas 2007).
175. Length of anterior and mid-dorsal centra: short, subequal to at most 1.4 times mid centrum height (0); elongated, at least 1.8 times mid centrum height (1) (modified from Hugi 2008 and Unterrassner 2009, Hugi 2008: character 94; *Eoraptor lunensis* after Sereno et al. 2012: Fig. 50.1, 50.2, Tab. 5, *Liliensternus liliensterni* after Huene 1934: Pl. 14.6-14.10 and Rauhut 2003: Fig. 26A, *Dilophosaurus wetherilli*

after Tykoski 2005: Fig. 48B: and Welles 1984: Fig. 14B, *Cryolophosaurs ellioti* after Smith et al. 2007: Fig. 12B, *Ceratosaurus* after Gilmore 1920: Fig. 96, Table on page 97 *Allosaurus fragilis* after Gilmore 1920: Fig. 22, 23, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Pl. 8.5, 8.6, *Piatnitzkysaurus floresi* after Bonaparte 1986: Fig. 14, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 15B, D, F; for character history see Ezcurra 2012).

176. Posterior dorsal vertebrae: strongly shortened, centrum length less than 1.33 times the height of the cranial articular surface (0); relatively short, centrum length equal or more than 1.33 times the height of the cranial articular surface (1); significantly elongated, centrum equal or longer than two times the height of the cranial articular surface (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 95; *Eoraptor lunensis, Eodromaeus murphi*, *Cryolophosaurus ellioti* and *Coelophysis rhodesiensis* after Ezcurra 2012: character 564, *Eoraptor lunensis*: value 1.43, *Eodromaeus murphi*: value 1.49, *Cryolophosaurus ellioti*: value 1.15, *Coelophysis rhodesiensis*: value 1.67 to 2.21; *Panguraptor lufengensis* after You et al. 2014: character 329, *Ceratosaurus* and *Allosaurus fragilis* after Ezcurra & Novas 2007: character 144, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 27, Pl. 10-12, *Piatnitzkysaurus floresi* and *Sinraptor dongi* after Smith et al. 2007: character 169; for character history see Ezcurra 2012).
177. Transverse processes of dorsal vertebrae: anteroposteriorly narrow (0); broad, extending to the lateral margin of the prezygapophyses (1) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 98; *Eoraptor lunensis*, *Ceratosaurus* and *Allosaurus fragilis* after Ezcurra & Cuny 2007: character 84, *Eodromaeus murphi* after Martinez et al. (2011): Fig. 2D, *Cryolophosaurus ellioti* after Smith et al. 2007: Fig. 12, *Panguraptor lufengensis* after You et al. 2014: 239 and Fig. 1, *Eustreptospondylus oxoniensis* after Tykoski 2005: character 140, *Piatnitzkysaurus floresi* after Bonaparte 1986: Fig. 17, *Sinraptor dongi* after Ezcurra & Novas 2007: character 142; for character history see Ezcurra & Cuny 2007).
178. Orientation of the transverse processes of dorsal vertebrae: directed laterally or slightly ventrolaterally (0); directed dorsolaterally (1) (after Hugi 2008, Unterrassner 2009 and Ezcurra 2012, modified from Hugi 2008: character 100, and Ezcurra 2012: character 550; *Eoraptor lunensis, Eodromaeus murphi*, *Cryolophosaurus ellioti*, *Liliensternus liliensterni*, *Coelophysis rhodesiensis*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 550, *Panguraptor lufengensis* after You et al. 2014: Fig. 1, *Segisaurus halli* after Carrano, Hutchinson and Sampson 2005: 836, Fig. 1, *Ceratosaurus* after Madsen & Welles 2000: 15, 17, Pl. 6G to 6I and 7A to 7C, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 32, Pl. 9 figs. 1, 2, 5. 6, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 15 and 16; for character history see Ezcurra 2012).
179. Height of neural spines of posterior dorsals relative to their anteroposterior length: approximately as high as long (0); significantly higher, than long (1); significantly longer, than high (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 102; *Eoraptor lunensis* after Sereno et al. 2012: Fig. 51, 52A, *Eodromaeus murphi*, *Coelophysis bauri, Coelophysis rhodesiensis, Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 566, *Panguraptor lufengensis* after You et al. 2014: Fig.1, character 330, *Ceratosaurus* after Ezcurra & Novas 2007: character 145, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Pl. 12 Fig. 16, 17, Tykoski 2005: character 143 and Smith et al. 2007: character 175,

Sinraptor dongi after Currie & Zhao 1993: Fig. 16, 17 and Smith et al. 2007: character 175; for character history see Ezcurra 2012).

180. Distal neural spines in posterior dorsals: subequal breath throughout the entire height or tapering dorsally (0); significantly expanded dorsally, fan-shaped (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 103; *Eoraptor lunensis, Eodromaeus murphi* and *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 568, *Panguraptor lufengensis* after You et al. 2014: Fig.1, character 137, *Ceratosaurus* after You et al. 2014: character 137, *Eustreptospondylus oxoniensis* and *Sinraptor dongi* after Smith et al. 2007: character 176; for character history see Ezcurra 2012).
181. Height of neural spines in dorsals (exclusive the last three vertebrae): more or less constant (0); increasing posteriorly (1) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 104; *Eoraptor lunensis* after Sereno, Martinez & Alcober 2012: Fig. 5 and 9, *Herrerasaurus ischigualastensis* after Novas (1994): Fig. 1, *Tawa hallae* after Nesbitt at al. 2009: Fig. 2, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 2, *Panguraptor lufengensis* after You et al. 2014: Fig.1, *Allosaurus fragilis* after Madsen 1976: 34, *Piatnitzkysaurus floresi* after Bonaparte 1986: Fig. 14, 15, 17, 18, *Sinraptor dongi* after Currie & Zhao 1993: 2058 and Fig. 15, 16 and 17A).
182. Hyposphene-hypantrum articulation in dorsal vertebrae: absent (0); present, hyposphene developed as a single sheet of bone (1); present, hyposphene wide, formed by the ventrally bowed medial parts of the postzygapophyses, and only connected by a thin horizontal lamina of bone (2) (after Hugi 2008, Unterrassner 2009 and Smith et al. 2007, modified from Hugi 2008: character 106 and 107, and Smith et al. 2007: character 173; *Eoraptor lunensis*, *Cryolophosaurus ellioti*, *"Syntarsus" kayentakatae*, *Coelophysis bauri*, *Ceratosaurus* and *Allosaurus fragilis*, *Eustreptospondylus oxoniensis*, *Piatnitzkysaurus floresi* and *Sinraptor dongi* after Smith et al. 2007: character 173; for character history see Ezcurra 2012).
183. Ventral keel in anterior dorsals: absent or very poorly developed (0); pronounced (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 109; *Eoraptor lunensis*, *Eodromaeus murphi* and *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 556, *Ceratosaurus* and *Sinraptor dongi* after Rauhut 2003: character 108, *Eustreptospondylus oxoniensis* after Smith et al. 2007: character 170; for character history see Ezcurra 2012).
184. Level of the parapophyses in posteriormost dorsals: on the same height as transverse processes (0); distinctly below transverse processes (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 110; *Eoraptor lunensis*, *Eodromaeus murphi*, *Cryolophosaurus ellioti* and *Allosaurus fragilis* after Ezcurra 2012: character 570, *Panguraptor lufengensis* after You et al. 2014: 239, *Ceratosaurus*, *Eustreptospondylus oxoniensis*, *Piatnitzkysaurus floresi* and *Sinraptor dongi* after Smith et al. 2007: character 179; for character history see Ezcurra 2012).
185. Lateral fossae in dorsal centra: absent (0); present in anterior dorsals («pectorals») (1); present in all dorsals (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 111; *Eoraptor lunensis*, *Cryolophosaurus ellioti*, *Ceratosaurus* and *Allosaurus fragilis*, *Eustreptospondylus oxoniensis*, *Piatnitzkysaurus floresi* and *Sinraptor dongi* after Smith et al. 2007: character 168, *Eodromaeus murphi* after Ezcurra 2012: character 539; for character history see Ezcurra 2012).
186. Fusion of sacral centra in adults: absent, or fused but sutures still visible (0); extensively fused to one another, all sutures obliterated (1) (after Hugi 2008 and

Unterrassner 2009, Hugi 2008: character 112; *Tawa hallae*, *Eodromaeus murphi*, *Cryolophosaurus ellioti* and *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 574, *Ceratosaurus* after Ezcurra & Cuny 2007: character 87, *Sinraptor dongi* after Currie & Zhao 1993: 2062; for character history see Ezcurra 2012).

187. Fusion of sacral ribs and ilia: absent throughout ontogeny (0); present in late ontogeny, ribs fuse to medial wall of ilia (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 113; *Eoraptor lunensis*, *Ceratosaurus* and *Allosaurus fragilis* after Ezcurra & Cuny 2007: character 88, *Piatnitzkysaurus floresi* and *Sinraptor dongi* after Holtz 2000: character 189, Frick theropod after Unterrassner 2009 and Hugi 2008: character 113, coding changed; for character history see Ezcurra & Cuny 2007).
188. Sacral ribs respectively modified transverse processes in adults: slender and well separated (0); very massive and strongly expanded (1); forming a more or less continuous sheet in ventral or dorsal view (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 115; *Eoraptor lunensis* after Sereno, Martinez & Alcober 2012: Fig. 54 and Martinez et al. 2011: character 57, *Eodromaeus murphi* after Martinez et al. 2011: 206 and character 57, *Cryolophosaurus ellioti*, *Piatnitzkysaurus floresi* and *Sinraptor dongi* after Smith et al. 2007: character 187, *Ceratosaurus* and *Allosaurus fragilis* after Gilmore 1920: Pl. 8, 9, 21, Ezcurra & Cuny 2007: character 89 and Ezcurra & Novas 2007: character 148; for character history see Ezcurra & Novas 2007).
189. Number of sacral vertebrae: two (0); three (1); four or five (2); more than five (3) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 116; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphi* and *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 577, *Ceratosaurus* after Gilmore 1920: Pl. 21 and Smith et al. 2007: character 182, *Eustreptospondylus oxoniensis* and *Sinraptor dongi* after Carrano et al. 2012: character 197, Frick theropod after Unterrassner 2009 and Hugi 2008: character 116, coding changed, compare Hugi 2008: 51, Fig. 5 and 6; for character history see Ezcurra 2012).
190. Sacral centra: rounded or keeled ventrally (0); flattened ventrally (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 119; *Cryolophosaurus ellioti* after Smith et al. 2007: 398, Fig. 13A to 13C, *Ceratosaurus, Allosaurus fragilis*, *Piatnitzkysaurus floresi* and *Sinraptor dongi* after Rauhut 2003: character 114, *Eustreptospondylus oxoniensis* after Sadleir et al. Pl. 13-15; for character history see Rauhut 2003).
191. Diameter of mid-sacral centra with respect to posterior dorsals and anterior caudals: approximately the same (0); substantially smaller (1); substantially larger (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 120; *Eoraptor lunensis*, *Ceratosaurus and Allosaurus fragilis* after Tykoski 2005: character 149, *Cryolophosaurus ellioti* after Smith et al. 2007: Fig. 12G, 12I, 13A, 13C, 13E and 13G, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Pl. 13.7, 13.8, 14.8, 16.3, 16.6,; for character history see Tykoski 2005).
192. Pleurocoels in sacral vertebrae: absent (0); present with at least one fossa (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 121; *Cryolophosaurus ellioti* after Smith et al. 2007: 398, Fig. 13B, *Ceratosaurus, Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 33, *Piatnitzkysaurus floresi* and *Sinraptor dongi* after Carrano et al. 2012: character 196, *Allosaurus fragilis* after Gilmore 1920: 43 and Carrano 2012: character 196; for character history see Rauhut 2003).

193. Ventral surface of anterior caudals: smooth or weakly grooved longitudinally (0); at least some vertebrae with narrow, sharply defined, longitudinal, ventral groove (1) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 122 and 123; *Eoraptor lunensis*, *Eodromaeus murphi* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 611, *Allosaurus fragilis* after Rauhut 2003: 87, Madsen 1976: Fig. 8A and Ezcurra 2012: character 611, *Ceratosaurus* after Gilmore 1920: Pl. 22, Fig. 2 and Madsen 1976: Fig. 8B, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 34 and character 193 of Holtz 2000, *Sinraptor dongi* after Ezcurra & Novas 2007: character 150; for character history see Ezcurra 2012).
194. Number of caudal vertebrae: 41 or more (0); less than 41 (1); less than 36 (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 124; *Eodromaeus murphi* and *Allosaurus fragilis* after Ezcurra 2012: character 599, *Ceratosaurus* and *Sinraptor dongi* after Smith et al. 2007: character 189; for character history see Ezcurra 2012).
195. Vertical orientation of anterior caudal transverse processes in respect to the longitudinal axis of the centra: lateral (0); dorsolateral (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 127; *Eoraptor lunensis* after Sereno, Martinez & Alcober 2012: Fig. 56 to 59, *Cryolophosaurus ellioti* after Smith et al. 2007: 400, Fig. 13E to 13G, *Ceratosaurus* after Madsen 1976: Fig. 21B and Madsen & Welles 2000: Pl. 7D to 7F, *Allosaurus fragilis* after Madsen 1976: Fig. 21A and Gilmore 1920: Fig. 28, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 34, Pl. 16 figs. 4, 5, Pl. 17 figs. 1, 2, Pl. 18 figs. 1, 2, *Piatnitzkysaurus floresi* after Bonaparte 1986: 271, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 18D).
196. Horizontal orientation of anterior caudal transverse processes in respect to the longitudinal axis of the centra: lateral (0); caudolateral (= back-swept) (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 128; *Eoraptor lunensis* after Sereno, Martinez & Alcober 2012: 133, *Dilophosaurus wetherilli* after Welles 1984: 125, Fig. 21 and 22, *Cryolophosaurus ellioti* after Smith et al. 2007: 400, Fig. 13E to 13G, *Ceratosaurus* after Gilmore 1920: Pl. 22, *Allosaurus fragilis* after Madsen 1976: 35, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Pl. 15 fig. 9, Pl. 16 figs. 1, 3, 6, 9, *Piatnitzkysaurus floresi* after Bonaparte 1986: 271, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 18C).
197. Length of zygapophyses of anterior caudal vertebrae: prezygapophyses and postzygapophyses short, not overlapping the cranial or caudal centrum face (0); prezygapophyses and postzygapophyses elongated, overlapping the centrum faces (1); only prezygapophyses elongated (2) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 129; *Eoraptor lunensis* after Sereno, Martinez & Alcober 2012: 132, Fig. 55, 56, 58, 59, *Ceratosaurus* after Gilmore 1920: Pl. 22 Fig. 1 and Madsen 1976: Fig. 21B, *Allosaurus fragilis* after Madsen 1976: 21A, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 34, Pl. 16.1-16.3, *Sinraptor dongi* after Currie & Zhao 1993: Fig 18C).
198. Anterior process at base of chevrons: absent (0); small tubercles (1); large and projecting (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 131; *Eoraptor lunensis*, *Eodromaeus murphi*, *Cryolophosaurus ellioti* and *Allosaurus fragilis* from Ezcurra 2012: character 630, *Dilophosaurus wetherilli* after Welles 1984: 126, Fig. 24B and 24D, *Ceratosaurus* after Smith et al. 2007: character 199 and Ezcurra & Novas 2007: character 154; for character history see Ezcurra 2012).
199. Pleurocoels in caudals: absent (0); present (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 132; *Eoraptor lunensis*, *Dilophosaurus wetherilli*,

Cryolophosaurus ellioti, *"Syntarsus" kayentakatae*, *Coelophysis bauri*, *Coelophysis rhodesiensis* and *Ceratosaurus* after Smith et al. 2007: character 188, after Gilmore 1920: Pl. 22 Fig. 1 and Madsen 1976: 21B, *Allosaurus fragilis* after Gilmore 1920: Fig. 28, Madsen 1976: Pl. 29 to 33 and Carrano et al. 2012: character 204, *Eustreptospondylus oxoniensis*, *Piatnitzkysaurus floresi* and *Sinraptor dongi* after Carrano et al. 2012: character 204; for character history see Smith et al. 2007).

200. Maximum length to minimal breath ratio of scapular blade: < 9, scapula broad and relatively short (0); > 10, scapula narrow and long (1) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 168; *Eoraptor lunensis*, *Herrerasaurus ischigualastensis*, *Tawa hallae*, *Eodromaeus murphi*, *Liliensternus liliensterni*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 651, *Panguraptor lufengensis* after You et al. 2014: Tab. 1, ratio 7.82, *Ceratosaurus*, *Eustreptospondylus oxoniensis* and *Sinraptor dongi* after Carrano et al. 2012: character 223; for character history see Ezcurra 2012).
201. Distal end of scapular blade: distinctly expanded, fan-shaped (0); slightly expanded (1); not expanded (2) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 174; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphi*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 652, *Panguraptor lufengensis* after You et al. 2014: Fig. 2, *Ceratosaurus* after Madsen & Welles 2000: Pl. 20A, 20C, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 36, Fig. 15, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 20A; for character history see Ezcurra 2012).
202. Shape of anterodistal corner of scapular blade: rounded (0); acuminate (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 175; *Tawa hallae* after Nesbitt et al. 2009: Fig. 2B, *Panguraptor lufengensis* after You et al. 2014: Fig. 2, *Ceratosaurus* after Madsen & Welles 2000: Pl. 20A, 20C, *Allosaurus fragilis* and after Ezcurra 2012: character 653, *Sinraptor dongi* after Ezcurra & Novas 2007: character 156; for character history see Ezcurra 2012).
203. Posterior margin of scapular blade: concave, curves over full length posteriorly (0); nearly straight or partly slightly convex, curves only at distal tip posteriorly (1) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 252; *Eoraptor lunensis* after Martinez & Alcober 2012: Figs. 61, 62 and Tykoski 2005: character 165, *Tawa hallae*, *Eodromaeus murphi*, *Ceratosaurus*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 654, *Panguraptor lufengensis* after You et al. 2014: Fig. 1, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 20A; for character history see Ezcurra 2012)
204. Acromion process of scapula: clearly offset from scapular blade, protruding conspicuously dorsally (0); not offset, with gradual transition to scapular blade (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 170; *Eoraptor lunensis* after Sereno, Martinez & Alcober 2012: 62 and Tykoski 2005: character 166, *Tawa hallae*, *Eodromaeus murphi*, *Zupaysaurus rougieri* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 656, *Panguraptor lufengensis* after You et al. 2014: Fig. 2, *Ceratosaurus* and *Allosaurus fragilis* after Carrano et al. 2012: character 219, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: character 214 of Holtz 2000, *Sinraptor dongi* after Currie & Zhao 1993: 2065; for character history see Ezcurra 2012).
205. Anterior margin of scapulacoracoid at scapula-coracoid contact in adults: distinctly notched (0); continuous, uninterrupted (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 176; *Eoraptor lunensis* after Sereno, Martinez & Alcober

2012: Fig. 61 to 64, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 2, *Ceratosaurus* after Madsen & Welles 2000: Pl. 20A, 20C and Carrano et al. 2012: character 219, *Allosaurus fragilis* after Rauhut 2003: Fig. 33B and Carrano et al. 2012: character 219, *Sinraptor dongi* after Carrano et al. 2012: character 219, Frick theropod after Unterrassner 2009 and Hugi 2008: character 176, coding changed, compare Hugi 2008: Fig. 8 and Unterrassner 2009: Fig. 6 and 8, subadult; for character history see Nesbitt et al. 2009).

206. Shape of coracoid: higher (dorsoventrally) than long (anteroposteriorly) (0); longer than high (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 172; *Eodromaeus murphi*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 664 *Ceratosaurus* after Madsen & Welles 2000: Pl. 20A, 20C, *Sinraptor dongi* after Rauhut 2003: character137; for character history see Ezcurra 2012).
207. Distance between anterior end of glenoid and tip of posteroventral process of coracoid (= sternal process anterior to the glenoid): more than dorsoventral depth of glenoid (0); less than dorsoventral depth of glenoid (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 177; *Eoraptor lunensis*, *Eodromaeus murphi*, *Zupaysaurus rougieri*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 666, *Ceratosaurus* after Madsen & Welles 2000: Pl. 20A, 20C, Ezcurra 2006: character 163 and Ezcurra & Novas 2007: character 158; for character history see Ezcurra 2012).
208. Posteroventral process (= sternal process) of coracoid: rounded, not projected beyond posterior margin of glenoid fossa (0); tapering, projected little beyond posterior margin of glenoid fossa (1); tapering, projected strongly beyond posterior margin of glenoid fossa (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 178; *Eoraptor lunensis*, *Eodromaeus murphi*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 669, *Ceratosaurus* after Madsen & Welles 2000: Pl. 20A, 20C and Ezcurra & Novas 2007: character 159; for character history see Ezcurra 2012).
209. Shape of humerus in lateral view: sigmoidal (0); straight (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 183; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphy*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 673, *Ceratosaurus* after Rauhut 2003: character 143, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: character 235; for character history see Ezcurra 2012).
210. Outline of humeral head in proximal view: rectangular or oval (more than twice as broad transversely than anteroposteriorly) (0); approximately circular (less than twice as broad anteroposteriorly than transversely) (1) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 181; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphy*, *Cryolophosaurus ellioti*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 676, *Panguraptor lufengensis* after You et al. 2014: 240, *Ceratosaurus* after Rauhut 2003: character 140, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Fig. 16E; for character history see Ezcurra 2012).
211. Torsion of shaft between proximal and distal ends of humerus: absent (0); present (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 184; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphy*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 674, *Ceratosaurus* after

Ezcurra & Novas 2007: character 161, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: character 234 of Holtz 2000; for character history see Ezcurra 2012).

212. Distal surface of humeral condyles: rounded (0); flattened (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 179; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphy*, *Cryolophosaurus ellioti*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 697, *Ceratosaurus* after Madsen & Welles 2000: Fig. 3, *Eustreptospondylus oxoniensis* after Carrano et al. 2012: character 238; for character history see Ezcurra 2012).
213. Ratio of radius length to humerus length: 49.42% to 54.17% (0); 61.00% to 69.54% (1); 71.61% to 80.00% (2); 89.9% to 114.87% (3) (modified from Ezcurra 2012: character 708; Frick theropod: 72.73%; for character history see Ezcurra 2012).
214. Ratio of manual length (measured as the average length of digits I to III) to total length of humerus plus radius: 0.36 (0); 0.47 to 0.51 (1); 0.58 to 0.60 (2) (after Ezcurra 2012: character 724, Frick theropod: 0.39; for character history see Ezcurra 2012).
215. Composition of manus regarding the number of metacarpals and digits: five digits (0); four digits, fourth digit reduced (three-and-a-half fingers) (1); five or four metacarpals and three digits (2); three metacarpals and three digits (3) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 217; *Eoraptor lunensis* after Rauhut 2003: character 153 and Sereno, Martinez & Alcober 2012: Figs. 68, 70, 73 and 74, *Herrerasaurus ischigualastensis* after Rauhut 2003: character 153, *Tawa hallae* after Nesbitt et al. 2009: Fig. 2F, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 1G, *Panguraptor lufengensis* after You et al. 2014: 240 and 241, Figs. 1 and 4, *Ceratosaurus* after Gilmore 1920: Figs. 58, 60, 62, Pl. 30, Rauhut 2003: character 153 and Carrano & Choiniere 2016, *Allosaurus fragilis* after Gilmore 1920: Figs. 40, 45, Pl. 7 Fig. 3 and Rauhut 2003: character 153, *Sinraptor dongi* after Carrano et al. 2012: character 249; for character history see Rauhut 2003).
216. Large distal carpal, capping Mc I and parts of Mc II: absent (0); present (1) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 189; *Tawa hallae* after Nesbitt et al. 2009: 1531 and Fig. 2F, *Eodromaeus murphi* after Martinez at al. 2011: 207 and Fig. 1G, *Allosaurus fragilis* after Rauhut 2003: character 146; for character history see Rauhut 2003).
217. Distal carpal 5: present (0); absent (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 190; *Tawa hallae* and *Allosaurus fragilis* after Ezcurra 2012: character 723; for character history see Ezcurra 2012).
218. Length - width ratio of metacarpals I to III: < 2, metacarpus relatively short and broad (0); > 2.2, metacarpus elongated and slender (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 199; *Eoraptor lunensis* after Sereno, Martinez & Alcober 2012: Figs. 68, 70 to 74, *Tawa hallae* after Nesbitt et al. 2009: Fig. 2F, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 1G, *Panguraptor lufengensis* after You et al. 2014: Tab. 1, Fig. 4, *Ceratosaurus*, *Allosaurus fragilis* and *Sinraptor dongi* after Rauhut 2003: character 147; for character history see Rauhut 2003).
219. Extensor pits on dorsal surface of distal ends of metacarpals I to III: absent or shallow and symmetrical (0); deep, well-developed and asymmetrical (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 256; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphi* and *Allosaurus fragilis* after Ezcurra 2012: character

728, *Ceratosaurus* after Nesbitt et al. 2009: character 177, *Sinraptor dongi* after Smith et al. 2007: character 243; for character history see Ezcurra 2012).

220. Length of metacarpal I relative to its width: significantly longer than broad (0); very stout, approximately as broad as long (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 223; *Eoraptor lunensis*, *Ceratosaurus* and *Allosaurus fragilis* after Rauhut 2003: character 164, *Tawa hallae* after Nesbitt et al. 2009: Fig. 2, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 1G; for character history see Rauhut 2003).
221. Width of metacarpal I at middle of shaft versus total length of bone: ≤ 0.3 (0); 0.3 to 0.45 (1); > 0.45 (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 192; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphi* and *Allosaurus fragilis* after Ezcurra 2012: character 736, *Ceratosaurus* after Carrano & Choinree 2016: Fig. 5, 6 and You et al. 2014: character 178; for character history see Ezcurra 2012).
222. Distal end of metacarpal I: condyles more or less symmetrical proximodistally (0); condyles strongly asymmetrical, the medial condyle being positioned more proximally than the lateral one (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 201; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphi* and *Allosaurus fragilis* after Ezcurra 2012: character 738, *Panguraptor lufengensis* after You et al. 2014: character 181, *Ceratosaurus* after Rauhut 2003: character 149; for character history see Ezcurra 2012).
223. Metacarpal I shorter than phalanx I-1: absent (0); present (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 193; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphi* and *Allosaurus fragilis* after Ezcurra 2012: character 740; for character history see Ezcurra 2012).
224. Length of metacarpal I: ≥ 50% the length of metacarpal II (0), < 50% the length of metacarpal II (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 208; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphi* and *Allosaurus fragilis* after Ezcurra 2012: character 732; for character history see Ezcurra 2012).
225. Contact between metacarpal I and metacarpal II: confined to their bases (0), along proximal half of metacarpal II (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 200; *Eoraptor lunensis* and *Eodromaeus murphi* after Ezcurra 2012: character 735, *Allosaurus fragilis* and *Ceratosaurus* after Rauhut 2003: character 148; for character history see Ezcurra 2012).
226. Medial side of metacarpal II: expanded proximally (0); not expanded (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 202; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphi* and *Allosaurus fragilis* after Ezcurra 2012: character 752, *Ceratosaurus* and *Sinraptor dongi* after Rauhut 2003: character 150; for character history see Ezcurra 2012).
227. Strongly developed anterior lip proximal to the extensor pit on the distal end of metacarpals II and III: absent (0); present (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 191; *Eoraptor lunensis*, *Eodromaeus murphi* and *Allosaurus fragilis* after Ezcurra 2012: character 754, *Ceratosaurus* and *Sinraptor dongi* after Ezcurra 2006: character 174; for character history see Ezcurra 2012).
228. Metacarpal II in relation to metacarpal III: shorter (0); subequal or longer (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 194; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphi* and *Allosaurus fragilis* after Ezcurra 2012: character 751, *Panguraptor lufengensis* and *Ceratosaurus* after You et al. 2014:

character 182, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 20 B, C, F, G; for character history see Ezcurra 2012).

229. Width of shaft of metacarpal II compared to metacarpal III: subequal (0); considerably broader (metacarpal III less than 70 per cent of the width of metacarpal II) (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 203; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphi* and *Allosaurus fragilis* after Ezcurra 2012: character 760, *Panguraptor lufengensis* after You et al. 2014: 240, Fig. 4, *Ceratosaurus* after Smith et al. 2007: character 239 and Carrano & Choinree 2016: Fig. 7, 8, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 20 B, C, F, G and Smith et al. 2007: character 239; for character history see Ezcurra 2012).
230. Width of distal end of metacarpal II in relation to distal end of metacarpal III: smaller or subequal (0); larger (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 195; *Eoraptor lunensis*, *Eodromaeus murphi* and *Allosaurus fragilis* after Ezcurra 2012: character 753, *Panguraptor lufengensis* after You et al. 2014: 240, Fig. 4, *Ceratosaurus* after Gilmore 1920: Fig. 62 and Carrano & Choinree 2016: Fig. 7, 8, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 20 B, C, F, G; for character history see Ezcurra 2012).
231. Proximal outline of Mc III: subrectangular (0); triangular, apex dorsal (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 205; *Eodromaeus murphi* and *Allosaurus fragilis* after Ezcurra 2012: character 761, *Ceratosaurus* after Gilmore 1920: 105 and Carrano & Choinree 2016: Fig. 8 E, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 20 H; for character history see Ezcurra 2012).
232. Shaft of metacarpal III: straight (0); bowed laterally (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 206; *Eoraptor lunensis*, *Eodromaeus murphi* and *Allosaurus fragilis* after Ezcurra 2012: character 759, *Panguraptor lufengensis* after You et al. 2014: 240, Fig. 4, *Ceratosaurus* after Gilmore 1920: Fig. 62 and Carrano & Choinree 2016: Fig. 8 A-D, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 20 F, G; for character history see Ezcurra 2012).
233. Shaft of metacarpal IV: subequal in width to that of metacarpal II (0), significantly narrower than that of metacarpal II (1), metacarpal IV absent (2) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 196; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphi* and *Allosaurus fragilis* after Ezcurra 2012: character 766, *Panguraptor lufengensis* after You et al. 2014: 240, Tab. 1, Fig. 4, *Ceratosaurus* after Carrano & Choinree 2016: Fig. 7 and 9 and Ezcurra & Novas 2007: character 176, *Sinraptor dongi* after Ezcurra & Novas 2007: character 176; for character history see Ezcurra 2012).
234. Length of metacarpal IV in percentage of metacarpal III length: 27.59% (0), 53.23 to 59.13% (1), 65.14 to 76.19 (2), 88.58% (after Ezcurra 2012: character 765; *Panguraptor lufengensis* after You et al. 2014: Tab. 1, Fig. 4, 64.71%, *Ceratosaurus* after Gilmore 1920: Fig. 62, 67.31%, *Sinraptor dongi* after Currie & Zhao 1993: 2067 and Fig. 20 G, 44.54% Frick theropod: 75% ; for character history see Ezcurra 2012).
235. Position of metacarpal IV: lateral to metacarpals I to III (0), palmar to metacarpals I to III (1) (after Ezcurra 2012: character 767; *Herrerasaurus ischigualastensis*, *Dilophosaurus wetherilli*, *"Syntarsus" kayentakatae*, *Coelophysis rhodesiensis* and Frick theropod after Hugi: character 197, *Panguraptor lufengensis* after You et al. 2014: Fig. 4, *Ceratosaurus* after Gilmore 1920: Fig. 60 and Ezcurra 2006: character 191, *Allosaurus fragilis* after Ezcurra 2006: character 191; for character history see Ezcurra 2012).

236. Metacarpal V: present, well developed, with phalanges (0); present, reduced to vestigial, lacking phalanges (1); absent (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 198; *Eoraptor lunensis* and *Eodromaeus murphi* after Ezcurra 2012: character 773, *Panguraptor lufengensis* after You et al. 2014: Fig. 4, *Ceratosaurus* after Gilmore 1920: Fig. 60, 62 and Ezcurra & Novas 2007: character 179, *Allosaurus fragilis* after Gilmore 1920: Fig. 40 and Ezcurra & Novas 2007: character 179; for character history see Ezcurra 2012).
237. First phalanx of manual digit I: not the longest non-ungual phalanx of the manus (0); longest non-ungual phalanx of the manus (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 211; *Eoraptor lunensis* after Sereno, Martinez & Alcober 2012: Fig. 70, 73, 74 and Tab. 8, *Tawa hallae* after Nesbitt et al. 2009: character 180, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 1G, *Ceratosaurus* after You et al. 2014: character 180, *Allosaurus fragilis* after Gilmore 1920: Fig. 40 and Madsen 1976: Pl. 45, *Sinraptor dongi* after Currie & Zhao 1993: 2067 and Fig. 20; for character history see Nesbitt et al. 2009).
238. Distal end of first phalanx of manual digit I ventrolaterally twisted around the transversal axis of the bone in relation to its proximal end: absent (0); present (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 212; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphi* and *Allosaurus fragilis* after Ezcurra 2012: character 745; for character history see Ezcurra 2012).
239. Manual digit II longer than digit III: absent (0); present (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 213; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphi* and *Allosaurus fragilis* after Ezcurra 2012: character 755, *Panguraptor lufengensis* after You et al. 2014: Fig. 4, Tab. 1; for character history see Ezcurra 2012).
240. Number of phalanges in digit IV: more than one (0), one (1), none (2) (modified from Ezcurra 2012: character 768; *Eoraptor lunensis* after Sereno, Martinez & Alcober 2012: 149, estimated, *Herrerasaurus ischigualastensis* after Sereno 1994: 410, *Dilophosaurus wetherilli* after Rauhut 2003: Fig. 36, *Procompsognathus triassicus*, *Coelophysis bauri*, *Coelophysis rhodesiensis*, *Ceratosaurus* and *Allosaurus fragilis* after Rauhut 2003: character 153, *"Syntarsus" kayentakatae* after Tykoski 1998: 82 and 83, *Panguraptor lufengensis* after You et al. 2014: 240 and 241, Frick theropod after Hugi 2008: Fig. 3 and Unterrassner 2009: Fig. 11a; for character history see Ezcurra 2012).
241. Penultimate phalanx of second manual digit: subequal or shorter than first phalanx (0); longer than first phalanx (1) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 218, *Eoraptor lunensis* and *Allosaurus fragilis* after Ezcurra & Novas 2007: character 173; *Tawa hallae* after Nesbitt et al. 2009: Fig. 2F, *Eodromaeus murphi* after Martinez et al. 2012: Fig. 1G, *Panguraptor lufengensis* after You et al. 2014: Tab. 1; for character history see Ezcurra & Novas 2007).
242. Penultimate phalanx of third manual digit: as long as, or shorter than, more proximal phalanges (0); longer than each of the more proximal phalanges (1); longer than both proximal phalanges taken together (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 219; *Eoraptor lunensis* after Rauhut 2003: character 160 and Sereno, Martinez & Alcober 2012: Fig. 70, 73 and 74, *Tawa hallae* after Nesbitt et al. 2009: Fig. 2F, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 1G and Tab. S1, *Panguraptor lufengensis* after You et al. 2014: Fig. 4

and Tab. 1, *Allosaurus fragilis* after Rauhut 2003: character 160 and Gilmore 1920: Figs. 40 and 45; for character history see Rauhut 2003).

243. Anterior lip at proximal articular end of manual unguals: absent (0); present (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 221; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphi*, *Zupaysaurus rougieri* and *Allosaurus fragilis* after Ezcurra 2012: character 748, *Panguraptor lufengensis* after You et al. 2014: Fig. 4; *Sinraptor dongi* after Smith et al. 2007: character 250; for character history see Ezcurra 2012).
244. Flexor tubercle on manual unguals: less than half the height of the articular facet (0); more than half the height of the articular facet (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 222; *Eoraptor lunensis*, *Tawa hallae*, *Zupaysaurus rougieri* and *Allosaurus fragilis* after Ezcurra 2012: character 749, *Panguraptor lufengensis* after You et al. 2014: Fig. 4, *Sinraptor dongi* after Smith et al. 2007: character 250; for character history see Ezcurra 2012).
245. Ungual phalanx of digit II: longest of the manus (0); equal in length to the ungual of digit I (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 216; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphi* and *Allosaurus fragilis* after Ezcurra 2012: character 758; for character history see Ezcurra 2012).
246. Unguals of manual digits II and III: poorly curved (0); trenchant, i.e. strongly curved, tips of claws below level of flexor tubercle (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 215; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphi*, *Zupaysaurus rougieri* and *Allosaurus fragilis* after Ezcurra 2012: character 757, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 20X and Smith et al. 2007: character 248, Frick theropod, coding changed; for character history see Ezcurra 2012).
247. Fusion of bones in pelvic girdle: separate elements throughout ontogeny (0); fused together by late ontogeny (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 133; *Tawa hallae*, *Eodromaeus murphi*, *Cryolophosaurus ellioti* and *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 575, *Ceratosaurus* and *Sinraptor dongi* after Carrano et al. 2012: character 261; for character history see Ezcurra 2012).
248. Supraacetabular crest of ilium: present as a weakly developed ridge (0); present as a laterally well-developed raised shelf (1); flares lateroventrally to form a hood-like overhang that hides craniodorsal half of acetabulum in lateral view (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 134; *Eoraptor lunensis* after Tykoski 2005: 205 and 206, character 195, *Tawa hallae*, *Eodromaeus murphy*, *Cryolophosaurus ellioti* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 800, *Ceratosaurus* after Ezcurra & Novas 2007: character 188 and Carrano et al. 2012: character 267, *Allosaurus fragilis* after Gilmore 1920: Pl. 10 Fig. 2 and Ezcurra 2012: character 800, *Eustreptospondylus oxoniensis* after Carrano et al. 2012: character 267, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 21A and Ezcurra & Novas 2007: character 188; for character history see Ezcurra 2012).
249. Lateral surface of caudal end of ilium: smooth (0); distinct rim for m. iliofibularis (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 138; *Eoraptor lunensis*, *"Syntharsus" kayentakatae* and *Dilophosaurus wetherilli after* Ezcurra 2006: character 200, *Tawa hallae* after Nesbitt et al. 2009: Fig. 2C, *Ceratosaurus* after Gilmore 1920: Pl. 23 and Ezcurra & Novas 2007: character 186, *Allosaurus fragilis* after Gilmore 1920: Pl. 10 Fig. 2 and Ezcurra & Novas 2007: character 186, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Pl. 20.1 and Tykoski 2005:

character 199, *Sinraptor dongi* after Currie & Zhao 1993: 2067, Fig. 21 A and Ezcurra & Novas 2007: character 186, *Piatnitzkysaurus floresi* after Smith et al. 2007: character 263; for character history see Hugi 2008).

250. Dorsal margin of iliac blade in lateral view: more or less straight/angular (0); slightly convex and obviously curved (1); strongly convex (2) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 139 and Tykoski 2005: character 191; *Eoraptor lunensis* after Sereno et al. 2012:152, Fig. 82A and Tykoski 2005: character 191, *Eodromaeus murphi* after Ezcurra 2012: character 775, *Dilophosaurus wetherilli* after Tykoski 2005: Fig. 67E, 67F, character 191 and Ezcurra & Cuny 2007: Fig. 5F, *Liliensternus liliensterni* after Tykoski 2005: Fig. 69C, character 191, *Cryolophosaurus ellioti* after Smith et al. 2007: 402, Fig. 15A, *Ceratosaurus* after Gilmore 1920: Fig. 63, Pl. 23, Tykoski 2005: character 191 and Carrano et al. 2012: character 277, *Allosaurus fragilis* after Gilmore 1920: Pl. 10 Fig. 2, Tykoski 2005: character 191, Ezcurra & Novas 2007: character 180 and Carrano et al. 2012: character 277, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 39, Pl. 21 Fig. 1, 2, Tykoski 2005: character 191 and Carrano et al. 2012: charcter 277, *Piatnitzkysaurus floresi* after Bonaparte 1979: Fig. 22 and Ezcurra 2012: character 775, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 21A,B, Ezcurra & Novas 2007: character 180 and Carrano et al. 2012: character 277; for character history see Ezcurra 2012).

251. Pronounced ventral hook on anterior expansion of ilium: absent (0); present (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 141; *Eoraptor lunensis* after Ezcurra & Cuny 2007: character 106, *Tawa hallae* after Nesbitt et al. 2009: Fig. 2C, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 2A, *Ceratosaurus* after Rauhut 2003: character 168, *Allosaurus fragilis* after Gilmore 1920: Fig. 46, Pl. 10 Fig. 2, Madsen 1976: Pl. 46, 47, Ezcurra & Cuny 2007: Fig. 5G and Rauhut 2003: character 168, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Pl. 20 Fig. 1, 2, *Sinraptor dongi* after Currie & Zhao 1993: Fig. 21 A, B and Rauhut 2003: character 168; for character history see Ezcurra & Cuny 2007).

252. Continuity of supraacetabular crest and ventrolateral margin of postacetabular blade (= lateral brevis shelf): absent, not continuous (0); present, continuous as a weakly developed ridge (1); present, continuous as a well developed ridge, with non-distinct separation between both structures (2) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 145; *Eoraptor lunensis*, *Ceratosaurus, Allosaurus fragilis* and *Sinraptor dongi* after Ezcurra & Novas 2007: character 189, *Tawa hallae* after Nesbitt et al. 2009: 1531, Fig. 2C, *Cryolophosaurus ellioti* after Smith et al. 2007: 402, Fig. 15A, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 40, Pl. 20.1; for character history see Ezcurra & Cuny 2007).

253. Shape of brevis fossa: narrow, with subparallel margins or posteriorly slightly expanded (0); posteriorly strongly expanded (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 147; *Eoraptor lunensis*, *Eodromaeus murphi*, *Cryolophosaurus ellioti*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 804, *Ceratosaurus* and *Sinraptor dongi* after Ezcurra & Novas 2007: character 190, *Eustreptospondylus oxoniensis* after Smith et al. 2007: character 270; for character history see Ezcurra 2012).

254. Articulation facet of pubic peduncle of ilium: facing more ventrally than anteriorly, without pronounced kink between pubic peduncle and praeacetabular process of ilium (0); facing more anteriorly than ventrally, with pronounced kink between pubic

peduncle and praeacetabular process of ilium (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 148; *Eoraptor lunensis*, *Segisaurus halli*, *Ceratosaurus* and *Allosaurus fragilis* after Ezcurra & Novas 2007: character 193, *Tawa hallae* after Nesbitt et al. 2009: Fig. 2, *Panguraptor lufengensis* after You et al. 2014: Fig. 1, *Eustreptospondylus oxoniensis, Piatnitzkysaurus floresi* and *Sinraptor dongi* after Carrano et al. 2012: character 268; for character history see Ezcurra & Novas 2007).

255. Obturator notch or foramen of ischium: absent (0); present (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 152; *Eoraptor lunensis* and *Allosaurus fragilis* after Ezcurra & Cuny 2007: character 110, *Eodromaeus murphi* after Martinez et al. 2012: Fig. 2, *Ceratosaurus* after Ezcurra 2012: character 859, *Sinraptor dongi* after Currie & Zhao 1993: 2069, Fig. 21G, J; for character history see Ezcurra 2012).
256. Ventral notch behind obturator process or flange on ischium: absent (0); present (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 153; *Eoraptor lunensis*, *Cryolophosaurus ellioti*, *Ceratosaurus, Eustreptospondylus oxoniensis, Piatnitzkysaurus floresi* and *Sinraptor dongi* after Smith et al. 2007: character 289, *Eodromaeus murphi* after Martinez et al. 2012: Fig. 2, *Allosaurus fragilis* after Tykoski 2005: Fig. 73A and 73B; for character history see Smith et al. 2007).
257. Ischium length in relation to pubis length: at least three-quarters (0); two-thirds or less (1); less than three-quarters and more than two-thirds (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 155; *Eoraptor lunensis*, *Eodromaeus murphi*, *Liliensternus liliensterni* and *Allosaurus fragilis* after Ezcurra 2012: character 851, *Ceratosaurus*, *Eustreptospondylus oxoniensis, Piatnitzkysaurus floresi* and *Sinraptor dongi* after Smith et al. 2007: character 284 and Holtz 2000, Sadleir et al. 2008: character 320 of Holtz 2000; for character history see Ezcurra 2012).
258. Distal end of ischium: unexpanded or slightly expanded (0); strongly expanded, anteroposterior length more than twice the ischial shaft diameter, distal tip of ischium forms a smaller boot than that of the pubis (1) strongly expanded, anteroposterior length more than twice the ischial shaft diameter, distal tip of ischium forms a larger boot than that of the pubis (2) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 157; *Eoraptor lunensis* after Sereno, Martinez & Alcober 2012: Fig. 80 to 82, *Tawa hallae* after Nesbitt et al. 2009: Fig. 2, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 2, *Cryolophosaurus ellioti* after Smith et al. 2007: 404, Fig. 15, *Panguraptor lufengensis* after You et al. 2014: Fig. 1, *Ceratosaurus* after Gilmore 1920: Pl. 23, *Allosaurus fragilis* after Madsen 1976: Pl. 48 and 49, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: 42, Fig. 18, *Piatnitzkysaurus floresi* after Smith et al. 2007: character 290, *Sinraptor dongi* after Rauhut 2003: character 193 and Currie & Zhao 1993: Fig. 21D, J; for character history see Smith et al. 2007).
259. Shape of pubic shaft in lateral view: more or less straight, margins may be weakly curved (0); distinctly bowed posteriorly (1) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 158; *Eoraptor lunensis* after Sereno, Martinez & Alcober 2012: Fig. 82, *Tawa hallae* after Nesbitt et al. 2009: Fig. 2H, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 2H, *Dilophosaurus wetherilli* and *Liliensternus liliensterni* after Tykoski 2005: character 207, *Cryolophosaurus ellioti* after Smith et al. 2007: 403, Fig. 15A, *Procompsognathus triassicus* after Ezcurra & Novas 2007: character 196, *Ceratosaurus* after Gilmore 1920: Pl. 23 and

Tykoski 2005: character 207, *Allosaurus fragilis* after Madsen 1976: Pl. 48 and 49; for character history see Ezcurra & Novas 2007). *Eustreptospondylus oxoniensis, Piatnitzkysaurus floresi* and *Sinraptor dongi* after Carrano et al. 2012: character 282, and after Sadleir et al. 2008: Fig. 17B, D, Bonaparte 1979: Fig. 1, Currie & Zhao 1993: 2069, Fig. 21 D, F

260. Distal expansion of pubis: absent or weakly developed (0); strongly developed, forming a pubis boot (1) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 159; *Eoraptor lunensis* after Sereno, Martinez & Alcober 2012: Fig. 82 and Ezcurra & Novas 2007: character 198, *Herrerasaurus ischigualastensis* after Tykoski 2005: Fig. 72C, *Tawa hallae* after Nesbitt et al. 2009: Fig. 2H and character 207, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 2H, *Ceratosaurus* after Gilmore 1920: Fig. 63 Pl. 23, 27 above, 29, 30 and Ezcurra & Novas 2007: character 198, *Allosaurus fragilis* after Gilmore 1920: Fig. 47, Pl. 11, 13 and Ezcurra & Novas 2007: character 198, *Eustreptospondylus oxoniensis, Piatnitzkysaurus floresi* and *Sinraptor dongi* after Smith et al. 2007: character 280, and after Sadleir et al. 2008: Fig. 17G, Bonaparte 1979: Fig. 1, Currie & Zhao 1993: 2069, Fig. 21 D, F; for character history see Ezcurra & Novas 2007).
261. Anteroposterior expansion of distal end of pubis: absent (0); present, anteriorly and posteriorly developed (1); mainly posteriorly developed (2) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 162; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphi*, *Liliensternus* liliensterni, *Coelophysis rhodesiensis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 845, *Herrerasaurus ischigualastensis* after Tykoski 2005: 72C, *Coelophysis bauri* after Hugi 2008: character 166 and Rinehart et al. 2009: 69, Fig. 76A, 78, *Dilophosaurus wetherilli* after Welles 1984: Fig. 31A, *Ceratosaurus* after Gilmore 1920: Fig. 63 Pl. 23, 27 above, 29, 30, *Allosaurus fragilis* after Tykoski 2005: Fig. 73A, 73B and Ezcurra 2012: character 845, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Fig. 17G, *Sinraptor dongi* after Currie & Zhao 1993: 2069, Fig. 21 D, F; for character history see Ezcurra 2012).
262. Pubic apron: completely closed, with or without distal notch (0); with medial fenestra (1) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 164; *Eoraptor lunensis*, *Eodromaeus murphi* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 842, *Dilophosaurus wetherilli* after Welles 1984: Fig. 31A, *Ceratosaurus* and *Sinraptor dongi* after Smith et al. 2007: character 279 and Rauhut 2003: character 181, *Allosaurus fragilis* after Gilmore 1920: Pl. 11 Fig. 1, Tykoski 2005: Fig. 73C and Ezcurra 2012: character 842; for character history see Ezcurra 2012).
263. Obturator foramen of pubis: completely enclosed (0); open ventrally (1); absent (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 165; *Eoraptor lunensis* after Sereno et al. 2012: 155, Fig. 78, 82A and Ezcurra 2012: character 830, *Eodromaeus murphi* after Ezcurra 2012: character 830, *Dilophosaurus wetherilli* after Smith et al. 2007: character 279 and Tykoski 2005: Fig. 75C, 76C, *Cryolophosaurus ellioti* after Smith et al. 2007: character 279, Fig. 15A, *Ceratosaurus* after Gilmore 1920: Fig. 63 Pl. 23, 27 above, Tykoski 2005: Fig. 74A, *Allosaurus fragilis* after Gilmore 1920: Pl. 11 Fig. 2 and Ezcurra 2012: character 830, *Piatnitzkysaurus floresi* after Ezcurra 2012: character 830 and Smith et al 2007: character 279, *Eustreptospondylus oxoniensis* and *Sinraptor dongi* after Smith et al. 2007: character 279; for character history see Ezcurra 2012).

264. Pubic fenestra below obturator foramen: absent (0); present, enclosed (1); present, opened ventrally (2); present, intersect with obturator foramen to form obturator notch (3) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 166; *Eoraptor lunensis* after Ezcurra 2012: character 833, Sereno et al. 2012: 155, Fig. 78, 82A, *Segisaurus halli* after Hugi 2008: character 166 and Carrano et al. 2005: 839, Fig. 7A, *Coelophysis bauri* after after Hugi 2008: character 166 and Rinehart et al. 2009: Fig. 78, *Cryolophosaurus ellioti* and *Allosaurus fragilis* after Ezcurra 2012: character 833, Tykoski 2005: character 205, Fig. 73, *Ceratosaurus* after Gilmore 1920: Fig. 63 Pl. 23, 27 above and Tykoski 2005: 74A, *Eustreptospondylus oxoniensis* after Sadleir at al. 2008: character 308 of Holtz 2000, Smith et al. 2007: character 277 and Tykoski 2005: character 205, *Sinraptor dongi* after Smith et al. 2007: character 277 and Currie & Zhao 1993: Fig. 21D, F; for character history see Ezcurra 2012).
265. Ratio of femur to humerus: more than 2.5 (0); between 1.2 and 2.2 (1); less than 1 (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 180; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphy, Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: deduced from character 672, *Ceratosaurus* after Gilmore 1920, *Eustreptospondylus oxoniensis* after Sadleir at al. 2008:Tab. 1 and 3: value 2.156; for character history see Ezcurra 2012).
266. Shape of femoral anterior trochanter (lesser trochanter = cranial trochanter): absent or poorly developed, low ridge or tuberosity (0); spike-like or pyramidal prominence (1); anteroposteriorly broadened, wing like, aliform (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 227; *Eoraptor lunensis*, *Cryolophosaurus ellioti*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 901, *Tawa hallae* after Nesbitt et al. 2009: Fig. 2I, *Eodromaeus murphi* after Martinez et al. 2011: 207, Figs. 2K and 2L, *Panguraptor lufengensis* after You et al. 2014: 241, Fig. 1, *Ceratosaurus* after Tykoski 2005: character 222, Fig. 1 and Smith et al. 2007: character 297, *Eustreptospondylus oxoniensis* and *Sinraptor dongi* after Smith et al. 2007: character 297; for character history see Ezcurra 2012).
267. Placement of anterior trochanter: at distal end of femoral head (0); more proximally placed, but below the greater trochanter (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 228; *Eoraptor lunensis* after Sereno, Martinez & Alcober 2012: Figs. 78 and 86, *Tawa hallae* after Nesbitt et al. 2009: Fig. 2I, *Eodromaeus murphi* after Martinez et al. 2011: 207, Figs. 2K and 2L, *Cryolophosaurus ellioti* after Smith et al. 2007: 404, Figs. 16A, 17A, 17C and 17D, *Panguraptor lufengensis* after You et al. 2014: 241, Fig. 1, *Ceratosaurus, Allosaurus fragilis, Piatnitzkysaurus floresi* and *Sinraptor dongi* after Rauhut 2003: character 199, *Eustreptospondylus oxoniensis* after Sadleir at al. 2008: 43, Fig. 19B; for character history see Rauhut 2003).
268. Tibiofibular crest of posterodistal femur in late ontogeny: smoothly continuous with lateral fibular condyle (0); sharply demarcated from lateral fibular condyle by a sulcus or concavity (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 229;, *Eoraptor lunensis* and *Sinraptor dongi* after Ezcurra & Novas 2007: character 216 and Sereno et al. 2012: 159, Curry & Zhao 1993: Fig. 22D, E, *Tawa hallae*, *Eodromaeus murphi*, *Zupaysaurus rougieri*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 929, *Cryolophosaurus ellioti* after Smith et al. 2007: 404, Figs. 16D and 17D, Fig. 1, *Ceratosaurus* after Tykoski

2005: character 227 and Gilmore 1920: Fig. 64C; for character history see Ezcurra 2012).

269. Femoral popliteal fossa in adults: smooth (0); transversed by infrapopliteal ridge between tibial condyle and tibiofibular crest (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 230; *Tawa hallae*, *Eodromaeus murphi*, *Cryolophosaurus ellioti*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 922, *Ceratosaurus* after Tykoski 2005: character 228, *Sinraptor dongi* after Ezcurra & Novas 2007: character 217; for character history see Ezcurra 2012).
270. Medial epicondyle (= mediodistal crest) on anteromedial surface of distal femur in adults: absent or weak (0); present as ridge (1); present, hypertrophied and flange-like (2) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 231; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphi*, *Cryolophosaurus ellioti*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 915, *Zupaysaurus rougieri*, *Liliensternus liliensterni*, *"Syntarsus" kayentakatae* and *Eustreptospondylus oxoniensis* after Tykoski 2005: character 225, *Ceratosaurus* after Gilmore 1920: Fig. 64, *Sinraptor dongi* after Currie & Zhao 1993: 2069, Fig. 22B; for character history see Ezcurra 2012).
271. Broad groove on anterior surface of distal femur: absent or poorly developed (0); well developed and bound medially by an expanded medial lamella (1) (after Smith et al. 2007: character 302; *Tawa hallae* after Nesbitt et al. 2009: Fig. 2I, *Eodromaeus murphi* after Martinez et al. 2011: Figs. 2K and 2M, *Segisaurus halli* and *Allosaurus fragilis* after Rauhut 2003: character 202; for character history see Smith et al. 2007).
272. Proximal tuberosity or crest on lateral side of tibia for connection with fibula: absent (0); present, extending from the proximal articular surface distally (1); present, clearly separated from proximal articular surface (2) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 233; *Tawa hallae*, *Eodromaeus murphi* and *Allosaurus fragilis* after Ezcurra 2012: character 947, *Zupaysaurus rougieri, Ceratosaurus, Eustreptospondylus oxoniensis* and *Sinraptor dongi* after Smith et al. 2007: character 308, *Piatnitzkysaurus floresi* after Ezcurra 2012: character 947 and Smith et al. 2007: character 308; for character history see Ezcurra 2012).
273. Shape of lateral malleolus of tibia: lobe-like (0); polygonal, with marked angles (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 234; *Tawa hallae*, *Eodromaeus murphi*, *Cryolophosaurus ellioti*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 955, *Ceratosaurus* after Ezcura & Novas 2007: character 225, *Eustreptospondylus oxoniensis* and *Sinraptor dongi* after Smith et al. 2007: character 309; for character history see Ezcurra 2012).
274. Distal articular surface of tibia: subrectangular to round in outline and slightly wider transversely than anteroposteriorly (0); subrectangular with small lateral process (1); anteroposteriorly narrow triangular in outline and strongly mediolaterally expanded (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 236; *Eoraptor lunensis*, *Eodromaeus murphi*, *Zupaysaurus rougieri* and *Cryolophosaurus ellioti* after Ezcurra 2012: character 966, *Ceratosaurus*, *Allosaurus fragilis* and *Sinraptor dongi* after Rauhut 2003: character 208, *Eustreptospondylus oxoniensis* after Sadlir et al. 2008: Fig. 20A-D and Smith et al. 2007: character 311, *Piatnitzkysaurus floresi* after Ezcurra 2012: character 966,

Rauhut 2003: Fig. 45C, character 208 and Smith et al. 2007: character 311; for character history see Ezcurra 2012).

275. Facet for the reception of the ascending process of the astragalus on the tibia: quadrangular, anteroposteriorly and mediolaterally equally expanded (0); subtriangular, not well expanded anteriorly (1); subrectangular, not well expanded anteriorly (2); not differentiated, nearly absent (3) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 237; *Eoraptor lunensis*, *Eodromaeus murphi*, *Zupaysaurus rougieri*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 958, *Coelophysis bauri* after Ezcurra & Novas 2007: character 227 and Ezcurra 2012: character 958, *Ceratosaurus* and *Sinraptor dongi* after Ezcurra & Novas 2007: character 227; for character history see Ezcurra 2012).

276. Proximal ridge on medial side of fibula that runs anterodistally from the posteroproximal end: absent (0); present (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 238; *Tawa hallae* after Nesbit et al. 2009: character 264, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 2I, *Segisaurus halli*, *Ceratosaurus*, *Allosaurus fragilis*, *Piatnitzkysaurus floresi* and *Sinraptor dongi* after Rauhut 2003: character 209, *Eustreptospondylus oxoniensis* after Smith et al. 2007: character 314; for character history see Nesbit et al. 2009).

277. Astragalus and calcaneum fusion: absent, separate elements throughout ontogeny (0); present in later stages of ontogeny (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 240; *Eoraptor lunensis* after Sereno, Martinez & Alcober 2012: Figs. 87 and 88, *Tawa hallae* after Nesbitt et al. 2009: 1532, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 2J, *Zupaysaurus rougieri*, *Ceratosaurus* and *Allosaurus fragilis* after Ezcurra & Novas 2007: character 237, *Cryolophosaurus ellioti* after Smith et al. 2007: 406, character 327, *Sinraptor dongi* after Carrono et al. 2012: character 339 and Smith et al. 2007: character 327; for character history see Ezcurra & Novas 2007).

278. Height of ascending process of astragalus in relation to height of astragalar body measured immediately below ascending process in adults: lower (0); subequal or higher (1) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 241; *Eoraptor lunensis* after Sereno, Martinez & Alcober 2012: Fig. 88, *Tawa hallae*, *Zupaysaurus rougieri*, *Dilophosaurus wetherilli*, *Cryolophosaurus ellioti* and *Allosaurus fragilis* after Ezcurra 2012: character 994, *Ceratosaurus*, *Eustreptospondylus oxoniensis* and *Sinraptor dongi* after Carrano et al. 2012: character 333, Smith et al 2007: character 321, and after Sadleir et al. 2008: Fig. 21A,B; for character history see Ezcurra 2012).

279. Deep fossa on anterolateral surface of ascending process of astragalus: absent (0); present (1) (after Hugi 2008 and Unterrassner 2009, modified from Hugi 2008: character 243; *Zupaysaurus rougieri*, *Cryolophosaurus ellioti* and *Allosaurus fragilis* after Ezcurra 2012: character 998, *Ceratosaurus* and *Sinraptor dongi* after Ezcurra & Novas 2007: character 240, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008: Fig. 21A, C; for character history see Ezcurra 2012).

280. Horizontal groove across anterior surface of astragalar condyles: absent (0); present (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 244; *Zupaysaurus rougieri* and *Cryolophosaurus ellioti* and after Ezcurra 2012: character 1001, *Allosaurus fragilis*, *Ceratosaurus* and *Sinraptor dongi* after Rauhut 2003: character 218, *Eustreptospondylus oxoniensis* after Sadleir et al. 2008:47, character 365 of Holtz 2000; for character history see Ezcurra 2012).

281. Facet for tibia on calcaneum: absent (0); present, small facet posteromedially (1); present, well-developed facet posteriorly (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 245; *Eoraptor lunensis* after Sereno, Martinez & Alcober 2012: Figs. 88A to 88C, *Tawa hallae* after Nesbitt et al. 2009: character 285 state 0 implicates no tibial facet on calcaneum, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 2J, *Zupaysaurus rougieri*, *Dilophosaurus wetherilli*, *Cryolophosaurus ellioti*, *Ceratosaurus*, *Eustreptospondylus oxoniensis* and *Sinraptor dongi* after Smith et al. 2007: character 328, *Panguraptor lufengensis* after You et al. 2014: Fig. 5, *Allosaurus fragilis* after Tykoski 2005: Fig. 99B and Rauhut 2003: character 219; for character history see Smith et al. 2007).
282. Metatarsal I: contacts the ankle joint (0); reduced, elongated splint-like, attached to Mt II and not reaching the ankle joint (1); reduced, broadly triangular, attached to the distal part of Mt II (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 248; *Eoraptor lunensis* after Sereno, Martinez & Alcober 2012: Figs. 89 and 91, *Tawa hallae* after Nesbitt et al. 2009: Fig. 2J, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 2, *Allosaurus fragilis* after Ezcurra 2012: character 1044, *Sinraptor dongi* after Rauhut 2003: character 222 and Ezcurra & Novas 2007: character 247; for character history see Ezcurra 2012).
283. Co-ossification of proximal ends of metatarsals II and III in adults: absent (0); present (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 249; *Tawa hallae* after Nesbitt et al. 2009: Fig. 2J, *Eodromaeus murphi* after Martinez et al. 2011: Fig. 2, *Ceratosaurus* and *Allosaurus fragilis* after Tykoski 2005: character 257 and Ezcurra & Novas 2007: character 249, *Sinraptor dongi* after Ezcurra & Novas 2007: character 249; for character history see Ezcurra & Novas 2007).
284. Proximal end of metatarsal III: not elongated posteriorly, does not back posterior sides of metatarsals II and IV (0); with posterior process, backs metatarsals II and IV posteriorly (T-shaped proximal profile: «antarctometatarsus») (1) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 250; *Eoraptor lunensis*, *Tawa hallae*, *Eodromaeus murphy*, *Allosaurus fragilis* and *Piatnitzkysaurus floresi* after Ezcurra 2012: character 1066, *Panguraptor lufengensis* after You et al. 2014: character 298, *Ceratosaurus*, *Eustreptospondylus oxoniensis* and *Sinraptor dongi* after Smith et al. 2007: character 336 and Carrano et al. 2012: character 347; for character history see Ezcurra 2012).
285. Distal articular facet of metatarsal V: present, rounded (0); absent, metatarsal V strongly reduced (1); absent, metatarsal V short, transversely flattened and anteriorly bowed distally (2) (after Hugi 2008 and Unterrassner 2009, Hugi 2008: character 251; *Eoraptor lunensis*, *"Syntarsus" kayentakatae* and *Allosaurus fragilis* after Tykoski 2005: character 261 and 262, *Tawa hallae* after Ezcurra 2012: character 1086, *Procompsognathus triassicus* after Rauhut 2003: character 223, *Panguraptor lufengensis* after You et al. 2014: Fig. 5 and character 306, *Sinraptor dongi* after Smith et al. 2007: character 343 and Rauhut 2003: character 223; for character history see Ezcurra 2012).

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