APPENDIX 1. OPINIONS ON THE LOCOMOTION AND STANCES OF BASAL SAUROPODOMORPH DINOSAURS

The following table summarises the views given regarding the locomotion and stance in basal sauropodomorphs. There are five types of conclusions: 1) mapping character evolution refers to conclusions based on how characters are displayed in a phylogenetic tree; 2) morphological analysis refers to the discussion of features (proportions, osteological elements) that may indicate quadrupedality; 3) comparative morphological analysis relates to studies that compare morphological characteristics with other taxa whose stance is assumed to be solved; 4) phylogenetic inference refers to a conclusion based in the position of the taxon in a phylogeny and assuming that the stance is a synapomorphy for the grouping; 5) biomechanical analysis refers to the conclusions based on reconstructions of either the possible movements of the limbs, the stress on the bones, or a reconstruction of the hypothetical musculature.

Sauropodomorph taxa	Quadrupedal	Bipedal	Conclusion on the stance	Type of conclusion	General taxonomic opinion
Aardonyx celestae	NA	Yates et al., 2010	*Aardonyx* lacks the specialisations found in the clade *Melanorosaurus* + Sauropoda for quadrupedal stance.	Mapping character evolution	Basal Sauropoda
Adeopapposaurus mognai	Martinez, 2009	NA	Reconstructed as such, but not discussed why this posture is given. Reduced brevis fossa, a shallow embayment on the ventral surface of the postacetabular process (McPhee et al., 2015)	Morphological analysis	Basal Sauropodomorpha
Agnosphitys chromhallensis	NA	Fraser et al., 2002; Ezcurra, 2010; Nesbitt et al., 2015	Phylogenetic position within Guaibasauridae.	Phylogenetic inference	Basal Dinosauriforms - Silesauria
Ammosaurus major	Galton, 1971, 1976 (Facultatively bipedal)	NA	Hind limb to trunk ratios. During quadrupedal locomotion with the digits of the manus in full extension, the weight was taken by digits II-IV (mostly II and III), and the enormous first ungual phalanx was held clear off the ground. The lateral surface of this phalanx would only have touched the ground if it was irregular or soft and even then the point of the claw not have been damaged (Galton, 1971).	Morphological analysis	Basal Sauropoda

Sauropodomorph taxa	Quadrupedal	Bipedal	Conclusion on the stance	Type of conclusion	General taxonomic opinion
Anchisaurus polyzelus	Galton, 1971, 1976; Yates, 2004 (Facultatively bipedal)	NA	Hind limb to trunk ratios. During quadrupedal locomotion with the digits of the manus in full extension, the weight was taken by digits II-IV (mostly II and III), and the enormous first ungual phalanx was held clear off the ground. The lateral surface of this phalanx would only have touched the ground if it was irregular or soft and even then the point of the claw not have been damaged (Galton, 1971).	Morphological analysis	Basal Sauropoda
Antetoniturs ingenipes	Yates and Kitching, 2003 (Habitual quadrupedality)	NA	Ability to pronate the manus during locomotion (triradiate proximal ulna), but the ovoid shape of its distal radius suggests that it was not locked into this position (like in Vulcanodon). The manus has a strongly twisted and mobile pollex that maintained the grasping ability seen in prosauropods (Galton, 1971). Large deltopectoral crest and olecranon process also suggests a greater range of forelimb movement than in more derived sauropods. The short metatarsus implies a loss of agility, but not short nor splayed as in Eusauropoda. Robust metatarsal I suggest that the distribution of weight across the metatarsus was beginning to become biased towards the medial side. Still, it was not as extreme as in derived eusaropods, where the lateral mtIII-V are 65% of the width of the medial mtI-II.	Biomechanical analysis	Basal Sauropoda
Blikanasaurus cromptoni	Galton, Heerden, 1998 (Quadrupedality)	NA	Hindlimb that is extremely stocky, especially the metatarsus, early-built, quadrupedal saurischian.	Morphological analysis	Basal Sauropodomorpha

Sauropodomorph taxa	Quadrupedal	Bipedal	Conclusion on the stance	Type of conclusion	General taxonomic opinion
Camelotia borealis	Heerden and Galton, 1997	NA	The femur is similar to that of *Meroktenos thabanensis* in that the lateral margin of the proximal end is rounded, but the fourth trochanter is situated on the medial margin, as in *Riojasaurus* and *Melanorosaurus*. Anteriormost caudals are similar to *Melanorosaurus*.	Comparative morphological analysis	Basal Sauropoda
Chinshakiangosaurus chungoensis	Upchurch et al., 2007	NA	Cladistic analysis places it as one of the most basal sauropods, mostly on the study of the skull.	Phylogenetic inference	Basal Sauropoda
Chromogisaurus novasi	Ezcurra, 2010	NA	No opinion on the stance but reconstructed as a quadruped. The analysis recovered it as a Basal Sauropodomorph, as a member of Guaibasauridae, an early branch of basal sauropodomorphs composed of *Guaibasaurus*, *Agnosphitys*, *Panphagia*, *Saturnalia* and *Chromogisaurus*. Such an affinity is for the first time suggested for Guaibasaurus, whereas Panphagia is not recovered as the most basal sauropodomorph. Furthermore, *Chromogisaurus* is consistently located as more closely related to Saturnalia than to any other dinosaur. Thus, the *Saturnalia* + *Chromogisaurus* clade is named here as the new subfamily Saturnaliinae.	Phylogenetic inference	Basal Sauropodomorpha
Coloradisaurus brevis	NA	Apaldetti et al., 2013	The phylogenetic analysis recovers it as the sister taxon of *Lufengosaurus*, and it is ambiguously placed as either a massospondylid or a plateosaurid. Both groups are found bipedal elsewhere (Bonnan and Yates, 2007).	Phylogenetic inference	Basal Sauropodomorpha

Sauropodomorph taxa	Quadrupedal	Bipedal	Conclusion on the stance	Type of conclusion	General taxonomic opinion
Efraasia minor	Charig et al., 1965; Galton et al., 1973; Remes, 2007	NA	Proposed in Galton 1973 based on comparison with *Anchisaurus*, and *Plateosaurus*. This would be conflictive since *Anchisaurus* was probably quadrupedal, and *Plateosaurus* bipedal. A detailed biomechanical analysis supposes that most 'prosauropods' had a sprawling quadrupedal posture like that in ceratopsians (Remes, 2007), mostly in the most primitive sauropodomorphs, supporting the ideas of Charig et al., 1965; Galton, 1971, 1973. The brevis fossa is relatively deep (Benton et al., 2000; Yates, 2003b, c).	Comparative morphological analysis	
Eoraptor lunensis	NA	Sereno et al., 2013 (Cursorial)	Based on the structure and proportions of the fore and hind limbs.	Morphological analysis	Basal Sauropodomorpha or Basal Saurischia or Basal Theropoda
Eucnemosaurus fortis	NA	NA	Material is too sparse to discuss stance.	NA	Basal Sauropodomorpha
Eucnemosaurus entaxonis	NA	McPhee et al., 2015b (Obligate, facultative bipedality)	Robust foot architecture, presence of a deep brevis fossa on the ventral surface of iliac postacetabular process, a stout metatarsus evidences the relatively early occurrence of a robust subentaxonic pes amongst Late Triassic basal sauropodomorphs. It suggests the first experiment in a slower, sub-graviportal form of locomotion. A hypertrophied M. caudofemoralis brevis complex may be related to the adducting forces required to steady the feet beneath the body of a large, wide-gaited biped (Malliso, 2010a; McPhee et al., 2014).	Morphological analysis	Basal Sauropodomorpha
Euskelosaurus browni	Van Heerden 1979	Cooper 1984 (Facultative)	Limb proportions more towards quadrupedality, still allowing bipedal stance	Morphological analysis	Basal sauropodomorph -Prosauropoda-

Sauropodomorph taxa	Quadrupedal	Bipedal	Conclusion on the stance	Type of conclusion	General taxonomic opinion
Glacilisaurus hammeri	NA	Smith and Pol 2007 (Obligate?)	Similar phylogenetic position than *Lufengosaurus, Massospondylus* and *Coloradisaurus*. Foot similar to *Lufengosaurus*.	Phylogenetic inference and Comparative morphological analysis	
Gongxianosaurus shibeiensis	Yaonan and Wang, 2000 (Obligate)	NA	Elongated forelimbs that reached 70 to 75% of hind limb length	Morphological analysis	Basal Sauropoda
Guaibasaurus candelariensis	NA	Langer et al., 2011	Phylogenetic position at the base of Saurischia	Phylogenetic inference	Eusaurischian/Theropoda
Gyposaurus sinensis	NA	NA	It has been considered related to *Lufengosaurus* (Galton, 1976), or *Anchisaurus* (1992), meaning the stance would be either biped or quadruped.	Phylogenetic inference	Prosauropoda/Basal Sauropoda
Ignavusaurus rachelis	NA	Knoll, 2010 (Subcursorial)	The phylogenetic position between *Thecodontosaurus-Pantydraco* and *Efraasia*.	Phylogenetic inference	Basal Sauropodomorpha
Isanosaurus attavipachi	Buffetaut et al., 2000 (Obligate)	NA	Osteological features of a primitive sauropod	Comparative morphological analysis	Basal Sauropoda
Jingshanosaurus xinwaensis	NA	Zhang and Yang (1994)	Conflicting information. The summary claims that the forelimbs are either 2/3 or 3/5 the length of the hindlimbs. They are either way too short to allow quadrupedality. It is placed within Yunnanosauridae.	Morphological analysis	Basal sauropodomorpha
Kotasaurus yampalliensis	Yadagiri (2001) (Obligate)	NA	Affinity with Sauropoda, despite the prosauropod features. The femur was straight and oval in cross-section, which means that the limbs were already columnar. Prosauropod features: relatively short and slightly twisted humerus, retention of lesser trochanter on the femur.	Comparative morphological analysis	Basal Sauropoda

Sauropodomorph taxa	Quadrupedal	Bipedal	Conclusion on the stance	Type of conclusion	General taxonomic opinion
Lamplughsaura	Kutty et al., 2007 (Obligate)	NA	Osteological correlation with *Riojasaurus*. deep rib cage, long, powerful vertical limbs, and a long tail. The humerus is proportionately large with a robust but low deltopectoral crest; the ulna is powerful, the manus is broad and short. The forelimb is stout and long, about 74% of the length of the hindlimb (within the range seen for sauropods), and was used for body support.	Comparative morphological analysis	Basal sauropodomorph - Prosauropoda- or Basal Sauropoda
Leonerasaurus taquetrensis	Pol et al., 2011 (Obligate)	NA	Phylogenetic position at the base of Anchisauria.	Phylogenetic inference	Basal Sauropoda
Lessemsaurus sauropoides	Pol and Powell, 2007 (Obligate)	NA	Affinity with sauropoda, despite the prosauropod features.	Comparative morphological analysis	Basal Sauropoda
Leyesaurus marayensis	Apaldetti et al., 2011	NA	There is a reconstruction as a quadruped. It is placed within Massospondylidae, closely related to *Adeopapposaurus*, which has also been reconstructed as quadruped.	Phylogenetic inference	Basal Sauropodomorpha
Lufengosaurus huenei	NA	Young, 1941	Not extensive comment except the morphology of the forearm.	Morphological analysis	Basal sauropodomorpha - Massospondylidae
Massospondylus carinatus	Cooper, 1980 (Obligate).	Bonnan and Senter, 2007 (Obligate)	There is no evidence of the adaptations to quadrupedality found in sauropods, nor even in the juveniles. Appendicular heterochrony is accepted, but not with a pronated hand, probably a horizontally orientated humerus, like in ceratopsians. The forelimb:hindlumb ratio are not conclusive. Also, no real evidence left on what could be the use of the forelimb.	Biomechanical analysis	Prosauropoda (with Plateosaurus)

Sauropodomorph taxa	Quadrupedal	Bipedal	Conclusion on the stance	Type of conclusion	General taxonomic opinion
Melanorosaurus readi	Heerden and Galton, 1997; Yates et al., 2010 (Obligate)	NA	General morphology of the skeleton (Herden and Galton, 1997). Shared features that indicate an obligate quadrupedality in Sauropoda (Yates et al., 2010).	Comparative morphological analysis	Basal Sauropodomorpha
Meroktenos thabanensis (=Melanorosaurus thabanensis)	Peyre de Fabregues and Allain (2016)	NA	Mostly phylogenetic analyses, supported with morphological evidence: femur is very compact with a robusticity index, length divided by the circumference of the shaft, of 2.09. The femur has a straight shaft in both side and front views. The femoral shaft is substantially wider transversely than it is wide in side view, with a ratio of 1.58. On the rear of the femoral shaft, the fourth trochanter is oriented obliquely, running from the upper and inner side to the lower and outer side.	Phylogenetic inference and Morphological analysis	Basal Sauropoda
Mussaurus patagonicus	Otero and Pol, 2013; McPhee et al., 2015 (Obligate)	Otero et al., 2017	Reduced brevis fossa, a shallow embayment on the ventral surface of the postacetabular process (Otero and Pol., 2013; McPhee et al., 2015). Phylogenetic position at the base of Anchisauria.	Phylogenetic inference and Morphological analysis	Basal Sauropoda
Panphagia protos	NA	Martinez and Alcober, 2009 (Cursorial)	Based on the osteological similitude with *Eoraptor* and *Saturnalia.*	Comparative morphological analysis	Basal Sauropodomorpha
Pantydraco caducus	Benton et al., 2000; Yates, 2003b, c	NA	The brevis fossa is relatively deep (Benton et al., 2000; Yates, 2003b, c).	Morphological analysis	Basal sauropodomorpha

Sauropodomorph taxa	Quadrupedal	Bipedal	Conclusion on the stance	Type of conclusion	General taxonomic opinion
Plateosauravus cullingworthi	Christian and Preuschoft (1996)	Cooper 1984 (Facultative); Bonner and Santer, 2007 (Obligate).	Bending moment in the sagittal plane of the vertebral column. They observed two distinct local maxima at the shoulders and hips that are consistent with a habitual quadrupedal posture for the animal. There is no evidence of the adaptations to quadrupedality found in sauropods, nor even in the juveniles. Appendicular heterochrony is accepted, but not with a pronated hand, probably a horizontally orientated humerus, like in ceratopsians. The forelimb:hindlimb ratio are not conclusive. Also, no real evidence left on what could be the use of the forelimb. Reduced brevis fossa, a shallow embayment on the ventral surface of the postacetabular process (McPhee et al., 2015)	Biomechanical analysis	Basal sauropodomorph - Prosauropoda, along with *Plateosaurus*-
Plateosaurus (=Gresslyosaurus) ingens	NA	NA	NA	NA	Basal Sauropodomorpha
Plateosaurus engelhardti	Galton, 1986, 2000	Bonnan and Senter, 2007 (Obligate)	There is no evidence of the adaptations to quadrupedality found in sauropods, nor even in the juveniles. Appendicular heterochrony is accepted, but not with a pronated hand, probably a horizontally orientated humerus, like in ceratopsians. The forelimb:hindlumb ratio are not conclusive. Also, no real evidence left on what could be the use of the forelimb.	Biomechanical analysis	Basal Sauropodomorpha
Plateosaurus (=Sellosaurus) gracilis	Galton, 1986, 2000	Bonnan and Senter, 2007 (Obligate)	There is no evidence of the adaptations to quadrupedality found in sauropods, nor even in the juveniles. Appendicular heterochrony is accepted, but not with a pronated hand, probably a horizontally orientated humerus, like in ceratopsians. The forelimb:hindlumb ratio are not conclusive. Also, no real evidence left on what could be the use of the forelimb.	Biomechanical analysis	Basal Sauropodomorpha

Sauropodomorph taxa	Quadrupedal	Bipedal	Conclusion on the stance	Type of conclusion	General taxonomic opinion
Pradhania gracilis	Not clear (Kutty et al., 2007)	Not clear (Kutty et al., 2007)	No discussion provided.	NA	Basal sauropodomorph - Prosauropoda- or Basal Sauropoda
Riojasaurus incertus	Van Heerden and Galton, 1997 (Obligate)	NA	The proportions of the forelimbs are used as the key features to indicate quadrupedality. Personal comments: there is an anterolateral process in the ulna like the ones seen in melanorosaurid anchisaurids, which is not present in basal anchisaurids, being *Aardonyx* the first to show this feature. The fourth trochanter is reduced (convergent character indicative of quadrupedality in ornithischians) and the ilium has been described as robust (another diagnostic feature of quadrupedality in ornithischian dinosaurs). Reduced brevis fossa, a shallow embayment on the ventral surface of the postacetabular process (McPhee et al., 2015)	Comparative morphological analysis	Riojasauridae
Ruehleia bedhemensis	Not discussed (Galton, 1999, 2001)	Not discussed (Galton, 1999, 2001)	No discussion provided.	NA	Plateosauridae
Sarahsaurus aurifrontalis	NA	NA	NA	NA	Basal sauropodomorpha - Basal Sauropoda
Saturnalia tupiniquim	Facultative quadrupedality (Langer, 1999, 2000, Langer et al., 2007)		Quadrupedal stance when the animal was moving slowly. The reconstruction of the muscles of the forelimb and the pectoral girdle were subsequently described. The brevis fossa is relatively deep (Benton et al., 2000; Yates, 2003b, c).	Morphological analysis	Basal sauropodomorpha - Stem
Seitaad ruessi	NA	Sertich and Loewen, 2010	Phylogenetic position as a Plateosauridae	Phylogenetic inference	Basal sauropodomorpha
Tazoudusaurus naimi	Allain et al., 2004	NA	Phylogenetic position as the sister taxon of *Vulcanodon*	Phylogenetic inference	Basal Sauropoda

Sauropodomorph taxa	**Quadrupedal**	**Bipedal**	**Conclusion on the stance**	**Type of conclusion**	**General taxonomic opinion**
Thecodontosaurus antiquus	Benton et al., 2000; Yates, 2003b, c	NA	The brevis fossa is relatively deep (Benton et al., 2000; Yates, 2003b, c).	Morphological analysis	Basal sauropodomorpha
Unaysaurus tolentinoi	NA	Leal et al., 2004	Phylogenetic position within Plateosauria.	Phylogenetic inference	Basal sauropodomorpha
Vulcanodon karibaensis	Cooper 1984 (Obligate)	NA	Limb proportions, similar to *Plateosaurus* but osteological features of a sauropod.	Comparative morphological analysis	Basal sauropoda
Yimenosaurus youngi	Bai et al., 1990	NA	Affinity with Plateosauria (*Plateosaurus* and *Lufengosaurus*).	Comparative morphological analysis	Basal sauropodomorpha
Yunnanosaurus huangi (=robustus)	NA	Young, 1942 (Obligate)	The forelimb length realtive to the hindlimb length is 0.37, reported as the shortest record for Sauropodomorpha and Theropoda.	Morphological analysis	Basal sauropodomorpha
Yunnanosaurus youngi	NA	Lu et al., 2007	Phylogenetic position as the sister taxon of *Yunnanosaurus huangi.*	Phylogenetic inference	Basal sauropodomorpha