Supporting Information

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Data Collection

Faunal data were collected from the Upper Permian *Cistecephalus* Assemblage Zone (AZ) and the Middle Triassic *Cynognathus* AZ of South Africa and their temporal equivalents. In Tanzania, the tetrapod assemblage of the Usili (or Kawinga) Formation has been shown to correspond to the *Cistecephalus* zone (1–3). In Malawi, a small collection of fossils from the Chiweta beds has been made relatively recently (4), in addition to some historical collections (5, 6). Sidor et al. (3) noted the likelihood that the Chiweta beds and Usili Formation of Tanzania represent the same rock unit, separated by geologic faulting and political boundaries. In Zambia, the fossils of the upper Madumabisa Mudstone Formation are biostratigraphically correlated with the *Cistecephalus* AZ (7–10). For the Middle Triassic, we used the entire *Cynognathus* zone recognized in the Karoo Basin (11, 12) and three of its well known correlates: the Lifua Member of the Manda beds of Tanzania (2, 13, 14), the Ntawere Formation of Zambia (12, 14, 15), and the upper member of the Fremouw Formation of Antarctica (16–18). The bulk of the *Cynognathus* biozone is considered Anisian in age, although some of its base might be latest Olenekian (12–14).

The bulk of the occurrence data has been reported in several key publications (19–25), but we have done extensive taxonomic revisions as the result of our recent fieldwork efforts (3, 10, 15, 18, 26–28) and accompanying museum research. Moreover, we have recognized several previously undescribed species, only a handful of which have been reported or described (e.g., refs. 3, 10, 27, 29, and 30).

We excluded two other fossiliferous southern Pangean basins because in each case our research group has not had the opportunity to examine the pertinent fossil material, and we consider the taxonomic identifications in the literature to be either suspect or too poorly resolved for this work. First, we have not included faunal data from the Middle Triassic Omingonde Formation of Namibia (31) because the taxonomic data currently in the literature are not sufficient for our purpose. Recent fieldwork in Namibia has yielded an interesting cynodont fauna as well as the only African record of the dicynodont *Stahleckeria* (32), but many of the recovered specimens lack species-level identifications (33, 34). We consider the taxonomic identifications of fossils from older collections to be questionable. Nevertheless, including the Namibian material would likely only strengthen the conclusions drawn herein, as its Triassic fauna seems distinct from those known elsewhere. Second, for many of the same reasons as previously noted, we have not included data from the Permian Kundaram Formation of India (35–39). Only a handful of therapsids have been described from these beds (*Cistecephalus microrhinus*, *Dicynodontoides* sp., *Emydops platyceps*, *Endothiodon mahalanobisi*, ?*Oudenodon*, *Pristerodon mackayi*), the majority of which correspond to dicynodont species known from the Karoo Basin (except for *E. mahalanobisi*, which we consider of doubtful validity until the taxonomy of the South African species of *Endothiodon* is revised). A small captorhinid reptile with multiple toothrows is known from the Kundaram (39), which parallels a similar occurrence in Zambia (40). Given the nature of the occurrence records from India, their inclusion would likely bolster our conclusion that the Upper Permian of southern Pangea was dominated by a widespread, homogeneous fauna.

Choice of Network

Three types of networks are candidates for biogeographic analysis: (*i*) the cooccurrence network between species, where nodes are species and the weight of the link between them is the number of co-occurrences observed between that pair; (*ii*) the bipartite network of occurrence relationships, where nodes are both localities and species, and links are either zero (species not present in locality) or one (species present in locality); and (*iii*) the locality-locality network, where nodes are localities and the weight of each link is equal to the number of shared species between each pair of localities.

Of these three the bipartite network is a superior choice for biogeographic analysis because it contains the information present in both the locality-locality network and the cooccurrence network. In the jargon of network science, the locality-locality network and the cooccurrence network are "one-mode" projections of the bipartite network, because they create relationships between one set of nodes (in our case, species or localities) from the patterns of connections to the other set (from species to localities, for example). Analysis of the bipartite network directly is therefore favorable to analysis of a one-mode projection, because no information is lost.

It is biologically intuitive why information is lost in the transition from a bipartite network, or a presence-absence matrix, to a cooccurrence or locality-locality network. If localities are compared by a distance measure (e.g., number of shared species or a similarity measure such as Jaccard), then we have reduced complex presence-absence patterns among taxa to a single value between a pair of localities.

Separately, the cooccurrence network accumulates $(n)(n-1)$ links from each faunal assemblage. Because of this nonlinearity, large faunal assemblages contribute substantially more links to the cooccurrence network than small faunal assemblages. This aspect is inconvenient for a paleontological analysis because of inherent differences in sampling between localities.

Network Analysis and Bootstrap

Community detection is an area of network science dedicated to identifying clusters of nodes in real world networks (41, 42). Among the available algorithms, the map equation is the best candidate for biogeographic studies because it can be applied to bipartite networks (43), and has been rated as one of the most accurate algorithms by a comparative study (44). These algorithms typically work as follows: define a function to compare the quality of a proposed partition, and use a separate optimization algorithm to cleverly pick good partitions without exhaustively comparing all possible partitions.

Although a community-detection approach for biogeography does reveal biogeographical delineations among localities given species geographic range data, for this study we are interested instead in the quality of the clustering solution. The map equation is the average description length of a random walk on a network (43). The equation is higher when a network has no structure (for our purposes, a homogeneous fauna), and lower when the network has modular structure (more provincial). Visit www.mapequation.org for information and tutorials about this approach.

To test for a change in biogeographic clustering, we performed a bootstrap analysis that simulated the sampling process. Our procedure was as follows: (*i*) For each occurrence, remove it from the original bipartite networks with 5% probability. We subsequently refer to this probability as A, which reflects the (overly conservative) chance that a species was identified but not present. Although we are confident that this situation did not occur in our data, we included this probability to generalize our sampling scheme. (*ii*) For each lack of occurrence (i.e., absence), create an occurrence with 5% probability. We subsequently refer to this probability as B, which reflects the chance that a species was present but never sampled from the fossil record.

We performed this procedure for the original Permian and Triassic bipartite networks 10,000 times. Next, we clustered each resampled network by seeking the partition that optimized the map equation in each bootstrap network. A t test is suitable to compare map equation scores before and after the boundary because the distribution of scores was close to normally distributed ($P = 10^{-16}$). The same procedure was used to generate the distribution of scores for the average range size and average number of endemics analyses presented in the main text.

We used this bootstrap technique to incorporate the realism of poor sampling into our analysis. However, we recognize that this approach allows for many more opportunities to generate new occurrences than to remove them, because taxa are more often missing than present. We found that our results were not sensitive to varying A and B, so we opted to choose a simple combination of values. Based on (*i*) the maintenance of total species richness between the Permian and the Triassic, (*ii*) the conservation of the majority of localities from the Permian to the Triassic, and (*iii*) no severe taphonomic biases affecting one period that do not affect the other, we felt that the bootstrap analysis was sufficient to determine the significance of our results. In situations with inconsistency of preservation potential or differences in sampling effort through time, A and B can be changed to reflect those inconsistencies, or A and B could be different for each species (reflecting, for example, substantial differences in rarity).

We used Gephi (v0.8.2; www.gephi.org) to visualize the bipartite taxon-locality occurrence networks. The following visualization settings were used: ForceAtlas 2, number of threads 2, prevent overlap on, edge weight influence 1.0, scaling 10.0, gravity 1.0, tolerance 0.1, and approximation 1.2. The same parameters were used for both Permian and Triassic networks to make the visualizations comparable.

Data

Tables S1 and S2 record the presence (1) or absence (0) of each species in each of the five regions identified (Beacon Basin, Antarctica; Chiweta beds, Malawi; Karoo Basin, South Africa; Luangwa Basin, Zambia; Ruhuhu Basin, Tanzania).

NMT RB4 was identified by Sidor et al. (3) as a Tanzanian burnetiid biarmosuchian most similar to *Burnetia mirabilis* from the *Dicynodon* Assemblage Zone of South Africa. Not enough anatomy is preserved on the isolated skull roof to formally designate a new species, but the specimen has morphology unknown elsewhere during *Cistecephalus* zone times, justifying its use as a unique taxon in this analysis.

MAL 240 was identified by Jacobs et al. (4) as a new burnetiamorph species. In their analysis, it was resolved as the sister taxon to the *Proburnetia* + *Burnetia* clade, suggesting that it does not belong to the same taxon as NMT RB4.

BP/1/3591 is one of several specimens of a recently identified species of cistecephalid (10), which is unique among cistecephalids in the presence of tusks (e.g., refs. 45–47). The Zambian cistecephalid can be further distinguished from *Cistecephalus microrhinus* by the absence of a depression or notch on the ventral surface of the maxilla lateral to the caniniform process (48), the presence of a small, triangular, ventrally directed flange on the anterior pterygoid ramus, a midventral vomerine plate that is wide and trough-like anteriorly, and a more robust, block-like crista oesophagea on the median pterygoid plate. This species can be distinguished from *Cistecephaloides boonstrai* by the presence of a single embayment anterior to the caniniform process, the presence of a small, triangular, ventrally directed flange on the anterior pterygoid ramus, a midventral vomerine plate that is wide and trough-like anteriorly, a robust, block-like crista oesophagea on the median pterygoid plate, a larger lateral dentary shelf, and the absence of a tall cutting blade on the dorsal surface of the dentary near the level of the lateral dentary shelf. Finally, the species can be distinguished from *Kawingasaurus fossilis* by larger size, the presence of a small, triangular, ventrally directed flange on the anterior pterygoid ramus, a midventral vomerine plate that is wide and trough-like anteriorly, and a robust, block-like crista oesophagea on the median pterygoid plate. The only mandible of *K. fossilis* (GPIT K55f) is poorly preserved, but the Zambian cistecephalid may additionally differ from this species in the presence of a posterior dentary sulcus and a larger lateral dentary shelf.

NMT RB22 and NMT RB156 represent a recently identified species of cryptodont dicynodont first noted by Sidor et al. (3). The former specimen consists of a partial maxilla of an adult individual and the latter consisting of a mostly complete skull, mandible, and associated postcrania of a subadult individual. Characters of the specimens that are consistent with their identification as a cryptodont species include the presence of paired nasal bosses that overhang the external nares, the presence of a postcaniniform keel, and broad exposure of the parietals on the skull roof between postorbitals that are vertically oriented and strongly concave laterally. The species can be distinguished from other cryptodonts by an alveolar rim of the premaxilla that flares anteriorly; extensive, deep pitting on the facial surface of the premaxilla, a deep posterodorsally-oriented groove on the medial surface of the caniniform process, and very weak development of the posterior dentary sulcus.

OUMNH TSK2 was identified by King and Jenkins (49) as a Permian specimen of *Lystrosaurus curvatus* from Zambia. However, Angielczyk and colleagues (10) have shown that it cannot be referred to the genus *Lystrosaurus* and is better considered a new species of lystrosaurid (also see ref. 50). The authors' conclusion is based on: the presence of an ectopterygoid in TSK 2 (absent in *Lystrosaurus*) (51); narrower exposure of the parietals on the skull roof than typical in *Lystrosaurus*; the relatively longer temporal bar; the narrower interorbital skull roof; the absence of conspicuous skull ornamentation, such as a sagittal ridge on the premaxilla or a prefrontal nasal crest; and the dorsoventrally shorter, less strongly deflected snout. Camp (52) also found that the skull shape of TSK 2 differed from that of *Lystrosaurus* in a geometric morphometric analysis.

SAM-PK-8516 was collected from the Teekloof Formation (lower *Cistecephalus* AZ), Western Cape Province, South Africa. The specimen represents a previously undescribed genus of eutherocephalian characterized by a box-shaped skull with a short, blunt snout and wide zygomatic arches (such that the skull is as wide as it is long), widened interorbital roof, and a raised pineal foramen. This combination of characters has not been identified in any therocephalian named in the literature.

Theriognathus microps has long been considered to occur exclusively in the *Dicynodon* Assemblage Zone of South Africa (24). A very recently recovered specimen (SAM-PK-K10981) from the Osfontein locality near Graaff-Reinet extends stratigraphic range of this species downward into the upper *Cistecephalus* zone. We note this record, but have not included its occurrence in the Karoo Basin in Table S1. This is conservative, however, as doing so would only reinforce the results presented.

NHCC LB36 and LB38 from the Luangwa Basin of Zambia represent a unique genus of eutherocephalian characterized by short, conical teeth, a long groove on external surface of maxilla, which runs parallel to the tooth row, and a short maxillovomerine bridge formed in part by narrow ventrolateral processes of the vomer. This combination of features is similar to *Chthonosaurus* from the Upper Permian of Russia, but has not previously been identified from any African basin.

GPIT K72 is a pareiasaur fossil consisting of six or seven dorsal vertebrae with articulated osteoderms, originally described by von Huene (53). The morphology of the osteoderms is unique among pareiasaurs (LAT, pers. ob.) and justifies its recognition as a new species.

BP/1/5532 represents the only known occurrence of the dicynodont *Shansiodon* in the Burgersdorp Formation of South Africa, a find that was initially reported by Hancox (ref. 54; but see also ref. 15). The specimen is currently unassigned to species, pending a revision of the four species of *Shansiodon* from China.

The traversodont cynodont genus *Scalenodon* was proposed to include four species (55, 56). However, more recent analyses (25, 57, 58) have suggested that all four species do not form a clade and that some species (specifically "*S.*" *hirschoni*) are more closely related to derived traversodonts. Because a fully revised taxonomy has yet to be proposed (but see ref. 59), we used *Scalenodon* in single quotes.

NHCC LB29 and LB30 represent a unique species of traversodontid cynodont from the upper Ntawere Formation of northeastern Zambia. The first specimen consists of a skull and anterior skeleton, including vertebrae and articulated forelimbs and girdles. The second specimen is an isolated skull that has been transversely crushed. Both are characterized by their possession of three upper incisors, the first two of which are remarkably small. These teeth are met by a single, large lower incisor, which features a flat lingual surface. The upper and lower canines are reduced in size. No other Triassic cynodont has this set of features and we are confident that the specimens pertain to a previously undescribed species.

AMNH 24411 is a large temnospondyl skull from the upper Fremouw Formation of Antarctica. It was figured by Hammer (16) and was noted by Damiani (60) as possibly referable to *Parotosuchus*. However, we consider it to represent a previously undescribed capitosaurian species closely related to *Paracyclotosaurus* characterized by the following features: extremely small marginal dentition (relative to the skull size); internal vomeropalatal tooth row extending far posteriorly to the posterior margin of the choana; broad posterior portion of the cultriformis process of the parasphenoid; very elongated lacrimal (relative to the skull length) with subparallel lateral borders; flat occiput with large, rounded and narrowly set occipital condyles; and narrow posttemporal fenestrae (relative to the occipital width).

UCMZ T997 represents a unique parareptile from the Lifua Member of the Manda beds of Tanzania, originally collected by Parrington in the early 1930s, but never described. It is the only known parareptile fossil from the Manda beds. The species preserves at least 15 transversely expanded maxillary teeth, three large and transversely expanded premaxillary teeth, and a ventral temporal emargination. The combination of these features occurs in no other parareptile taxon.

Several Triassic archosaurs from the Lifua Member of the Manda beds are noted here in single quotation marks (namely, *'Mandasuchus tanyauchen,' 'Pallisteria angustimentum,' 'Telecrater rhadinus'*). These taxa were named in a dissertation (61) and have occasionally appeared in the literature (e.g., ref. 62) as nomena nuda. However, our work suggests that they are each based on diagnostic material.

NHCC LB32 consists of ilia, ischia, fragmentary pubes, and anterior caudal vertebrae belonging to a previously undescribed genus of silesaurid dinosauriform (63). The unique Zambian silesaurid is distinct from other silesaurids in its possession of a tall iliac blade in relation to the height of the acetabulum and a mediolaterally thin, blade-like ischial shaft. It is one of two silesaurids known from the Anisian stage of the Triassic and can be distinguished from the other Anisian silesaurid, *Asilisaurus kongwe* of Tanzania, by its possession of a distinct brevis fossa on the ventrolateral face of the postacetabular process of the ilium. This feature is shared with Late Triassic silesaurids known from other continents.

NHMUK R36615 includes a well-preserved partial skull including a partial premaxilla, maxilla, frontal, parietal, lacrimal and possibly parts of the postorbital. An antorbital fenestra is present placing it in Archosauriformes, but lacks an antorbital fossa on the dorsal margin of the posterior process of the maxilla, thus precluding a referral to Archosauria. NHMUK R36615 can be differentiated from NHMUK PV R36619 by its much thicker and much more deeply sculpted frontal.

NHMUK PV R36619 consists of a partial skeleton including portions of the skull, vertebrae, partial pectoral and pelvic girdles, and forelimb and hind limb material. NHMUK PV R36619 possesses thecodont dentition and a femur with a strap-like fourth trochanter, which clearly places the taxon with archosauriforms. The specimen lacks two proximal tubera of the proximal portion of the femur and osteoderms, therefore the specimen cannot be assigned to Archosauria. This specimen can be differentiated from NHMUK R36615 by its dorsoventrally much thinner frontal.

NMT RB48 consists of a partial skeleton including a nearly complete hind limb, representative vertebrae from the presacral, sacral, and caudal vertebrae, pectoral girdle, and part of the mandible. NMT RB48 is a unique archosauriform and most likely an archosaur based on a concave facet on the calcaneum for a convex "peg" on the astragalus, thecodont dentition, and the presence of osteoderms (64). NMT RB48 differs from all archosauriforms in the possession of the following combination of character states: multiple anteroposteriorly oriented rows of pterygoid teeth; short pubic apron; hyposphene-hypantra intervertebral articulations in the presacral vertebrae; an astragalar facet of the calcaneum that is continuous with a hemicylindrical fibular facet; anteriorly tapering osteoderms that are arranged in paramedian rows dorsal to the neural spines; lateral expansions at the distal margins of the presacral neural spines; and two sacral vertebrae. NMT RB48 possesses the following autapomorphies: paramedian ridges (two total) on the ventral side of the posterior presacral (dorsal) vertebrae; anterodorsally oriented grooves on the medial side of the dentary just ventral to dentition.

NHCC LB34 is a proximal femur attributed to a shuvosaurid-like pseudosuchian archosaur based on the presence of a deep fossa in place of the fourth trochanter on the posteromedial surface and a corresponding medial bowing of the femur (30, 65). Although the specimen is not complete enough to diagnose a new species, it is clearly unique for southern Pangea during the Anisian and represents an important range extension for shuvosaurid-like poposauroids.

Tetrapod Faunas of the Early Triassic

A well-characterized feature of the marine fossil record is the appearance of earliest Triassic "disaster faunas" with low taxonomic diversity and low evenness, but high abundance of weedy species, such as *Claraia* (66). Carbon isotope data indicate that marine ecosystems stabilized and recovery commenced only by the Middle Triassic (67). This sequence is paralleled in the terrestrial record, with Early Triassic assemblages dominated by the therapsid dicynodont *Lystrosaurus* (68) and tetrapod diversification delayed until the Middle Triassic (69–71). Of the basins we have studied here, the Karoo and Beacon preserve highly similar Early Triassic *Lystrosaurus*-dominated assemblages (18, 23, 28, 72). The remains of *Lystrosaurus* likewise dominate the Panchet Formation of India (73).

We excluded Early Triassic faunas from our analysis for two reasons. First, we question the species level taxonomic lists available in the literature and have not been able to study the relevant Indian fossils personally. Second, and more importantly, we consider tetrapod assemblages of the Early Triassic to represent disaster faunas that likely lacked stable ecological structure (74, 75). Although the analysis of Early Triassic *Lystrosaurus*-dominated communities would likely produce a single, broadly connected network like the Late Permian *Cistecephalus* biozone, it would be for very different ecological reasons. We propose that in southern Pangea, a broadly distributed Late Permian fauna was decimated by the end-Permian mass extinction and then replaced by broadly distributed Early Triassic disaster fauna. Ecological recovery in the Middle Triassic introduced multiple faunal provinces, similar to what has been recognized in marine ecosystems (76).

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Table S1. Occurrence data for Late Permian tetrapods

Permian species (*n* = 62)	Karoo	Luangwa	Ruhuhu	Chiweta
NMT RB4	0	0	1	0
MAL 240	0	0	0	1
Herpetoskylax hopsoni	1	0	0	0
Lemurosaurus pricei	1	0	0	0
Lycaenodon longiceps	1	0	0	0
Paraburnetia sneeubergeneis	1	0	0	0
Aulacephalodon baini	1	0	0	0
Basilodon woodwardi	1	0	0	0
BP/1/3591	0	1	0	0
Cistecephaloides boonstrai	1	0	0	0
Cistecephalus microrhinus	1	0	0	0
Compsodon helmoedi	1	1	0	0
NMT RB156, RB22	0	0	1	0
Dicynodon huenei	0	1	1	0
Dicynodon lacerticeps	1	0	0	0
Dicynodontoides nowacki	0	1	1	1
Dicynodontoides recurvidens	1	1	0	0
Diictodon feliceps	1	1	0	0
Dinanomodon gilli	1	0	0	0
Emydops minor	1	1	0	0
Emydops oweni	1	1	0	0
Endothiodon uniseries	1	1	1	1
Euptychognathus bathyrhynchus	1	0	1	0
Galepus jouberti	1	0	0	0
Geikia locusticeps	0	0	1	0
Katumbia parringtoni	0	1	1	0
Kawingasaurus fossilis	0	0	1	0
Keyseria benjamini	1	0	0	0
Kitchinganomodon crassus	1	1	0	1
OUMNH TSK2	0	1	0	0
Myosauroides minaari	1	0	0	0
Odontocyclops whaitsi	1	1	0	0
Oudenodon bainii	1	1	1	1
Oudenodon grandis	1	0	0	0
Pachytegos stockleyi	0	0	1	0
Pristerodon mackayi	1	1	1	0
Rhachiocephalus behemoth	0	0	1	0
Rhachiocephalus magnus	1	0	1	0
Syops vanhoepeni	0	1	0	0
Akidnognathus parvus	1	0	0	0
Euchambersia mirabilis	1	0	0	0
Hofmeyria atavus	1	0	0	0
Ictidostoma hemburyi	1	0	0	0
Ictidosuchoides longiceps	1	0	0	0
Ictidosuchops rubidgei	1	0	0	0
Mirotenthes digitipes	1	0	0	0
SAM-PK-8516	1	0	0	0
Silphoictoides ruhuhuensis	0	0	1	0
Theriognathus microps	0	1	1	0
NHCC LB36, LB38	0	1	0	0
Procynosuchus delaharpeae	1	1	1	0
Peltobatrachus pustulatus	0	0	1	0
Rhinesuchus sp.	1	0	0	1
Captorhinus sp.	0	1	0	0
Owenetta rubidgei	1	0	0	0
Anthodon serrarius	1	0	1	0

Table S1. Cont.

Permian species (n = 62)	Karoo	Luangwa	Ruhuhu	Chiweta
Nanoparia luckhoffi	1	0	0	0
Pareiasaurus serridens	1	0	1	0
Pareiasuchus nasicornis	1	1	0	0
Pareiasuchus peringueyi	1	0	0	0
Pumiliopareia pricei	1	0	0	0
GPIT K72	0	0	1	0

Specimen numbers are used to identify new taxa or new occurrences. The following museum abbreviations are used: BP, Bernard Price Institute for Palaeontological Research, Johannesburg; GPIT, Geologisch-Paläontologisches Institut Tübingen; NHCC, National Heritage Conservation Commission, Lusaka; NMT, National Museum of Tanzania, Dar es Salaam; OUMNH, Oxford University Museum of Natural History, Oxford.

Table S2. Occurrence data for Middle Triassic tetrapods

Triassic species (n = 68)	Karoo	Luangwa	Ruhuhu	Beacon
Angonisaurus cruickshanki	1	0	1	1
Kannemeyeria lophorhinus	1	0	0	0
‘Kannemeyeria’ latirostris	0	1	0	0
Kannemeyeria simocephalus	1	0	0	0
Kombuisia frerensis	1	0	0	0
Sangusaurus edentatus	0	1	0	0
Sangusaurus parringtonii	0	0	1	0
Shansiodon sp.	1	0	0	0
Tetragonias njalilus	0	0	1	0
Zambiasaurus submersus	0	1	0	0
Bauria cynops	1	0	0	0
Microgomphodon oligocynus	1	0	0	0
Aleodon brachyrhamphus	0	0	1	0
Bolotridon frerensis	1	0	0	0
Cistecynodon parvus	1	0	0	0
Cricodon metabolus	1	1	1	0
Cynognathus craternotus	1	0	0	1
Diademodon tetragonas	1	1	1	1
Langbergia modisei	1	0	0	0
Luangwa drysdalli	0	1	0	0
Lumkuia fuzzi	1	0	0	0
Scalenodon angustifrons	0	0	1	0
‘Scalenodon’ hirschsoni	0	0	1	0
‘Scalenodon’ attridgei	0	0	1	0
‘Scalenodon’ charigi	0	0	1	0
NHCC LB29, LB30	0	1	0	0
Trirachodon berryi	1	0	0	0
Trirachodon kannemeyeri	1	0	0	0
Bathignathus poikilops	1	0	0	0
Batrachosuchus browni	1	0	0	0
Batrachosuchus concordi	0	1	0	0
Cherninia megarhina	0	1	0	0
Jammerbergia formops	1	0	0	0
Kryostega collinsoni	0	0	0	1
Laidleria gracilis	1	0	0	0
Microposaurus casei	1	0	0	0
Paracyclotosaurus morganorum	1	0	0	0
AMNH 24411	0	0	0	1
Parotosuchus haughtoni	1	0	0	0
Stanocephalosaurus pronus	0	1	1	0
Trematosuchus sobeyi	1	0	0	0
Vanastega plurimidens	1	0	0	0
Watsonisuchus magnus	1	0	0	0
Xenotosuchus africanus	1	0	0	0
Teratophon spinigenis	1	0	0	0
Theledectes perforatus	1	0	0	0
Thelephon contritus	1	0	0	0
Thelerpeton oppressus	1	0	0	0
Asilisaurus kongwe	0	0	1	0
Erythrosuchus africanus	1	0	0	0
Euparkeria capensis	1	0	0	0
Howesia browni	1	0	0	0
Hypselorhachis mirabilis	0	0	1	0
UCMZ T997	0	0	1	0
‘Mandasuchus tanyauchen’	0	0	1	0
Mesosuchus browni	1	0	0	0
NHCC LB32	0	1	0	0
Palacrodon browni	1	0	0	0
NHMUK R36615	0	0	1	0
NHMUK PV R36619	0	0	1	0
NMT RB48	0	0	1	0
Nyasasaurus parringtoni	0	0	1	0
‘Pallisteria angustimentum’	0	0	1	0

Table S2. Cont.

Triassic species (n = 68)	Karoo	Luangwa	Ruhuhu	Beacon
Parringtonia gracilis	0	0	1	0
NHCC LB34	0	1	0	0
Stagonosuchus nyassicus	0	0	1	0
Stenaulorhynchus stockleyi	0	0	1	0
'Teleocrater rhadinus'	0	0	1	0

Specimen numbers are used to identify new taxa or new occurrences. The following museum abbreviations are used: AMNH, American Museum of Natural History, New York; BP, Bernard Price Institute for Palaeontological Research, Johannesburg; NHCC, National Heritage Conservation Commission, Lusaka; NHMUK, Natural History Museum, London; NMT, National Museum of Tanzania, Dar es Salaam; UCMZ, University of Cambridge Museum of Zoology, Cambridge.