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THE BIOSTRATIGRAPHY OF THE PERMIAN AND THE TRIASSIC

PART 5. A REVIEW OF THE CLASSIFICATION AND DISTRIBUTION OF PERMO-TRIASSIC TETRAPODS

by

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ABSTRACT

A tabulated synthesis of the classification, with geographic and stratigraphic ranges, of the Permo-Triassic tetrapod genera (amphibians, reptiles and mammals) is presented. 657 named genera placed in 161 families are in current use. The degree of stability of these genera and the extent to which they represent a reasonable sample of the preserved remains is considered. A correlation chart of the 148 known faunas has been prepared, on the basis of which a composite zonation scheme is proposed (17 Permian and 20 Triassic zones). The concept of tetrapod "Empires" is introduced. Six successive lowland "Empires" and five concurrent aquatic "Empires" (or provinces) are recognised, recorded and briefly discussed.

CONTENTS

INTRODUCTION

The present review forms the introduction to a more extensive work on the distribution and ecology of the Permo-Triassic tetrapod vertebrates, which is in the course of preparation (Anderson, Cruickshank, Keyser and Smith, in prep.). These works are designed as part of an on-going series of contributions on the "Biostratigraphy of the Permian and the Triassic" (Anderson and Anderson, 1970; Anderson, 1973, 1977; Anderson and Schwyzer, 1978). It is envisaged that from this series will emerge an integrated synthesis of plant and animal life, and their setting, during the Pangaeic phase of earth history.

CORRELATION AND ZONATION (Notes on Charts 2.1 and 2.2)

a. Charts 2.1 and 2.2 present a correlation scheme of the known tetrapod faunas from the productive zones, members and formations of the Permo-Triassic and lowermost Jurassic.

b. A total of 148 such faunas from 12 regions (continents or sub-continents) and 50 sub-regions (discrete basins, grabens or other sub-divisions of regions) are included.

c. A few very inadequately known faunas are not included in these charts. These are:

Arctic Canada	Cameron Island: Heiberg Form.	U. Trias.	Galt. and Cluver, 1976, p. 150
Siberia	Tunguska Basin: U. Angara Series	L. Perm.	Welles and Estes, 1969, p. 27
Japan		L. Trias.	Young, 1959, p. 77
Maranhao Basin	N. E. South America	L. Perm.	Huene, 1956, p. 64
SWAs	South West Asia	M. Trias	Romer, 1966, p. 371
EInd	East India	M. Trias.	Romer, 1966, p. 371

d. The shading scheme denoting amphibians, reptiles and marine reptiles is introduced to provide a ready visual impression of the distribution of the three broad categories of tetrapods.

e. The Standard Stages and Sub-stages and the absolute ages follow those adopted in Anderson (1973).

f. The correlations, which are based on all lines of evidence, follow with minor changes from Anderson and Anderson (1970) and Anderson (1973, 1977). Detailed explanation of these correlations is outside the scope of the present work. Only a few tetrapod faunas can be correlated directly, on the basis of associated ammonite assemblages, with the standard biostratigraphic scheme. Such cases are restricted to the L. Triassic amphibian faunas (e.g. in Madagascar and Spitzbergen), and the M. Triassic marine reptile faunas (e.g. in Israel and Switzerland).

g. Chart 2.2, set at a scale of 1 mm = 1 million years to coincide exactly with that followed throughout Chart 3, is a scaled down version of Chart 2.1 (set at a scale of 2,5 mm = 1 million years). This reduced version of the faunal correlations has been designed such that the stratigraphic ranges of the tetrapod genera (Chart 3) can be readily related to the stratigraphic distribution of the faunas.

h. Composite tetrapod zonation schemes for the Permian and Triassic, based primarily on the four most complete and best-known sequences, Texas, Central Europe, Russian Platform and Karoo Basin, are introduced for cross-reference with Charts 3 and 6. Seventeen such zones are recognised in the Permian and 20 in the Triassic.

CLASSIFICATION AND DISTRIBUTION (Notes on Charts 3.1 to 3.13)

a. These charts present the classification to generic level, with geographic and stratigraphic distribution, of the known Permo-Triassic tetrapods.

b. The classification is based on the latest authoritative works. In a number of orders and sub-orders more or less contemporary revisions or syntheses are to hand in which quite widely divergent schemes of classification have been proposed. It has been a general policy in such instances to follow the simpler scheme.

c. An impression of current research activity and the dispersed nature of the published data can be gained from the fact that 149 references (mostly from the last decade) have been directly relevant to and necessary for the compilation. These references are all cited on the charts, the principal works being listed first with those providing additional data included chronologically and in brackets beneath.

d. The geographic distribution of each genus is noted according to region and sub-region following the abbreviations as used in Chart 2.1. The stratigraphic range is recorded by zone:

WEu (C18,19) — horizons occur in zones 18 & 19
WEu (SW9.10) — horizon overlaps zones 9 & 10

e. Where we have been unable to establish the precise geographic origin of a genus, a space has been left. A dotted line indicates the generalised stratigraphic occurrence.

f. The region or sub-region for genera deriving from those few faunas (text-table above) not plotted on the correlation chart is included in square brackets.

g. A question mark preceding a taxon indicates that its position in the classification is uncertain; one preceding a region or sub-region or zone indicates that that particular occurrence is uncertain.

DIVERSITY AND STABILITY (Notes on Charts 5.1 and 5.2).

These charts are designed to stimulate consideration of the following two related questions concerning the genera of Permo-Triassic tetrapods in current use:

a. Is the present tally of 657 genera a reasonably comprehensive sample of the preserved and potentially recoverable material?

b. To what extent has taxonomic stability been achieved?

Chart 5.2. includes a histogram showing the number of genera (including junior synonyms and *nomina dubia*) established each year for the southern African Permo-Triassic. Component histograms illustrate the contributions of individual research workers. A total of 468 genera have been decribed to date, of which only 168 are retained. Approximately two-thirds of all genera have been reduced to synonym status, regarded as *nomina dubia*, or are otherwise invalid. The critical revisions which have led to these dramatic reductions have all appeared in the last decade, e.g.:

Boonstra, 1969	—	Dinocephalia
Sigogneau, 1970	—	Gorgonopsia
Hopson and Kitching, 1972	—	Cynodontia
Keyser, 1972, 1973b, c, 1975, 1978	—	Permian Dicynodontia
Galton and Cluver, 1976	—	Prosauropoda

Two clear phases in the history of tetrapod research in southern Africa can be recognised. The first, starting in 1844, was characterised by an ever increasing flow of newly described genera with very little attempt at critical review. This period was overwhelmingly dominated by Broom who, during a period of exactly half a century, from 1900 to 1950, instituted over 200 genera. The second phase, starting in 1969, is in contrast characterised by works aimed principally at critical revision with very few new genera being described.

The period of fruitful revisions is by no means over. The earlier generation of revisionists, e.g. Boonstra (1969) and Sigogneau (1970), although effecting considerable reductions, were nevertheless probably too conservative in their approach. The Dinocephalia and Gorgonopsia merit further review in our opinion.

Some 15 000 specimens, mostly skulls, have been collected to date and it seems likely that few new forms of generic rank will come to light. With continued research the eventual tally of genera for southern Africa is likely to be less than the current figure of 168.

Chart 5.1 includes a series of histograms showing the number of genera (excluding synonyms and *nomina dubia*) established each year for the world Permo-Triassic and for each of the sub-continental regions.

The history of description of Permo-Triassic tetrapod genera covers a period of 157 years, from 1821 to the present. Aside from the peaks in the late 1870s, early 1910s and the late 1930s, a gradual increase in activity occurred from the start of the period through to the early 1960s, with a steady and rapid decline thereafter. The decline over the last decade surely does not reflect a decline in research activity, as was the case, through the intervention of the world wars, for the two earlier slumps this century. On the contrary, the intensity of research work and the number of researchers must be at least as high or higher now than ever before.

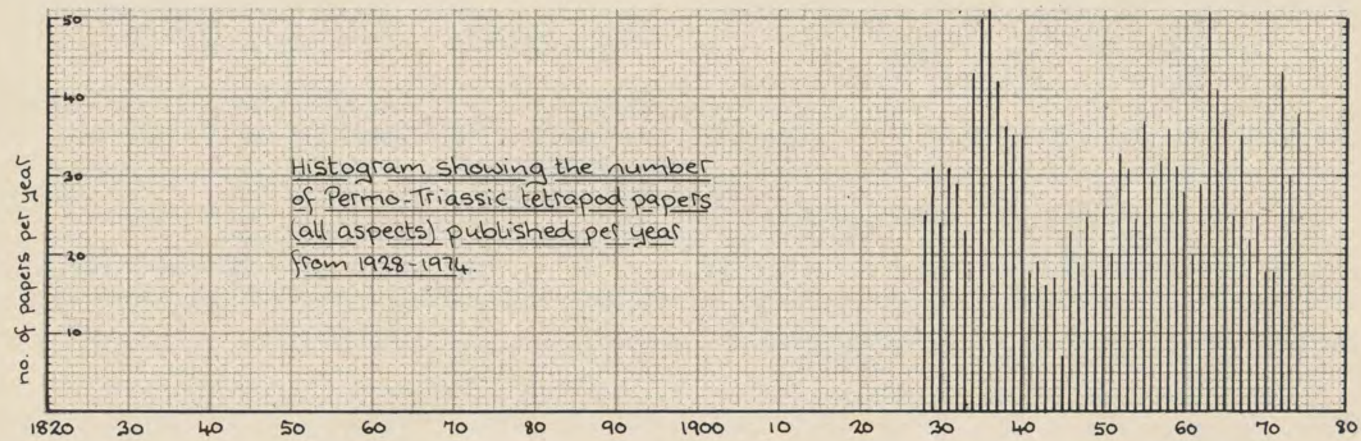
An attempt has been made, with only partial success, to verify this opinion. A histogram (below) showing the number of published Permo-Triassic tetrapod papers (all aspects of tetrapod research) per year was compiled. The data for this was fairly readily extracted from the two standard bibliographic works on vertebrate palaeontology (Camp *et al.*, 1940–42; 1949–73: Charles and Ostrom, 1973–76). Unfortunately the transfer of responsibility for the compilation of these bibliographies occurred just midway through the critical period (the last decade) with which we are here concerned. The disruption would appear to have affected the comprehensiveness of the lists of references cited.

material. More than likely, future taxonomic reductions will outnumber new additions. We would hazard the estimate, assuming that the theoretical concept of the genus remains much as it is today, that the generic count of Permo-Triassic tetrapods might stabilise at around 500.

EMPIRES AND PROVINCES (Notes on Chart 6)

A number of authors, e.g. Romer (1966, 1972, 1973, 1975), Anderson and Anderson (1970), Olson (1971), Milner and Panchen (1973), Cox (1973) and Kalandadze (1974), have recently contributed syntheses of distribution patterns of Permo-Triassic tetrapods. All emphasise the close relationships between certain faunas of now widely separated regions. The concept of a unified Pangaea enabling extensive intercontinental migrations to take place has become generally accepted. However, in view of the incompleteness of the fossil record and the imprecise nature of the correlations so far possible, no clear delineation of faunal provinces has emerged from the above works.

Romer (1966, 1972, 1973, 1975) recognised six clearly marked phases of evolutionary development in the Permo-Triassic tetrapods. These he equated loosely with the Lower, Middle and Upper Permian



As already noted for South Africa, research work on Permo-Triassic tetrapods, in a global context, has moved significantly towards taxonomic revisions and reductions and away from the descriptions of isolated material leading to the proliferation of new taxa. It is becoming increasingly evident, with each new critical review of the orders and sub-orders, and as the synonymy lists grow, that many genera are of a more cosmopolitan nature than was previously suspected. As collections accrue from the less-well-known regions (e.g. NAf, Mal, Ind, Aus, Ant) there is good reason to suspect that the majority of the genera unearthed will be already known from elsewhere.

We are inclined to the view, from the overall evidence, that the current tally of 657 genera comprises a reasonably complete sample of the recoverable

and Triassic. The relevant assemblages were referred to as belonging to the "A", "B" and "C" groups or faunas. Olson (1971) referred to Romer's groupings as faunal complexes and elaborated on his own earlier concept of the "chronofauna" (Olson, 1952). This concept unites faunas of a "similar character or cast" which "maintain a strong" though varying and evolving "structural consistency" through time and space. A chronofauna may maintain its identity over several million years but, considering the examples discussed (the "Permo-Carboniferous" and slightly younger "Caseid" chronofaunas of the United States) achieve a relatively limited geographic spread.

The data as presented in Chart 3 corroborates, with minor changes, Romer's six "faunal complexes" and prompts the suggestion that these may be equated with more globally recognised versions of Olson's chronofaunas. In the Permo-Triassic tetrapod faunas three broad ecologically and geographically distinct types of community are evident, i.e. aquatic, lowland and upland. Only minor intermixing occurs between them. The lowland faunas are by far the most prevalent, the aquatic faunas are less frequent and the upland faunas decidedly rare. The only known examples of the last are the Norian and Rhaetian fissure fillings of England and Wales.

It is in the lowland plains faunas that the six Permo-Triassic evolutionary pulses can be discerned. Each pulse is characterised by the appearance, diversification and spread of more advanced tetrapod communities which displaced the preceding faunas. The information as it presently exists is such that no obvious delineation of provinces or kingdoms within the successive lowland faunal complexes can be made. Rather, as with Olson's chronofaunas, each complex maintains a structural and taxonomic integrity throughout its geographic and stratigraphic extent. The component faunas vary through space and display evolutionary tendencies, but with no major dislocation to their essential unity. In their general nature the lowland complexes may be seen as analogous to the successive dominant empires shaping the course of human civilisation. It is therefore proposed that these complexes be referred to as "Empires".

Concurrent with the lowland empires occur aquatic tetrapod faunas of a wholly different cast. In the Permian such faunas are rare and are intimately associated with continental seas of limited extent and relatively short duration. They conform to the status of extant faunal provinces. In the Lower and Middle Triassic, aquatic tetrapod faunas of the inundated continental margins attain a geographic and stratigraphic spread more or less equivalent in scale to the contemporaneous lowland faunas and, as such, achieve empire status. No aquatic empires or provinces of post-Karnian Upper Triassic age are known.

The lowland empires are named after the dominant ubiquitous herbivorous families present; the aquatic empires (and provinces), being essentially devoid of tetrapod herbivores, are named after the dominant carnivorous families. The geographic extent of the empires (and provinces) is plotted on Chart 6.1 and the characteristic families, with zonal distribution, are listed on Chart 6.2.

There follows brief discussion of the six successive lowland empires and of the concurrent aquatic empires and provinces. Fuller discussion and integration with the tectonic, physiographic, climatic and floristic history of Pangaea is reserved for the work in preparation (Anderson *et al.*, in prep.).

1. *Lower Permian, Edaphosaurid Empire.* The Edaphosaurid Empire which continues through from the Upper Carboniferous appears to have been restricted to the equatorial belt of Euramerica. The tetrapod faunas were composed more or less evenly of amphibians and reptiles. Most of the amphibians were semi-aquatic, "living and feeding mostly in water but able to move about on land". The larger reptiles, primarily pelycosaurs such as the predaceous *Ophiacodon* and *Dimetrodon* and the herbivorous *Edaphosaurus* were terrestrial or semi-terrestrial, "living mainly on land but feeding primarily in water". The smaller reptiles, e.g. the captorhinomorphs and smaller pelycosaurs, were purely terrestrial (Olson, 1971, pp. 645–647).

The only known tetrapod beyond the equatorial belt was *Mesosaurus*, a small aquatic piscivore inhabiting the Karoo/Parana Sea of Gondwanaland.

2. *Middle Permian, Tapinocephalid Empire.* By the Middle Permian the first fully terrestrial communities, now strongly dominated by reptiles (primarily the therapsids or paramammals) had evolved. Coinciding with the northward drift of Pangaea through some 30 degrees of latitude, the plains communities are seen to have extended their range far beyond the equatorial belt. It is apparent, however, that colonisation into Asia and Eastern Gondwanaland was prevented, probably by mountain ranges and seas of the Uralian and Cape geosynclines respectively.

Within the general area occupied by the Tapinocephalid Empire occurred the Protorosaurid Aquatic Province of the Zechstein Sea.

3. *Upper Permian, Dicynodontid Empire.* By the Upper Permian, with the retreat of the Uralian and Cape geosynclinal seas (and indeed by the end of the Permian, through general uplift of Pangaea, of virtually all continental and marginal seas) general colonisation throughout Pangaea was achieved. The plains communities are still dominated by the therapsids, as they are till late in the Triassic, but by different groups thereof.

Again, as in the two earlier stages in the Permian, a single aquatic community of restricted geographic and temporal extent is known, i.e. that of the Tangasaurid Province of the Malagasy/Kenya Seaway.

4. *Lower Triassic, Lystrosaurid Empire.* The global extinctions seen in all walks of plant and marine animal life late in the Permian were paralleled in the tetrapod faunas. The relatively diverse therapsid faunas of the late Permian were decimated and replaced in the Lower Triassic by a very improverished plains community, dominated throughout their known range by the single herbivorous dicynodont genus *Lystrosaurus.*

During the Lower Triassic global marine transgressions occurred, flooding many of the low-lying littoral plains. The estuaries and swamps of this new habitat were inhabited by aquatic amphibian communities making up the extensive Trematosaurid/Rhytidosteid Empire of Eastern Gondwanaland and the East Greenland/Spitsbergen region.

5. *Middle Triassic, Kannemeyeriid/Diademodontid Empire.* The Middle Triassic witnessed renewed diversification amongst the therapsids (dicynodonts and cynodonts), and the flowering of the thecodonts (the forerunners of the dinosaurs) and the rhynchosaurs.

The widespread marine transgressions of the Lower Triassic continued, with different focus, in the Middle Triassic. The shores of the Tethys (including the epicontinental Muschelkalk Sea) and of western and arctic North America were flooded. In these regions arose the new and diverse classes of marine reptiles of the Nothosaurid/Mixosaurid Empire.

6. *Upper Triassic, Plateosaurid/Melanorosaurid Empire.* The changes which occurred approximately halfway through the Upper Triassic were as dramatic as any within the history of the tetrapods. Within a brief spell of time the dinosaurs virtually displaced the paramammals. The plains communities were now dominated by herds of massive plateosaurid and melanorosaurid dinosaurs. It is also during this phase of evolution that the earliest very small mammals made their appearance. These dramatic developments are associated with regressions, and widespread development of semi-desert and desert conditions.

No distinctive aquatic communities are known from this stage.

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CHART 1. PERMO-TRIASSIC TETRAPODS. GEOGRAPHIC OCCURRENCE.

Regions and Sub-regions included on Chart 2

1	California & Nevada	Ca	USA	United States of America
2	Arizona (Colorado Plateau)	Ar		
3	Utah	U		
4	Wyoming	W		
5	Colorado	C		
6	New Mexico	N		
7	Texas (N. Central)	T		
8	Oklahoma	O		
9	Kansas	K		
10	Pennsylvania	P		
11	Atlantic coast	At		
12	Scotland	Sc	WEu	Western Europe
13	England	E		
14	Central Europe (Germany etc)	C		
15	S. Switzerland (& N. Italy)	Sw		
16	Morocco	M	NAf	North Africa
17	Algeria (& N. Niger)	A		
18	Tunisia	T		
19	Israel	I		
20	E. Greenland	G	Arc	Arctic
21	Spitsbergen	S		
22	Russian Platform	P	EEu	Eastern Europe
23	Kweichow	K	SEAs	South Eastern Asia
24	Yunnan	Y		
25	Shansi	Sh		
26	Sinkiang	Si		
27	El Tranquilo Basin	E	SAm	South America
28	Puesto Viejo Basin	Pu		
29	Cacheuta Basin	C		
30	Ischigualasto/Villa Union Basin	I		
31	Parana Basin	Pa		
32	South West Africa (composite)	S	SAf	Southern Africa
33	South Africa (Karoo Basin)	K		
34	S. Rhodesia (Zambezi Valley)	Z		
35	Zambia (Luangwa Valley)	L		
36	Tanzania (Ruhuhu Valley)	R		
37	Tanzania/Kenya (Tanga Basin)	T		
38	Malagasy (Southern)	S	Mal	Malagasy
39	Malagasy (Northern)	N		
40	Himalayas (Kashmir & Salt Range)	H	Ind	India
41	Satpura region	Sa		
42	Pranhita-Godavari Valley	P		
43	Son Valley	So		
44	Damodar Valley	D		
45	N. Perth Basin	P	Aus	Australia
46	N. W. Canning Basin	C		
47	Bowen Basin	B		
48	Sydney Basin	S		
49	Tasmania	T		
50	Beardmore glacier	B	Ant	Antarctica

Sub-regions not included on Chart 2 (see text)

a) Arctic Canada (Cameron Island)
b) Siberia (Tunguska Basin)
c) Japan
d) E Ind — position unsure
e) SWAs — position unsure
f) Maranhao Basin

CHART 2.2 PERMO-TRIASSIC TETRAPODS
CORRELATION of FAUNAS

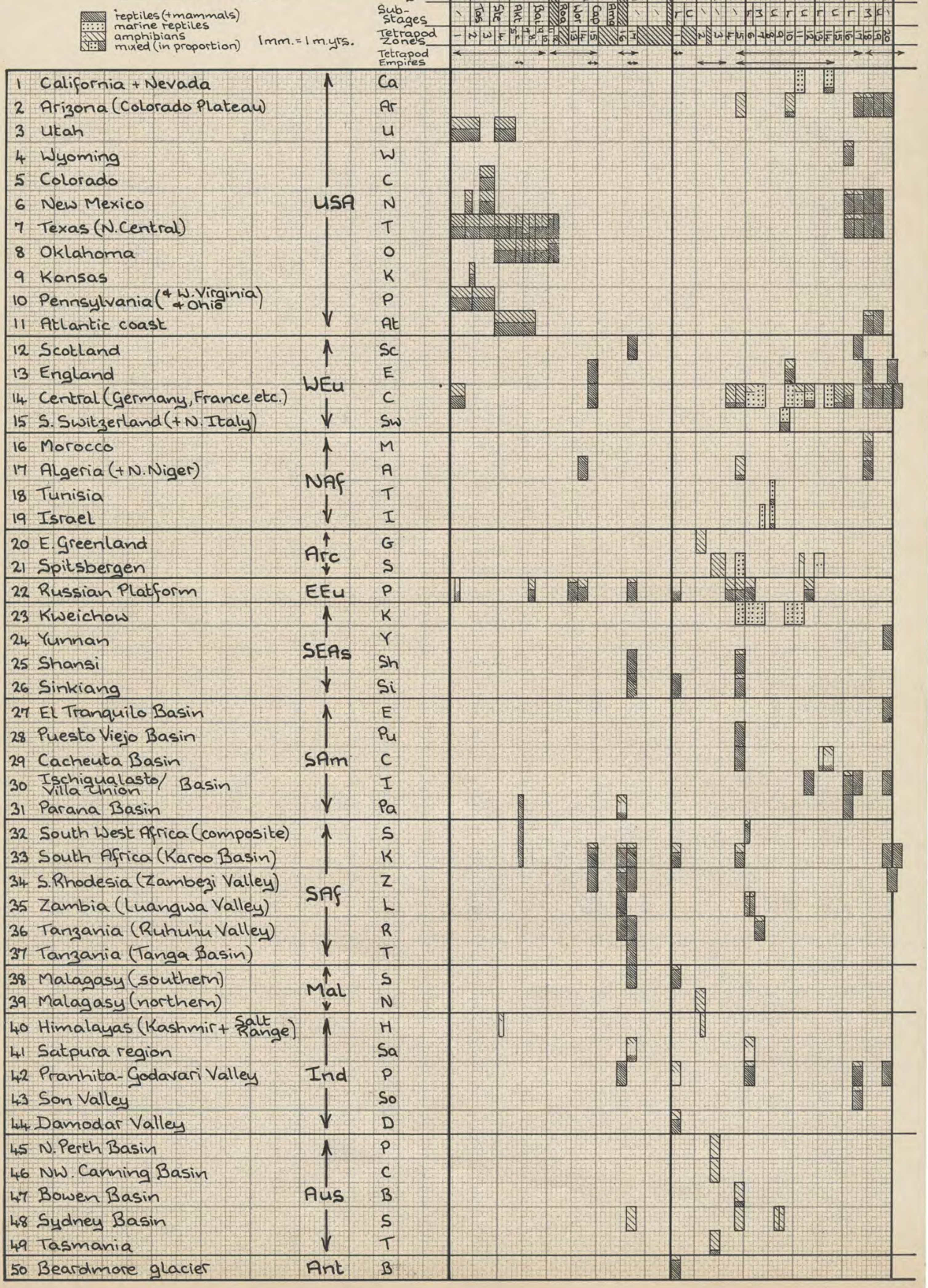


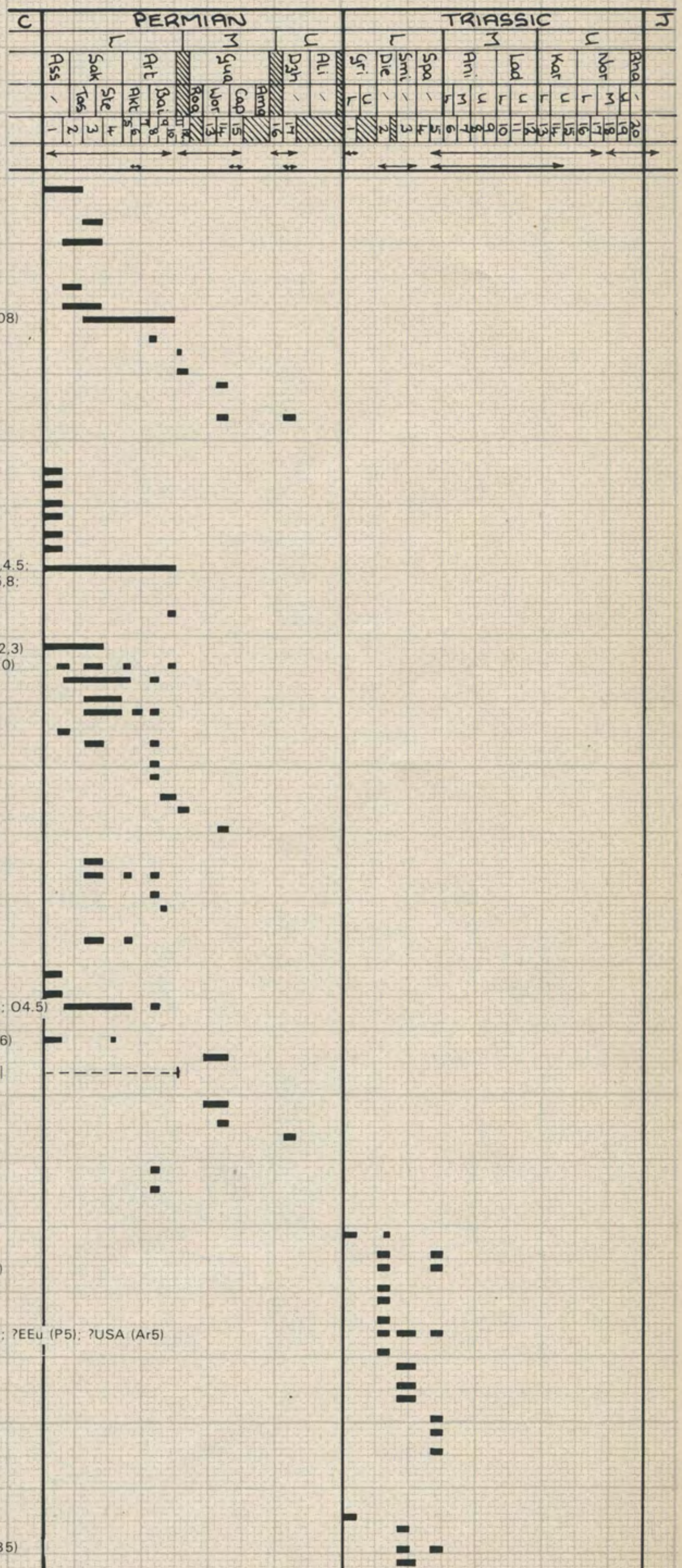
CHART 2.1

PERMO-TRIASSIC TETRAPODS CORRELATION of FAUNAS

CHART 3.1 PERMO-TRIASSIC TETRAPODS. CLASSIFICATION AND DISTRIBUTION

(Includes 657 named and 22 unnamed genera)

CLASS
SUBCLASS
INFRACLASS
ORDER
SUBORDER
INFRAORDER
SUPERFAMILY
FAMILY
SUBFAMILY
GENUS



	AMPHIBIA	
	LABYRINTHODONTIA	
	TEMNOSPONDYLI	
	RHACHITOMI	
	EDOPOIDEA	
Romer & Wit. 42	EDOPIDAE	
Langst. 53	Edops	USA (T1,2; N2)
	COCHLEOSAURIDAE	
Olson 55	Chenoprosopus	USA (N3);
	(unnamed)	USA (T2,3)
	TRIMERORHACHOIDEA	
	TRIMERORHACHIDAE	
	Acroplous	USA (K2)
	Neldasaurus	USA (T2,3)
Olson 55,62,65b	Trimerorhachis	USA (T3-10; N3; O8)
Hotton 59	Isodectes	USA (T8)
Chase 65	Slaughenhopia	USA (T11)
Welles & Estes 69	Nannospondylus	USA (O11.12)
	Chalcosaurus	EEu (P14)
	DVINOSAURIDAE	
	Dvinosaurus	EEu (P14,17)
	ERYOPOIDEA	
	ERYOPIDAE	
	Actinodon	WEu (C1)
Romer 66	Chelyderpeton	WEu (C1)
(Romer 35,47,52)	?Haplosaurus	WEu (C1)
(Langst. 53,63)	Onchiodon	WEu (C1)
(Olson 58,67)	Osteophorus	WEu (C1)
(Vaughn 62,64)	Sclerocephalus	WEu (C1)
(Lewis & Vaughn 65)	Eryops	USA (T1-10; U1,2,4,5; C3; N3; O4,5,8; P1-3; At4,8)
(Berm. 70)		
	(unnamed)	USA (T10)
	DISSOROPHIDAE	
	Platyhystrix	USA (U1,2; C3; N2,3)
	Tersomius	USA (T1/2,3,5; O10)
	Aspidosaurus	USA (T2-5,8; N3)
	Conjunctio	USA (T4; N3)
De Mar 68	Broiliellus	USA (T3,4,6,8)
(Olson 70)	Brevidorsum	USA (T1/2)
	Dissorophus	USA (T3,8)
	Longiscitula	USA (T8)
	Alegeinosaurus	USA (T8)
	Cacops	USA (T9,10)
	Fayella	USA (O11,12)
	Zygosaurus	EEu (P14)
	TREMATOPSIDAE	
	Ecolsonia	USA (N3)
Vaughn 69	Acheloma	USA (T3,5,8)
(Olson 41,56)	Trematops	USA (T8; O8)
	Trematopsis	USA (T9)
	PARIOXYIDAE	
Carr. 64	Parioxys	USA (T3,5)
Langst. 53	ZATRACHEIDAE	
Olson 65a	Acanthostoma	WEu (C1)
(Romer 35,47)	Dasyceps	WEu (C1)
	Zatrachys	USA (T2,4,5,8; N3; O4.5)
	ARCHEGOSAURIDAE	
	Archegosaurus	WEu (C1); ?Ind (H6)
	Platyops	EEu (P13,14)
Romer 66	Prionosuchus	SAm (Maranhao B)
(Romer 47)	MELANOSAURIDAE	
(v. Huene 56)	Melanosaurus	EEu (P13,14)
(Olson 57,62)	?Tryphosuchus	EEu (P14)
	Jugosuchus	EEu (P17)
	?INTASUCHIDAE	
	Intasuchus	EEu (P8)
	Syndiodosuchus	EEu (P8)
	TREMATOSAUROIDEA	
	TREMATOSAURIDAE	
	Gonioglyptus	Ind (D1; H2)
	Trematosuchus	EEu (P2); SAf (K5)
	Trematosaurus	Mal (N2); EEu (P5)
Romer 66	Lyrosaurus	Mal (N2)
(Buch. et al 65)	Ifasaurus	Mal (N2)
(Welles & Estes 69)	Wantzosaurus	Mal (N2)
(And. & And. 70)	Aphaneramma	Mal (N2); Arc (S3); ?EEu (P5); ?USA (Ar5)
(Chatt. & R.Ch. 74)	Stosschiosaurus	Arc (G12)
(Kitch. 78)	Lyrocephalus	Arc (P3)
	Platystega	Arc (S3)
	Tertrema	Arc (S3)
	Inflectosaurus	EEu (P5)
	Microposaurus	SAf (K5)
	?Laidleria	SAf (K5)
	RHYTIDOSTEOIDEA	
	RHYTIDOSTEIDAE	
	Rhytidosteus	SAf (K1)
Cosg. 74	Derwentia	Aus (T3)
	Deltasaurus	Aus (T3; P3; C3; B5)
	Peltostega	Arc (S3)

CHART 3.2 PERMO-TRIASSIC TETRAPODS. CLASSIFICATION AND DISTRIBUTION

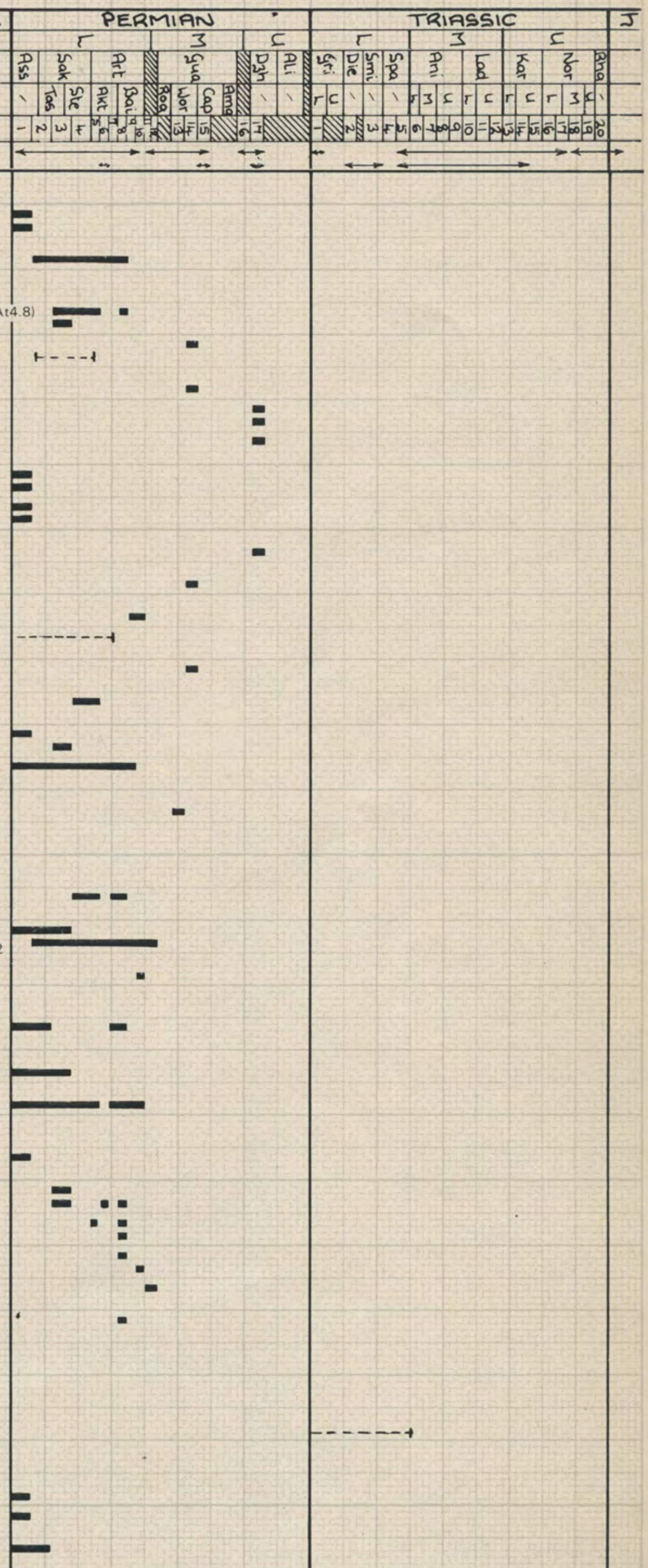
CLASS
SUBCLASS
INFRACLASS
ORDER
SUBORDER
INFRAORDER
SUPERFAMILY
FAMILY
SUBFAMILY
GENUS

C | PERMIAN | TRIASSIC | J

	AMPHIBIA	
	LABYRINTHODONTIA	
	TEMNOSPONDYLI	
	STEREOSPONDYLI	
	RHINESUCHOIDEA	
	RHINESUCHIDAE	
	Rhinesuchus	SAf (K15–17); SAm (P16)
Romer 66	Rhineceps	SAf (R16)
(Romer 47)	LYDEKKERINIDAE	
(Cosg. 74)	Lydekkerina	SAf (K1)
(Barb. 77)	Chomatobatrachus	Aus (T3)
(Chern. 78)	URANOCENTRODONTIDAE	
(Kitch. 78)	Laccosaurus	SAf (K17)
	Uranocentrodon	SAf (K1)
	?Sclerothorax	WEu (C4)
	BRACHYOPOIDEA	
	BRACHYOPIDAE	
	Austrobrachyops	Ant (B1)
	Bothriceps	Aus (S17)
Welles & Estes 69	Blinasaurus	Aus (C3; T3; S5)
Chern. 77	Batrachosuchus	SAf (K5); EEu (P5); SAf (L6)
(Colb. & Cosg. 74)	Brachyops	Ind (P1); Aus (B5)
	Hadrokkosaurus	USA (Ar10)
	Notobrachyops	Aus (S9)
	CHIGUTISAURIDAE	
Bonap. 75b	Pelorocephalus	SAm (C14, I 16)
	CAPITOSAUROIDEA	
	BENTHOSUCHIDAE	
	Gondwanosaurus	Ind (17)
	Pachygonia	Ind (D1)
Welles & Cosg. 65	Benthosuchus	EEu (P4); ?Mal (N2)
(Romer 47)	Parabenthosuchus	EEu (P4)
(Young 66)	Thoosuchus	EEu (P4)
(Welles & Estes 69)	CAPITOSAURIDAE	
(And. & And. 70)	Kestrosaurus	SAf (K1)
(Lehm. 71)	Parotosaurus	EEu (P4,5); WEu (C4,5); USA (Ar5); NAf (A5);
(Howie 72b)		SEAs (Sh5; Si5); SAf (K5; L6; R7)
(Chatt. & R.Ch. 74)		Ind (Sa6; P7); Aus (B5; S5,9)
(Paton 74a)	Paracyclotosaurus	Aus (S9)
(Chern. & Cosg. 75)	Cyclotosaurus	WEu (E10; C15,16,18,19); USA (Ar 10)
	MASTODONSAURIDAE	
	Mastodonsaurus	WEu (C5,6,11,12; E10); EEu (P12); ?Aus (9)
	Promastodonsaurus	SAm (I 16)
	METOPOSAUROIDEA	
Romer 66	METOPOSAURIDAE	
(And. & And. 70)	Metoposaurus	USA (Ar17,18; W16; T/N16,17; At18,19)
(Chatt. & R.Ch. 74)		WEu (C15,16); Ind (P17; So17)
	PLAGIOSAURIA	
	PELTOBATRACHIDAE	
	Peltobatrachus	SAf (R16)
Romer 66	PLAGIOSAURIDAE	
(And. & And. 70)	Plagiosuchus	WEu (C11)
(Parr. 74)	Plagiosternum	WEu (C11); Arc (S11)
	Plagiosaurus	WEu (C16,18,19)
	Gerrhothorax	WEu (C20)
	INCERTAE SEDIS	
	Lysipterygium	Ind (H4)
	Tungussogyrinus	[Siberia]
	Enosuchus	EEu (P14)
(Romer 47)	Indobrachyops	Ind (D1)
(Welles & Estes 69)	Tupilakosaurus	Arc (G2); EEu (P4)
Dutuit 72)	Boreosaurus	Arc (S3)
(Howie 72a)	Plagiorophus	EEu (P4)
(Kitch. 78)	Rewana	Aus (B5)
	Almasaurus	NAf (M18)
	Micropholis	SAf (K1)
	Limnoiketes	SAf (K1)

CHART 3.3 PERMO-TRIASSIC TETRAPODS. CLASSIFICATION AND DISTRIBUTION

CLASS
SUBCLASS
INFRACLASS
ORDER
SUBORDER
INFRAORDER
SUPERFAMILY
FAMILY
SUBFAMILY
GENUS



	AMPHIBIA	
	LABYRINTHODONTIA	
	BATRACHOSAURIA	
	ANTHRACOSAURIA	
	EOGYRINIDAE	
Panch. 70	Memonomenos	WEu (C1)
(Berm. 70)	Neopteroplax?	USA (T1)
	ARCHERIIDAE	
	Archeria	USA (T2-7; O4.5,?8 ?N3; ?K2)
	SEYMOURIAMORPHA	
	SEYMOURIIDAE	
	Seymouria	USA (T3,4,5,8; U4.5; At4.8)
	(unnamed)	USA (C3)
	Rhinosaurus	EEu (P14)
	?Gnorhimosuchus	EEu (P)
	KOTLASSIIDAE	
	?Nyctiboetus	EEu (P14)
	Kotlassia	EEu (P17)
	Buzulukia	EEu (P17)
	Bystrowiana	EEu (P17)
	DISCOSAURISCIDAE	
Romer 66	Discosauriscus	WEu (C1); EEu (P)
(Romer 35,44)	Letovertebron	WEu (C1)
(Langst. 53,63)	Melanerpeton	WEu (C1)
(Olson 58,67)	?Lusor	WEu (C1)
(Vaughn 62,64,66a)	CHRONIOSUCHIDAE	
(Lewis & Vaughn 65)	Chroniosuchus	EEu (P17)
(Berm. 70)	?NYCTEROLETERIDAE	
(Kuhn 72)	Nycteroleter	EEu (P14)
(Tatar. 72)	?WAGGONERIIDAE	
(Ivach. 73)	Waggoneria	USA (T9,10)
	?Helodectes	USA (T)
	?LANTHANOSUCHIDAE	
	Lanthanosuchus	EEu (P14)
	TSEAJAIIDAE	
	Tseajaia	USA (U4,5)
	DIADECTIDAE	
	Phanerosaurus	WEu (C1)
	Diasparactus	USA (N3)
	Diadectes	USA (T1-9; U1.2,4.5; C3; N3; O4.5,6,8; At4.8)
	Belebey	EEu (P13)
	LEPOSPONDYLI	
	NECTRIDEA	
	UROCORDYLIDAE	
	Crossotelos	USA (T7,8; O4.5,8)
	KERATERPETONTIDAE	
	Diploceraspis	USA (P1-3)
	Diplocaulus	USA (T2,4,5,7-10; U12 N3; O4-9,11,12)
	Peronedon	USA (O10)
	AISTOPODA	
	PHLEGETHONTIIDAE	
	Phlegethontia	USA (T7; U1.2; O8)
	MICROSAURIA	
Romer 66	MOLGOPHIDAE	
(Romer 35,52)	Megamolgophis	USA (P1-3)
(Olson 52,58,65b,67,70,72)	LYSOROPHIDAE	
(Langst. 53)	Lysorophus	USA (T7-10; O4.5,10; P1-3)
(Greg. et al 56)		
(Baird 64)	MICROBRACHIDAE	
(Vaughn 66b)	?Paramicrobrachis	WEu (C1)
(Berm. 70)	GYMNARTHRIDAE	
(Olson & Vaughn 70)	Pariotichus	USA (T3)
	Pantylus	USA (T3,6,8; N3)
	Cardiocephalus	USA (T5,8; O8)
	Euryodus	USA (T8; O8)
	Goniocara	USA (T8)
	Goniorhynchus	USA (O10)
	Cymatorhiza	USA (O11.12)
	TUDITANIDAE	
	?Ostodolepis	USA (T8)
	LISSAMPHIBIA	
	SALIENTIA	
	PROANURA	
Romer 66	TRIADOBATRACHIDAE	
	Triadobatrachus	Mal ( )
	INCERTAE SEDIS	
	INCERTAE SEDIS	
Romer 66	Broilisaurus	WEu (C1)
	Palaeosiren	WEu (C1)
Vaughn 65	LASALIDAE	
	Lasalia	USA (U1.2)

CHART 3.4 PERMO-TRIASSIC TETRAPODS. CLASSIFICATION AND DISTRIBUTION

CLASS
SUBCLASS
INFRACLASS
ORDER
SUBORDER
INFRAORDER
SUPERFAMILY
FAMILY
SUBFAMILY
GENUS

	REPTILIA	
	ANAPSIDA	
	COTYLOSAURIA	
	INCERTAE SEDIS	
	LIMNOSCELIDAE	
Carr. & Gask. 71	Limnosceloides	USA (N3; P2.3)
(Kuhn 69a)	Limnoscelis	USA (N3)
	Limnoscelops	USA (C3)
	CAPTORHINOMORPHA	
	ROMERIIDAE	
	Protorothyris	USA (T2; P1.2)
	Romeria	USA (T2,3)
	Protocaptorhinus	USA (T3,5)
	(undescribed)	USA (T3)
	Pleuristion	USA (O4.5)
	CAPTORHINIDAE	
	(unnamed)	USA (T5/6)
	(unnamed)	USA (T6)
	Captorhinus	USA (T8,?7; O8)
	Labidosaurus	USA (T8,O8)
	Captorhinoides	USA (T9)
	Labidosaurikos	USA (T9,10; O9)
	Captorhinikos	USA (T9,10; O10)
Carr. & Gask. 71	Kahneria	USA (T11,12)
Clark & Carr. 73	Rothioniscus	USA (T11,12)
Carr. 77	Rothia	USA (O11.12)
(Langst. 53)	Moradisaurus	NAf (A14)
(Wats. 54)	Gecatogomphius	EEu (P14)
(Vaughn 55,63)	INCERTAE SEDIS	
(Olson 58,62,65b,67,70)	Petrobates	WEu (C1)
(Kuhn 69a)	Sphenosaurus	WEu (C1)
(Daly 69)	Chamasaurus	USA (N3)
(Taq. 69)	Puercosaurus	USA (N3)
(Berm. 70)	(UNDESIGNATED)	
(Gow 72)	Batroptes	WEu (C1)
(Tatar. 74b)	ARAEOSCELIDAE	
(Kitch. 77)	Kadaliosaurus	WEu (C1)
	Araeoscelis	USA (T4,5,8)
	?Dictybolos	USA (O4,5)
	BOLOSAURIDAE	
	Bolosaurus	USA (T4,5); EEu (P1)
	ACLEISTORHINIDAE	
	Acleistorhinus	USA (O8)
	EUNOTOSAURIDAE	
	Eunotosaurus	SAf (K15)
	MILLERETTIDAE	
	?Broomia	SAf (K15)
	?Elliotsmithia	SAf (K15)
	Milleretta	SAf (K17)
	Millerosaurus	SAf (K17)
	Milleropsis	SAf (K17)
	PROCOLOPHONIA	
	PROCOLOPHONOIDEA	
	NYCTIPHRURETIDAE	
	Nyctiphruretes	EEu (P14)
	PROCOLOPHONIDAE	
	(unnamed)	Ind (P16)
	Owenetta	SAf (K17)
	Spondylolestes	SAf (K17)
	Estherrophagus	EEu (P17)
	Procolophon	SAf (K1); Ant (B1)
	Barasaurus	Mal (S1)
	Santaisaurus	SEAs (Si1)
	Phaanthosaurus	EEu (P4)
	Tichvinskia	EEu (P4)
	Burtensia	EEu (P4)
	Contritosaurus	EEu (P4)
	Koiloskiosaurus	WEu (C4)
Romer 66	Anomoiodon	WEu (C4,5)
Kuhn 69a	Orenburgia	EEu (P4,5,6)
(v. Huene 50)	Coelodontognathus	EEu (P5)
(Olson 57, 62)	Kapes	EEu (P5)
(Drys. & Kitch. 63)	Macrophon	EEu (P5)
(Krebs 69)	Vitalia	EEu (P5)
(And. & And. 70)	Sclerosaurus	WEu (C5)
(Bonap. 72)	Thelegnathus	SAf (K5)
(Kutty 72)	Neoprocolophon	SEAs (Sh5)
(Ivach. 73,74,75)	Paoteodon	SEAs (Sh5)
(Colb. & Kitch. 75)	Candelaria	SAm (Pa16)
(Gow 77)	Leptopleuron	WEu (Sc17)
(Kitch. 77)	Hypsognathus	USA (At19)
	Sphodrosaurus	USA (At19)
	PAREIASAUROIDEA	
	RHIPAEOSAURIDAE	
	Leptoropha	EEu (P14)
	Parabradysaurus	EEu (P14)
	Rhipaeosaurus	EEu (P14)
	PAREIASAURIDAE	
	Bradysaurus	SAf (K15)
	Embrithosaurus	SAf (K15)
	Parasaurus	WEu (C15)
	Pareiasaurus	SAf (K16,17; L16; R16); EEu (P17)
	Anthodon	SAf (K16; R16); EEu (P17)
	Scutosaurus	EEu (P17)
	Shihtienfenia	SEAs (Sh17)
	Elginia	WEu (Sc17)
Rom. 66	MESOSAURIA	
(Appl. et al 67)	MESOSAURIDAE	
(McL. & And. 73)	Mesosaurus	SAf (K7,S7); SAm (P7)
	CHELONIA	
	PROGANOCHELYDIA	
	PROGANOCHELYIDAE	
Romer 66	Proganochelys	WEu (C18)
(Mlyn. 76)	Proterochersis	WEu (C18)
(v. Huene 56)	Triassochelys	WEu (C19)
	?Saurischiocomes	WEu (C19)

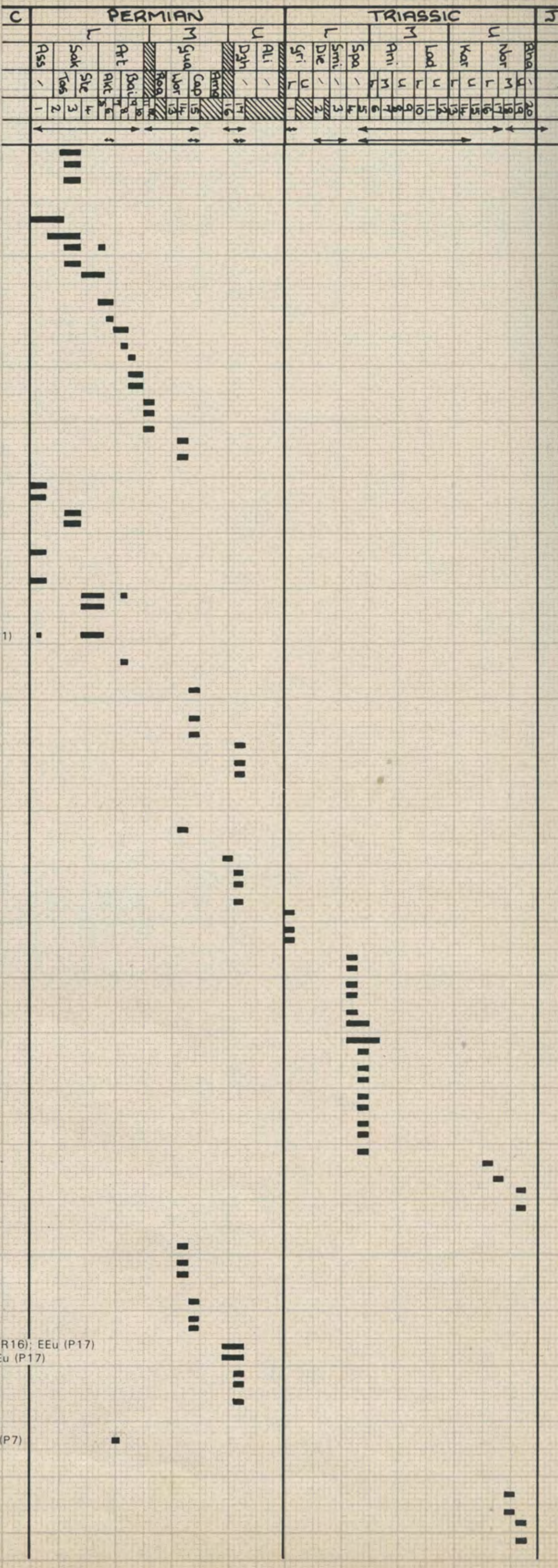


CHART 3.5 PERMO-TRIASSIC TETRAPODS. CLASSIFICATION AND DISTRIBUTION

CLASS / SUBCLASS / INFRACLASS / ORDER / SUBORDER / INFRAORDER / SUPERFAMILY / FAMILY / SUBFAMILY / GENUS

	REPTILIA	
	LEPIDOSAURIA	
	EOSUCHIA	
	YOUNGINIIDAE	
	Galesphyrus	SAf (K16)
	Heleosaurus	SAf (K16)
	Youngina	SAf (K17)
	TANGASAURIDAE	
Carr. 76b, c, 78	Hovasaurus	Mal (S17)
Harr. & Carr. 77	Tangasaurus	Mal (S17); SAf (T17)
	?Kenyasaurus	SAf (T17)
	UNDESIGNATED	
	Coelurosauravus	Mal (S17)
	Daedalosaurus	Mal (S17)
	THALATTOSAURIA	
	THALATTOSAURIDAE	
Romer 66	Askeptosaurus	WEu (Sw9.10)
(Kuhn 69b)	Nectosaurus	USA (Ca?14)
(K. Schn. 74)	Thalattosaurus	USA (Ca14)
	WEIGELTISAURIA	
	WEIGELTISAURIDAE	
	Weigeltisaurus	WEu (C15)
	PROTOROSAURIA	
	PROTOROSAURIDAE	
Romer 66	Protorosaurus	WEu (C15)
Kuhn 69b	?Trentinosaurus	WEu (C15)
(And. & And. 70)	?Adelosaurus	WEu (E15)
	TRACHELOSAURIDAE	
	Trachelosaurus	WEu (C4)
	TRILOPHOSAURIA	
	TRILOPHOSAURIDAE	
	Doniceps	EEu (P)
	?Anisodontosaurus	USA (Ar10)
	Gomphiosaurus	USA ( )
	Trilophosaurus	USA (T16)
	Tricuspisaurus	WEu (E18)
	Variodens	WEu (E18)
	RHYNCHOCEPHALIA	
	SPHENODONTIA	
	SPHENODONTIDAE	
	Schargengia	EEu (P5)
	Palacrodon	SAf (K5)
	Glevosaurus	WEu (E18)
	Brachyrhinodon	WEu (Sc17)
	Polysphenodon	WEu (C)
	?Pachystropheus	WEu (C20)
	(aff. Glevosaurus)	SAf (Z20.1)
	RHYNCHOSAURIA	
Appl. et al 67	RHYNCHOSAURIDAE	
Chatt. 69	MESOSUCHINAE	
And. & And. 70	Noteosuchus	SAf (K1)
(Romer 66)	Mesosuchus	SAf (K5)
(Kuhn 69b)	Howesia	SAf (K5)
(Carr. 76a)	RHYNCHOSAURINAE	
(Gow & Raath 77)	Stenaulorhynchus	SAf (R7)
	Rhynchosaurus	WEu (E10)
	HYPERODAPEDONTINAE	
	Scaphonyx	SAm (I 16)
	Hyperodapedon	WEu (Sc17)
	Paradapedon	Ind (P17)
	CLARAZISAURIA	
	CLARAZIIDAE	
	Clarazia	WEu (Sw9.10)
	Hescheleria	WEu (Sw9.10)
	SQUAMATA	
	LACERTILIA	
	EOLACERTILIA	
	PALIGUANIDAE	
	Saurosternon	SAf (K17)
	Palaeagama	SAf (K17)
Carr. 75,77	Paliguana	SAf (K1)
Carr. & Galt. 77	KUEHNEOSAURIDAE	
(And. & And. 70)	Kuehneosaurus	WEu (E18)
(Kitch. 77)	Kuehneosuchus	WEu (E18)
	Icarosaurus	USA (At18)
	INCERTAE SEDIS	
	FULENGIIDAE	
	Fulengia	SEAs (Y20)
	PARATHECODONTIA	
Gow 75b	PROLACERTIDAE	
(Wild 74)	Prolacerta	SAf (K1); ?Ant (B1)
(K. Schn. 74)	Macrocnemus	WEu (Sw9.10)
(And. & And. 70)	TANYSTROPHEIDAE	
	Tanystropheus	WEu (Sw9.10; C5-7,10-12); Naf (I 8)
	INCERTAE SEDIS	
Cruick. 78b	GALEOPSIDAE	
(Kitch. 77)	Galeops	SAf (K15)
	Galechirus	SAf (K16)
Romer 66	INCERTAE SEDIS	
Kuhn 69b	Aenigmasaurus	SAf (K1)
(Olson 62)	Mesenosaurus	EEu (P14)
(Krebs 69)	Eifelosaurus	WEu (C5)
(And. & And. 70)	Gwynnedosaurus	USA (At18)

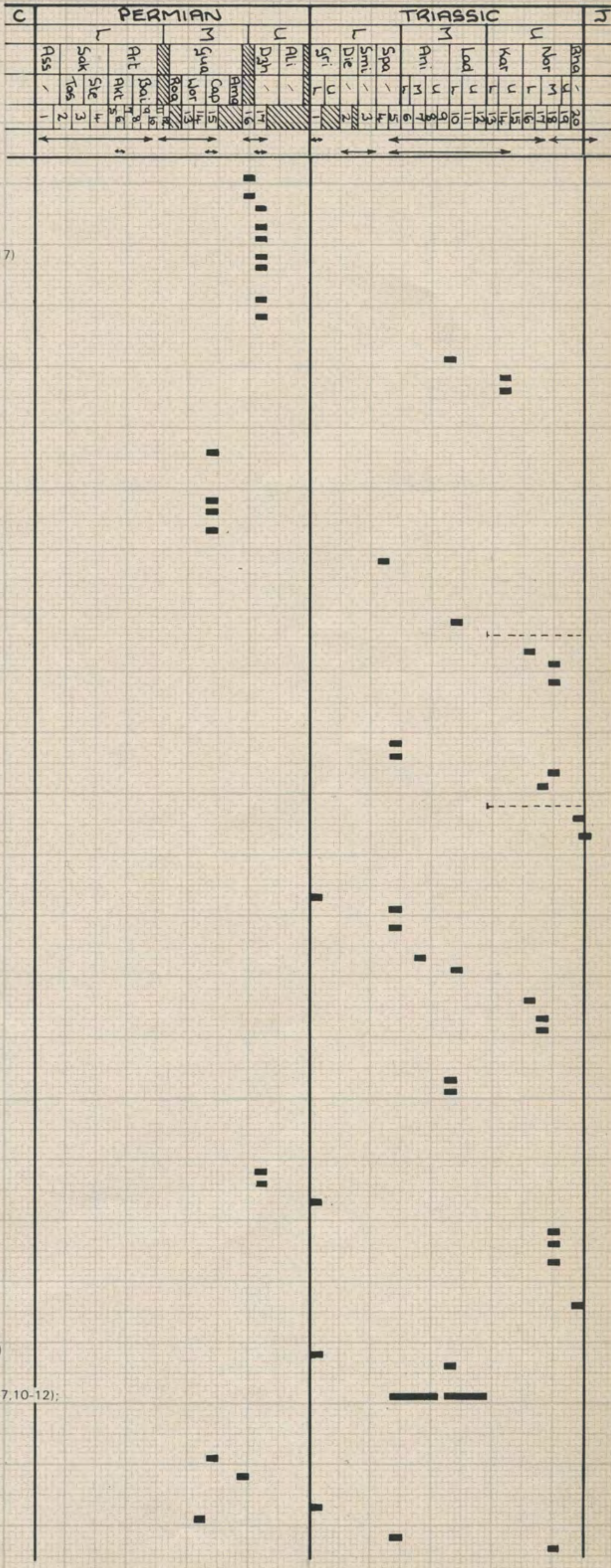
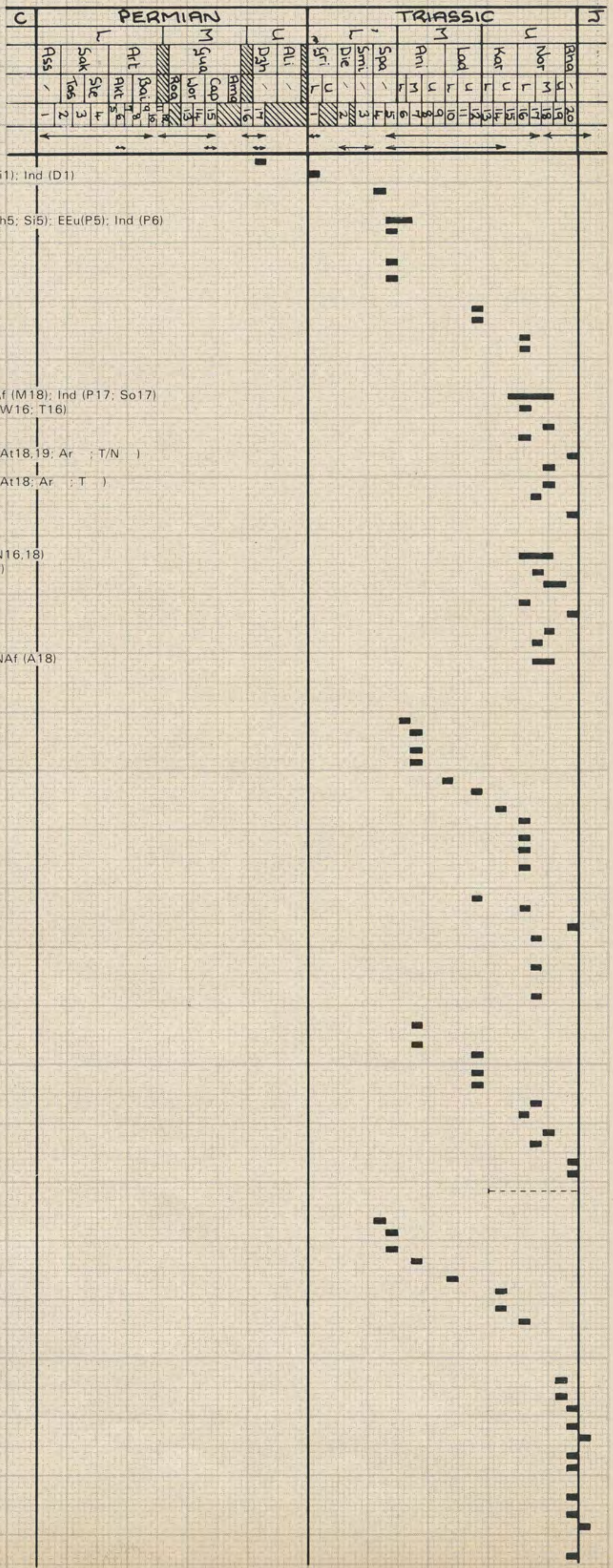


CHART 3.6 PERMO-TRIASSIC TETRAPODS. CLASSIFICATION AND DISTRIBUTION

CLASS
SUBCLASS
INFRACLASS
ORDER
SUBORDER
INFRAORDER
SUPERFAMILY
FAMILY
SUBFAMILY
GENUS



	REPTILIA	
	ARCHOSAURIA	
	THECODONTIA	
	PROTEROSUCHIA	
	PROTEROSUCHIDAE	
	Archosaurus	EEu (P17)
	Proterosuchus	SAf (K1); SEAs (Si1); Ind (D1)
	?Chasmatosuchus	EEu (P4)
	ERYTHROSUCHIDAE	
	Erythrosuchus	SAf (K5); SEAs (Sh5; Si5); EEu(P5); Ind (P6)
Cruick. 78a,b	Shansisuchus	SEAs (Sh5)
(Young 73a, b)	EUPARKERIIDAE	
(Chatt. 78)	Euparkeria	SAf (K5)
	Turfanosuchus	SEAs (Si5)
	PROTEROCHAMPSIDAE	
	Chanaresuchus	SAm (I 12)
	Gualosuchus	SAm (I 12)
	Cerritosaurus	SAm (Pa16)
	Proterochampsa	SAm (I 16)
	PARASUCHIA (PHYTOSAURIA)	
	PHYTOSAURIDAE	
	(incertae sedis)	WEu (C15,16); NAf (M18); Ind (P17; So17)
	Paleorhinus	WEu (C16); USA (W16; T16)
	Mystriosuchus	WEu (C18)
And. & And. 70	Angistorhinus	USA (W16, T16)
Westph. 76	Rutiodon	WEu (C20); USA (At18,19; Ar ; T/N)
	Belodon	WEu (C18)
	Nicrosaurus	WEu (C18); USA (At18; Ar ; T)
	Parasuchus	Ind (P17)
	?Pachysuchus	SEAs (Y20)
	AETOSAURIA	
	AETOSAURIDAE	
	Typothorax	USA (Ar17,18; T/N16,18)
Krebs. 76	Desmatosuchus	USA (Ar17; T/N17)
(Lehm. 71)	Stegomus	USA (At18,19)
(Romer 72)	Aetosauroides	SAm (I 16)
(Chatt. & R.Ch. 74)	Neoaetosauroides	SAm (I 20)
	Aetosaurus	WEu (C18)
	Stagonolepis	WEu (Sc17)
	(incertae sedis)	Ind (P17, So17); NAf (A18)
	PSEUDOSUCHIA	
	PRESTOSUCHIDAE	
	(unnamed)	Ind (P6)
	Pallisteria	SAf (R7)
	Mandasuchus	SAf (R7)
Romer 72	Stagonosuchus	SAf (R7)
(Chatt. & R.Ch. 74)	Ticinosuchus	WEu (Sw9.10)
(Krebs 76)	Luperosuchus	SAm (I 12)
(Cruick. 78b)	Cuyosuchus	SAm (C14)
	Prestosuchus	SAm (Pa16)
	Rauisuchus	SAm (Pa16)
	Hoplitosaurus	SAm (Pa16)
	Saurosuchus	SAm (I 16)
	ORNITHOSUCHIDAE	
	Gracilisuchus	SAm (I 12)
Bonap. 75a	Venaticosuchus	SAm (I 16)
	Riojasuchus	SAm (I 20)
	Ornithosuchus	WEu (Sc17)
	SCLEROMOCHLIDAE	
Krebs 76	Scleromochlus	WEu (Sc17)
	ERPETOSUCHIDAE	
	Erpetosuchus	WEu (Sc17)
	INCERTAE SEDIS	
	Teleocrater	SAf (R7)
	?Parringtonia	SAf (R7)
	?Lagerpeton	SAm (I 12)
	Lagosuchus	SAm (I 12)
	Lewisuchus	SAm (I 12)
	Hesperosuchus	USA (Ar17)
	Triassolestes	SAm (I 16)
	Saltoposuchus	WEu (C18)
Romer 72	Malerisuchus	Ind (P17)
(Chatt. & R.Ch. 74)	Strigosuchus	SEAs (Y20)
(Cruick. 78b)	Dibothrosuchus	SEAs (Y20)
	Dyoplax	WEu (C)
	?INCERTAE SEDIS	
	Ctenosauriscus	WEu (C4)
	Seemannia	WEu (C5)
	Crenelosaurus	WEu (C5)
	Hypselorhachis	SAf (R7)
	Arizonasaurus	USA (Ar10)
	Ocoyuntaia	SAm (C14)
	'Typothorax'	SAm (C14)
	Spondylosoma	SAm (Pa16)
	CROCODYLIA	
	PROTOSUCHIA	
	PROTOSUCHIDAE	
	Protosuchus	USA (Ar10)
	Stegomosuchus	USA (At19)
	Erythrochampsa	SAf (K20)
	Orthosuchus	SAf (K20)
	Notochampsa	SAf (K1)
Romer 72	?Platyognathus	SEAs (Y20)
(Steel 73)	?Microchampsa	SEAs (Y20)
	SPHENOSUCHIDAE	
	Hemiprotosuchus	SAm (I 20)
	Sphenosuchus	SAf (K20)
	?Pedeticosaurus	SAf (K1)
	?INCERTAE SEDIS	
	Pseudohesperosuchus	SAm (I 20)

CHART 3.7 PERMO-TRIASSIC TETRAPODS. CLASSIFICATION AND DISTRIBUTION

CLASS
SUBCLASS
INFRACLASS
ORDER
SUBORDER
INFRAORDER
SUPERFAMILY
FAMILY
SUBFAMILY
GENUS

	REPTILIA	
	ARCHOSAURIA	
	SAURISCHIA	
	THEROPODA	
	COELUROSAURIA	
	PROCOMPSOGNATHIDAE	
	Halticosuchus	WEu (C18)
	Procompsognathus	WEu (C18)
	PODOKESAURIDAE	
	Avipes	WEu (C12)
	Velocipes	WEu (C)
Steel 70	Dolichosuchus	WEu (C18)
(Raath 69)	Saltopus	WEu (Sc17)
	Spinosuchus	USA (T)
	Coelophysis	USA (Ar18; At19)
	Lukousaurus	SEAs (Y20)
	Syntarsus	SAf (Z20.1)
	CARNOSAURIA	
	POPOSAURIDAE	
	Poposaurus	USA (W16)
	SAUROPODOMORPHA	
	PROSAUROPODA	
	ANCHISAURIDAE	
	Efraasia	WEu (C18)
	Anchisaurus	USA (At19); SAf (K1)
Galt. & Cluv. 76	Thecodontosaurus	WEu (E20.1)
(And. & And. 70)	(indet.)	SAf (K20)
(Steel 70)	?(unnamed)	Ind (P20)
(Lehm. 71)	PLATEOSAURIDAE	
(Bonap. 72)	Plateosaurus	WEu (C18,19,20); ?SAm (E20)
(Bond 73)	Ammosaurus	USA (At19)
(Chatt. & R.Ch. 74)	Lufengosaurus	SEAs (Y20)
(v. Heerd. 78)	Euskelesaurus	SAf (K20)
	Massospondylus	SAf (K20.1; Z20.1)
	Aristosaurus	SAf (K1)
	(incertae sedis)	NAf (M18; A18); Ind (P20)
	MELANOROSAURIDAE	
v. Heerd. 78	Melanorosaurus	SAf (K20)
(Steel 70)	Riojasaurus	SAm (I 20)
(Bonap. 72)	Roccosaurus	SAf (K20)
	?Sinosaurus	SEAs (Y20)
	?Avalonianus	WEu (E20)
	INCERTAE SEDIS	
(Bonap. 72)	Arctosaurus	[Arctic Canada]
(Galt. & Cluv. 76)	Ischisaurus	SAm (I 16)
	Herrerasaurus	SAm (I 16)
	ORNITHISCHIA	
	ORNITHOPODA	
	FABROSAURIDAE	
	Fabrosaurus	SAf (K20)
Galt. 72	HETERODONTOSAURIDAE	
(Steel 69)	Pisanosaurus	SAm (I 16)
(Char. & Cromp. 74)	Lycorhinus	SAf (K20)
(Gow 75a)	Abrictosaurus	SAf (K20)
(Hops. 75)	Lanasaurus	SAf (K20)
(Bonap. 76)	Tatisaurus	SEAs (Y20)
	Geranosaurus	SAf (K1)
	Heterodontosaurus	SAf (K1)

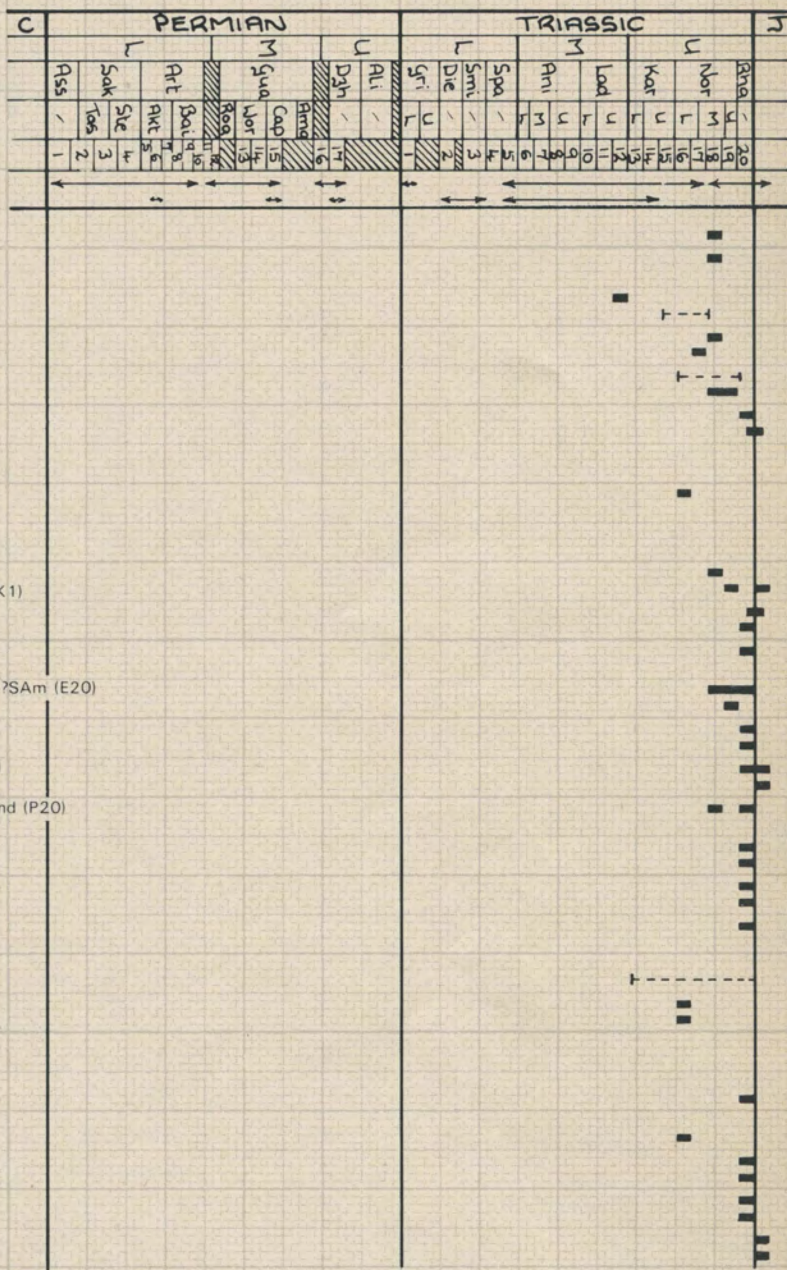
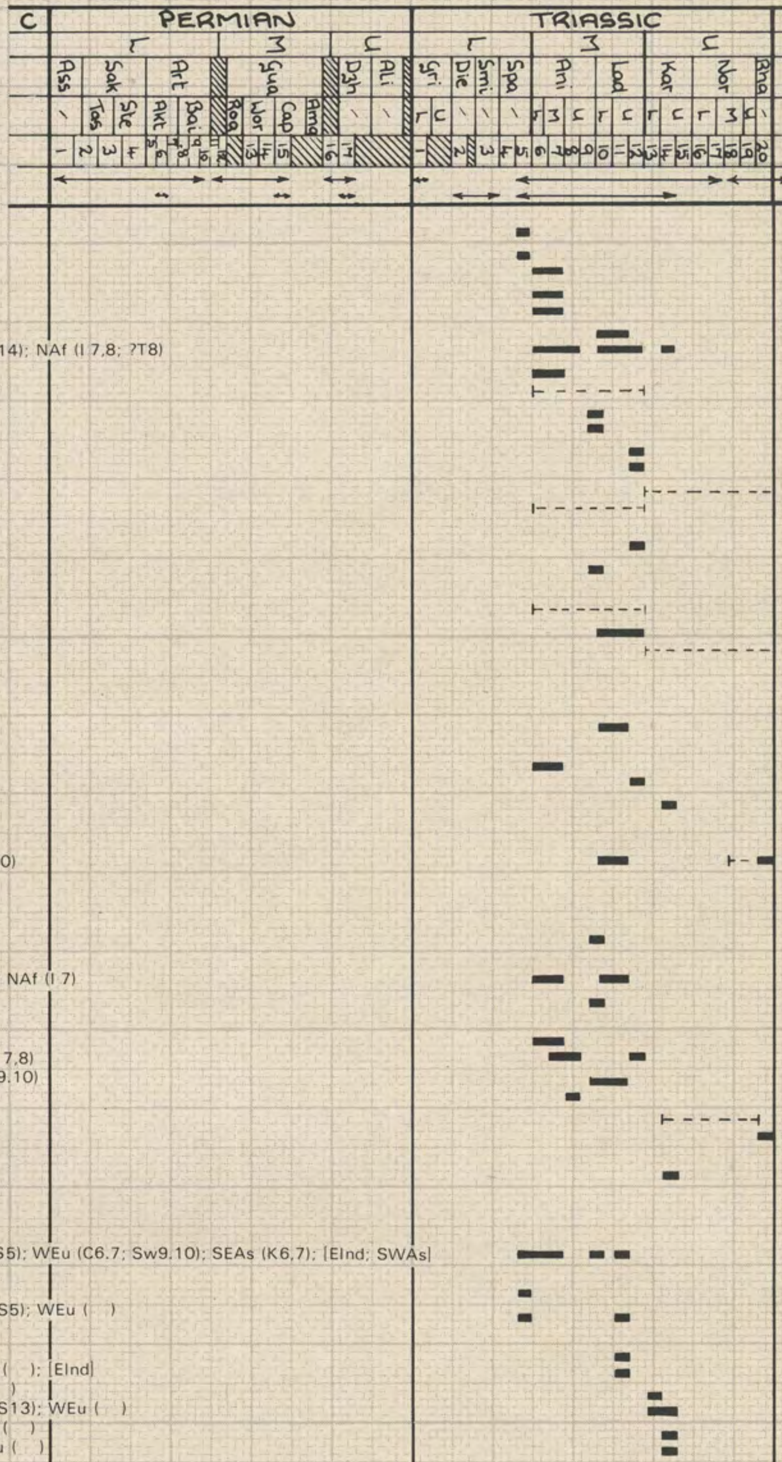


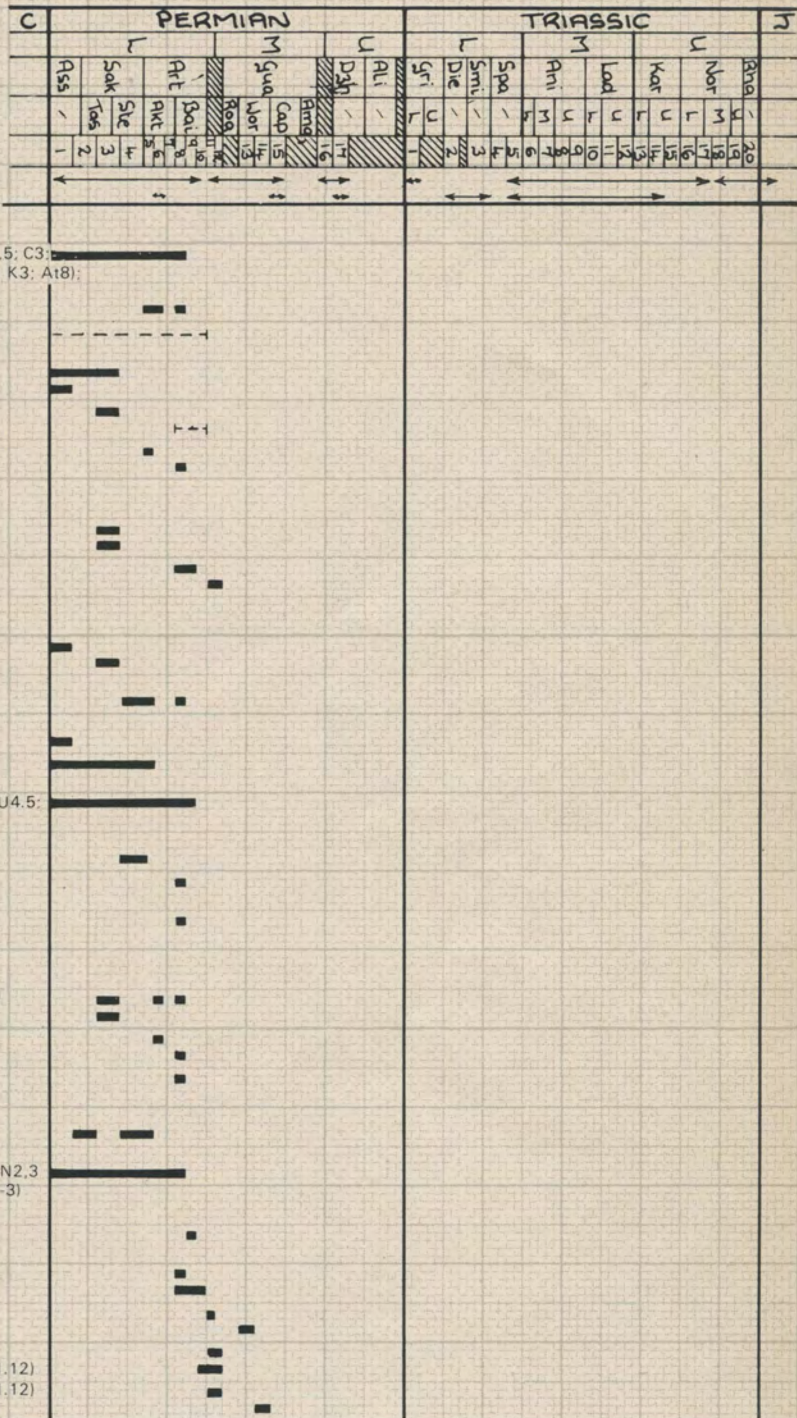
CHART 3.8 PERMO-TRIASSIC TETRAPODS. CLASSIFICATION AND DISTRIBUTION

CLASS
SUBCLASS
INFRACLASS
ORDER
SUBORDER
INFRAORDER
SUPERFAMILY
FAMILY
SUBFAMILY
GENUS



	REPTILIA	
	SAUROPTERYGIA	
	NOTHOSAURIA	
	NOTHOSAURIDAE	
	?Nothosauravus	WEu (C15)
	Metanothosaurus	SEAs [Japan 5]
	Kwangsisaurus	SEAs (K5)
	?Sanchiosaurus	SEAs (K6.7)
	Keichousaurus	SEAs (K6.7)
	?Nanchangosaurus	SEAs (K6.7)
	Chinchenia	SEAs (K10.11)
Romer 66	Nothosaurus	WEu (C6.7,10-12,14); NAf (I 7,8; ?T8)
Appl. et al. 67	Proneusticosaurus	WEu (C6.7)
(v. Huene 56)	Deirosaurus	WEu ( )
(Brotz. 57)	Ceresiosaurus	WEu (Sw9.10)
(Young 58,59,60,65a)	Paranothosaurus	WEu (Sw9.10)
(Hals. & Stew. 70)	Lariosaurus	WEu (C12)
(K. Schn. 74)	?Parthanosaurus	WEu (C12)
	Pontopus	WEu ( )
	Micronothosaurus	[SWAs]
	PACHYPLEUROSAURIDAE	
	Neusticosaurus	WEu (C12)
	Pachypleurosaurus	WEu (Sw9.10)
	SIMOSAURIDAE	
	?Elmosaurus	WEu ( )
	Simosaurus	WEu (C10-12)
	?Corosaurus	USA (W)
	PLESIOSAURIA	
	?PISTOSAUROIDEA	
	PISTOSAURIDAE	
	Pistosaurus	WEu (C10.11)
Romer 66	CYMATOSAURIDAE	
(v. Huene 56)	Cymatosaurus	WEu (C6.7)
(Perss. 63)	?Rhaeticonia	WEu (C12)
(Appl. et al 67)	?Sulmosaurus	WEu (C14)
	PLESIOSAUROIDEA	
	PLESIOSAURIDAE	
	Plesiosaurus	WEu (C10.11, ,20)
	PLACODONTOMORPHA	
	PLACODONTIA	
	HELVETICOSAURIDAE	
	Helveticosaurus	WEu (Sw9.10)
	PLACODONTIDAE	
Romer 66	Placodus	WEu (C6.7,10.11); NAf (I 7)
(Pey & K. Schn. 55)	Paraplacodus	WEu (Sw9.10)
(Brotz. 57)	PLACOCHELYIDAE	
(Appl. et al 67)	Saurosphargis	WEu (C6.7)
(Kuhn 69b)	Psephosaurus	WEu (C12); NAf (I 7,8)
(Hals. & Stew. 70)	Cyamodus	WEu (C10.11; Sw9.10)
(K. Schn. 74)	(undesignated)	NAf (T8)
	Placochelys	WEu (C)
	Psephoderma	WEu (C20)
	HENODONTIDAE	
	Henodus	WEu (C14)
	ICHTHYOPTERYGIA	
	ICHTHYOSAURIA	
	MIXOSAURIDAE	
	Mixosaurus	USA (Ca11); Arc (S5); WEu (C6.7; Sw9.10); SEAs (K6,7); [EInd; SWAs]
	OMPHALOSAURIDAE	
Romer 66	Grippia	Arc (S5)
(Merr. 08)	Omphalosaurus	USA (Ca11); Arc (S5); WEu ( )
(Buch. et al 65)	SHASTASAURIDAE	
(Young 65b)	?Chonespondylus	USA (Ca11)
(Appl. et al 67)	Cymbospondylus	USA (Ca11); WEu ( ); [EInd]
(K. Schn 74)	Pessosaurus	Arc (S13); WEu ( )
	Shastasaurus	USA (Ca14); Arc (S13); WEu ( )
	Toretocnemus	USA (Ca14); WEu ( )
	Merriamia	USA (Ca14); ?WEu ( )

CHART 3.9 PERMO-TRIASSIC TETRAPODS. CLASSIFICATION AND DISTRIBUTION



	CLASS	
	SUBCLASS	
	INFRACLASS	
	ORDER	
	SUBORDER	
	INFRAORDER	
	SUPERFAMILY	
	FAMILY	
	SUBFAMILY	
	GENUS	
	REPTILIA	
	SYNAPSIDA	
	PELYCOSAURIA	
	OPHIACODONTIA	
	OPHIACODONTIDAE	
	Ophiacodon	USA (T3-7; U1.2,4.5; C3; N2,3; O4.5,6; K3; At8); WEu (E1)
	Varanosaurus	USA (T5,6,8)
	Basicranion	USA ( )
	EOTHYRIDIDAE	
	Baldwinosaurus	USA (N3; P1.2)
	Stereophallodon	USA (T1)
	Oedaleops	USA (N3)
	Bayloria	USA (T)
	Eothyris	USA (T5)
	?Tetraceratops	USA (T8)
	SPHENACODONTIA	
	VARANOPSIDAE	
	Aerosaurus	USA (N3)
	Scoliomus	USA (N3)
	Varanops	USA (T8,9)
	Varanodon	USA (O11.12)
	SPHENACODONTIDAE	
	HAPTODONTINAE	
Romer & Price 40	Haptodus	WEu (C1; E1)
Romer 66	Cutleria	USA (C3)
(Romer 52)	SECODONTOSAURINAE	
(Langst. 53,63,65)	Secodontosaurus	USA (T4,5,8)
(Olson 58,62,65b,67)	SPHENACODONTINAE	
(Vaughn 62,63,64,66b)	Neosaurus	WEu (C1)
(Lewis & Vaughn 65)	Sphenacodon	USA (U4.5; N2,3) WEu (E1)
(Berm. 70)		
(Olson & Vaughn 70)	Dimetrodon	USA (T2-5, 7-11; U4.5; N3; P1-3; O4.5,6-9)
(Paton 74b)		
	Ctenospondylus	USA (T5; U4.5)
	Bathygnathus	USA (At8)
	INCERTAE SEDIS	
	?Thrausmosaurus	USA (O8)
	EDAPHOSAURIA	
	NITOSAURIDAE	
	Mycterosaurus	USA (T6; O8; At8)
	Nitosaurus	USA (N3)
	?Glaucosaurus	USA (T6)
	?Colobomycter	USA (O8)
	?Delorhynchus	USA (O8)
	LUPEOSAURIDAE	
	Lupeosaurus	USA (T2,4,5)
	EDAPHOSAURIDAE	
	Edaphosaurus	USA (T3-8; U1.2; N2,3 O4.5; K6; P1-3) WEu (C1)
	?(gen. nov.)	USA (T9)
	CASEIDAE	
	?Trichasaurus	USA (T8; At8)
	Casea	USA (T8-10)
	Caseoides	USA (T11)
Olson 68	Phreatophasma	EEu (P13)
	Caseopsis	USA (T11,12)
	Cotylorhynchus	USA (T11; O10,11.12)
	Angelosaurus	USA (T11,12; O11.12)
	Ennatosaurus	EEu (P14)

CHART 3.10 PERMO-TRIASSIC TETRAPODS. CLASSIFICATION AND DISTRIBUTION

CLASS
SUBCLASS
INFRACLASS
ORDER
SUBORDER
INFRAORDER
SUPERFAMILY
FAMILY
SUBFAMILY
GENUS

	REPTILIA	
	SYNAPSIDA	
	THERAPSIDA	
	PHTHINOSUCHIA	
	PHTHINOSUCHIDAE	
	Gorgodon	USA (T11)
	Knoxosaurus	USA (T11)
Romer 66	Steppesaurus	USA (T12)
(Olson 62,74)	Ivantosaurus	EEu (P13)
(Boonst. 69)	Eotitanosuchus	EEu (P13)
(Sigog. & Tchud. 72)	Biarmosaurus	EEu (P13)
(Tatar. 74a)	Biarmosuchus	EEu (P13)
	Phreatosuchus	EEu (P13)
	Phreatosaurus	EEu (P14)
	Phthinosaurus	EEu (P14)
	Phthinosuchus	EEu (P14)
	ANOMODONTIA	
	DINOCEPHALIA	
	DRIVERIIDAE	
	Driveria	USA (T11)
	MASTERSONIIDAE	
	Mastersonia	USA (T11)
Olson 62	TAPPENOSAURIDAE	
	Tappenosaurus	USA (T11)
	BRITHOPODIDAE	
	Eosyodon	USA (T11)
	Archaeosyodon	EEu (P13)
	Chthomatopus	EEu (P13)
	Brithopus	EEu (P14)
	Notosyodon	EEu (P14)
	Syodon	EEu (P14)
	Titanophoneus	EEu (P14)
	ANTEOSAURIDAE	
	Admetophoneus	EEu (P14)
	Deuterosaurus	EEu (P14)
	Doliosauriscus	EEu (P14)
	Anteosaurus	SAf (K15)
	Paranteosaurus	SAf (K15)
	TITANOSUCHIDAE	
	Jonkeria	SAf (K15)
	Titanosuchus	SAf (K15)
	TAPINOCEPHALIDAE	
	STRUTHIOCEPHALINAE	
	Struthiocephalus	SAf (K15)
	Struthiocephaloides	SAf (K15)
Boonst. 69	Struthionops	SAf (K15)
(Kalan. et al 68)	Taurocephalus	SAf (K15)
	MOSCHOPINAE	
	Avenantia	SAf (K15)
	Criocephalus	SAf (K15; Z15)
	Delphinognathus	SAf (K15)
	Moschops	SAf (K15); EEu (P14)
	RIEBEECKOSAURINAE	
	Riebeeckosaurus	SAf (K15)
	TAPINOCEPHALINAE	
	Keratocephalus	SAf (K15)
	Mormosaurus	SAf (K15)
	Phocosaurus	SAf (K15)
	Tapinocephalus	SAf (K15)
	STYRACEPHALIDAE	
	Styracephalus	SAf (K15)
	ESTEMMENOSUCHIDAE	
	Anoplosuchus	EEu (P13)
	Estemmenosuchus	EEu (P13)
	Molybdopygus	EEu (P14)

C	PERMIAN			TRIASSIC			J
	L	M	U	L	M	U	
	Ass, Sak, Art, Gua, Dzh, Ali			Gri, Die, Smi, Spa, Ani, Lad, Kar, Nor, Rha			
	1 – 9, 10 – 15, 16, 17			1 – 20			

CHART 3.11 PERMO-TRIASSIC TETRAPODS. CLASSIFICATION AND DISTRIBUTION

CLASS
SUBCLASS
INFRACLASS
ORDER
SUBORDER
INFRAORDER
SUPERFAMILY
FAMILY
SUBFAMILY
GENUS

	REPTILIA	
	SYNAPSIDA	
	THERAPSIDA	
	ANOMODONTIA	
	VENYUKOVIAMORPHA	
	VENYUKOVIIDAE	
Romer 66	?Dimacrodon	USA (T11)
(Olson 62)	Otsheria	EEu (P13)
	Venyukovia	EEu (P14)
	ENDOTHIODONTIA	
	ENDOTHIODONTIDAE	
	Endothiodon	SAf (K16; L16; R16; Z16); SAm (Pa16); Ind (P16)
	DICYNODONTIA	
	PRISTERODONTIDAE	
	Emydops	SAf (K16; L16)
	Pristerodon	SAf (K16; L16)
	Tropidostoma	SAf (K16)
	Brachyuraniscus	SAf (K16)
Keys 72,73b,c,75,78	Palemydops	SAf (K17)
Keys. & Smith 78	DICYNODONTIDAE	
(v. Huene 50)	Diictodon	SAf (K15-17; L16); SEAs (Si17)
(Drysd. & Kitch. 63)	Dicynodon	SAf (K16,17; L16)
(Kutty 72)	Kingoria	SAf (K16,17)
(Bond 73)	Kombuisia	SAf (K5)
(Barb. 77)	Daptocephalus	SAf (K17; R17)
(Cluv. 77)	Dinanomodon	SAf (K17)
(Kitch. 77)	Odontocyclops	SAf (L16)
(Cruick. 78b)	CISTECEPHALIDAE	
	Cistecephalus	SAf (K16; L16); ?Ind (P16)
	Kawingasaurus	SAf (R16)
	AULACEPHALODONTIDAE	
	Aulacephalodon	SAf (K16; L16)
	Pelanomodon	SAf (K17; R17)
	CRYPTODONTIDAE	
	Oudenodon	SAf (K16,17; L16)
	Rhachiocephalus	SAf (K16; L16; R16)
	Propelanomodon	SAf (K17)
Keys. 78	INCERTAE SEDIS	
(Olson 57)	Gordonia	WEu (Sc17)
(Sun 73)	Geikia	WEu (Sc17)
	(incertae sedis)	SEAs (Si17); EEu (P17)
	MYOSAURIDAE	
	Myosaurus	SAf (K1)
	LYSTROSAURIDAE	
	Lystrosaurus	SAf (K1); Ind (D1); Ant (B1); SEAs (Si1); EEu (P1)
	KANNEMEYERIIDAE	
	KANNEMEYERIINAE	
	Kannemeyeria	SAf (K5; L6; R7); SAm (Pu5); Ind (P6); EEu (P6)
	Rhadiodromus	EEu (P6)
	INCERTAE SEDIS	
	Sanguasaurus	SAf (L6)
	Wadiasaurus	Ind (P6)
Keys. & Cruick. 78	DINODONTOSAURINAE	
	Sinokannemeyeria	SEAs (Sh5)
	Shansiodon	SEAs (Sh5); SAm (C5); SAf (R7)
	Rhinodicynodon	EEu (P6)
	Dolichuranus	SAf (S6; L6)
	Dinodontosaurus	SAm (I 16; Pa16)
	STAHLECKERIINAE	
	Stahleckeria	SAm (Pa16);
	Ischigualastia	SAm (Pa16)
	Placerias	USA (W16; Ar17)
	JACKELERIINAE	
	Jackeleria	SAm (I 17)
	INCERTAE SEDIS	
	Elephantosaurus	EEu (P12)

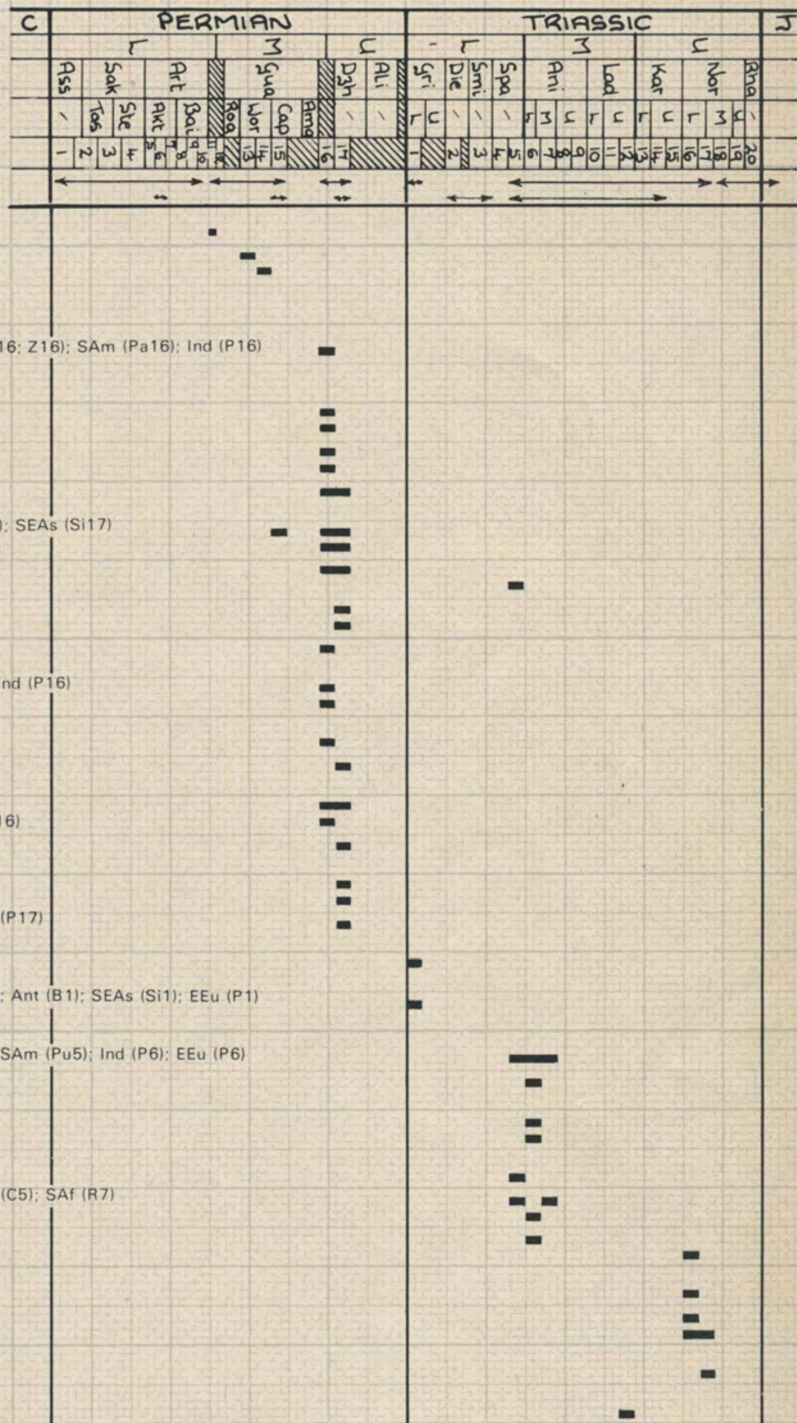
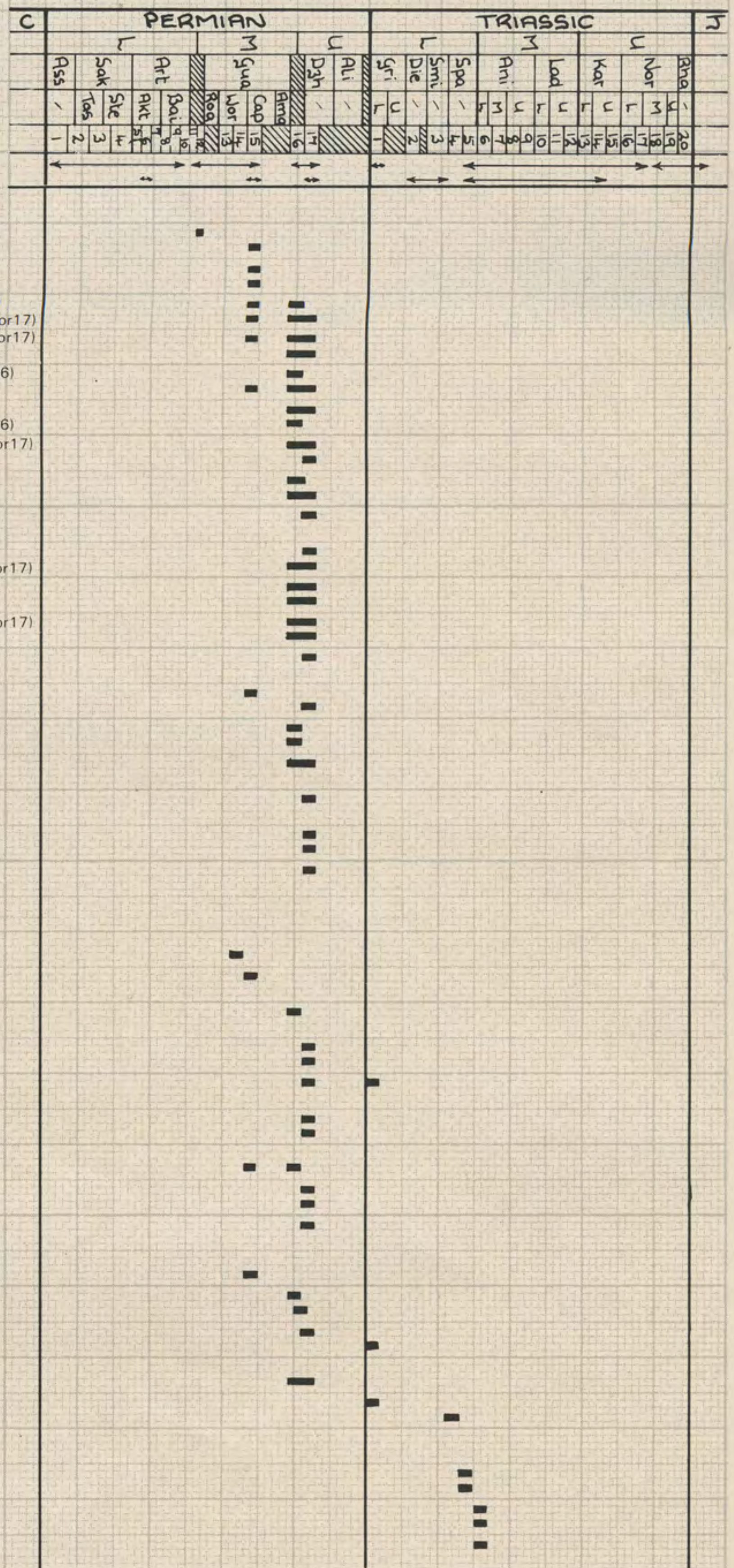


CHART 3.12 PERMO-TRIASSIC TETRAPODS. CLASSIFICATION AND DISTRIBUTION

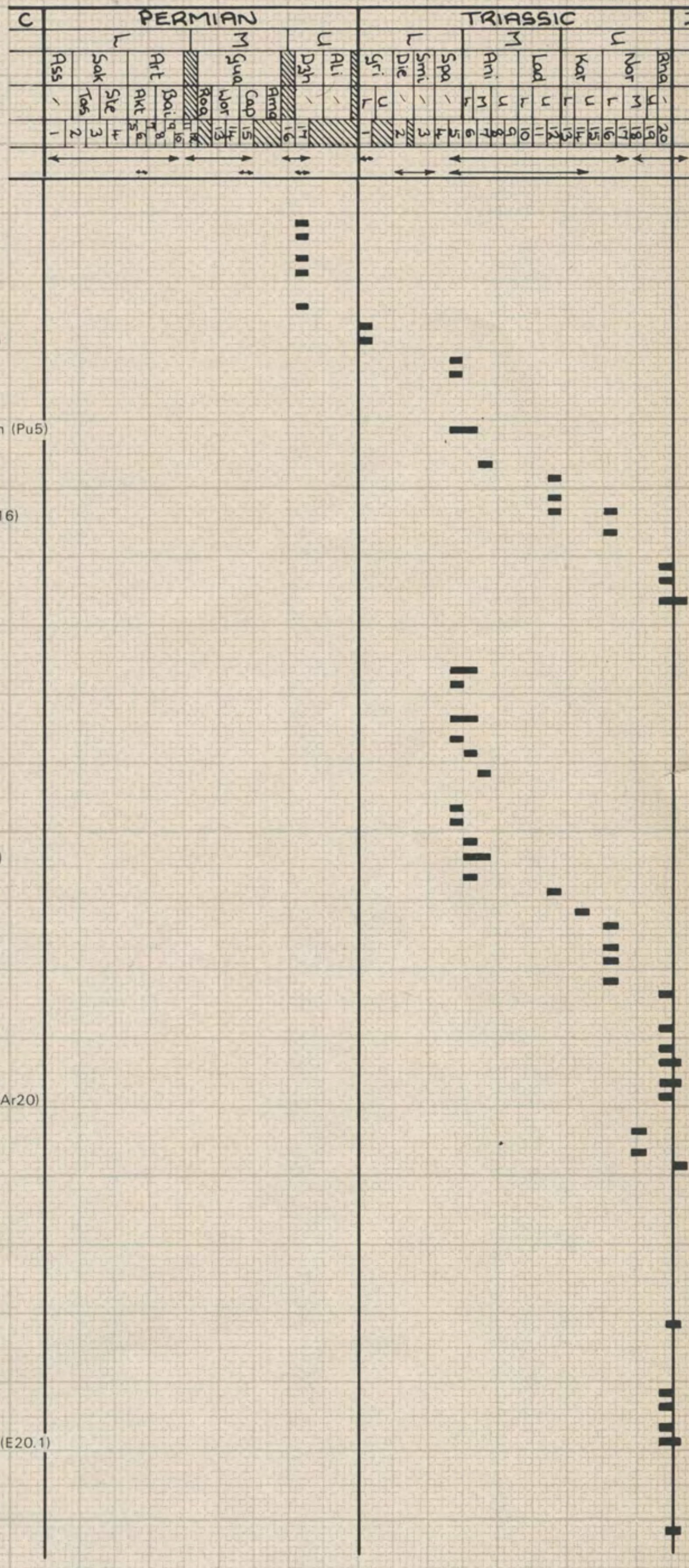
CLASS
SUBCLASS
INFRACLASS
ORDER
SUBORDER
INFRAORDER
SUPERFAMILY
FAMILY
SUBFAMILY
GENUS



	REPTILIA	
	SYNAPSIDA	
	THERAPSIDA	
	THERIODONTIA	
	GORGONOPSIA	
	GORGONOPSIDAE	
	GORGONOPSINAE	
	Watongia	USA (O12)
	Broomisaurus	SAf (K15)
	Galesuchus	SAf (K15)
	Eoarctops	SAf (K15)
	Gorgonops	SAf (K15,16; R16)
	Aelurosaurus	SAf (K15-17; R16or17)
	Arctognathus	SAf (K15-17; R16or17)
	Aloposaurus	SAf (K16,17)
	Scylacops	SAf (K16; R16; L16)
	Scylacognathus	SAf (K15-17)
	Arctops	SAf (K16,17)
	Aelurognathus	SAf (K16; R16; L16)
	Lycaenops	SAf (K16,17; R16or17)
Sigog. 70	Paragalerhinus	SAf (K17)
(Olson 74)	Cerdorhinus	SAf (K16)
(Kitch. 77)	Cyonosaurus	SAf (K16,17)
	Leontocephalus	SAf (K17; R17)
	RUBIDGEINAE	
	Sycosaurus	SAf (K17; R17)
	Prorubidgea	SAf (K16,17; R16or17)
	Clelandina	SAf (K16,17)
	Gorgognathus	SAf (R16,17)
	Dinogorgon	SAf (K16,17; R16or17)
	Rubidgea	SAf (K16,17)
	Broomicephalus	SAf (K17)
	ICTIDORHINIDAE	
	Hipposaurus	SAf (K15)
	Ictidorhinus	SAf (K17)
	Lycaenodon	SAf (K16)
	Lemurosaurus	SAf (K16)
	Rubidgina	SAf (K16,17)
Tatar. 74a	BURNETIIDAE	
	Proburnetia	EEu (P17)
	INOSTRANCEVIIDAE	
Romer 66	Inostrancevia	EEu (P17)
(Tatar. 74a)	Pravoslavlevia	EEu (P17)
	Sauroctonus	EEu (P17)
	THEROCEPHALIA	
	PRISTEROGNATHIDAE	
	Porosteognathus	EEu (P14)
	Pristerognathus	SAf (K15)
	EUCHAMBERSIIDAE	
	Euchambersia	SAf (K16)
	MOSCHORHINIDAE	
	Annatherapsidus	EEu (P17)
	Cthonasaurus	EEu (P17)
	Moschorhinus	SAf (K17,1)
	WHAITSIIDAE	
	Whaitsia	SAf (K17; R17)
	Moschowhaitsia	EEu (P17)
	INCERTAE SEDIS	
Kitch. 77	(incertae sedis)	SAf (Z15,16; L16)
(v. Huene 50)	Urumchia	SEAs (Si17)
(Drysd. & Kitch. 63)	Hexacynodon	EEu (P17)
(Bond 73)	Scylacosaurus	EEu (P17)
(Keys 73a,78)	SCALOPOSAURIA	
(Mendr. 74a,b)	ICTIDOSUCHOIDEA	
(Tatar. 74a)	Icticephalus	SAf (K15)
(v.d. Heev. 77)	Ictidosuchoides	SAf (K16)
	Silphoictidoides	SAf (R16or17)
	Ictidosuchops	SAf (K17)
	Oliviera	SAf (K1)
	SCALOPOSAURIDAE	
	Tetracynodon	SAf (K16,17)
	Scaloposaurus	SAf (K1)
	Scalopognathus	EEu (P4)
	BAURIAMORPHA	
	BAURIIDAE	
	Bauria	SAf (K5)
	Sesamodon	SAf (K5)
	Herpetogale	SAf (S6)
	Dongusaurus	EEu (P6)
	Nothogomphodon	EEu (P6)

CHART 3.13 PERMO-TRIASSIC TETRAPODS. CLASSIFICATION AND DISTRIBUTION

CLASS
SUBCLASS
INFRACLASS
ORDER
SUBORDER
INFRAORDER
SUPERFAMILY
FAMILY
SUBFAMILY
GENUS



	REPTILIA	
	SYNAPSIDA	
	THERAPSIDA	
	THERIODONTIA	
	CYNODONTIA	
	CYNOGNATHOIDEA	
	PROCYNOSUCHIDAE	
	Procynosuchus	SAf (K17)
	Parathrinaxodon	SAf (K17)
	Dvinia	EEu (P17)
	?Nanocynodon	EEu (P17)
	GALESAURIDAE	
	Cynosaurus	SAf (K17)
	Galesaurus	SAf (K1)
	Thrinaxodon	SAf (K1); Ant (B1)
	Tribolodon	SAf (K5)
	(incertae sedis)	EEu (P5)
	CYNOGNATHIDAE	
	Cynognathus	SAf (K5; S6); SAm (Pu5)
	CHINIQUODONTIDAE	
	Aleodon	SAf (R7)
	Probelesodon	SAm (I 12)
	Probainognathus	SAm (I 12)
	Chiniquodon	SAm (I 12,16; Pa16)
	Belesodon	SAm (Pa16)
	TRITHELEDONTIDAE	
	(incertae sedis)	SAm (I 20)
	Tritheledon	SAf (K20)
	Pachygenelus	SAf (K20,1)
	TRITYLODONTOIDEA	
	DIADEMODONTIDAE	
Hops. & Kitch. 72	DIADEMODONTINAE	
(Keys. 73a)	Diademodon	SAf (K5; S6; L6)
(Chatt. & R.Ch. 74)	?Ordosiodon	SEAs (Sh5)
(Tatar. 74a)	TRIRACHODONTINAE	
(Kitch. 77)	Trirachodon	SAf (K5; S6)
	?Sinognathus	SEAs (Sh5)
	(incertae sedis)	Ind (P6)
	Cricodon	SAf (R7)
	TRAVERSODONTINAE	
	Pascualgnathus	SAm (Pu5)
	Andescynodon	SAm (C5)
	Luangwa	SAf (L6)
	Scalenodon	SAf (R7); EEu (P6)
	Antecosuchus	EEu (P6)
	Massetognathus	SAm (I 12)
	?Colbertosaurus	SAm (C13)
	Traversodon	SAm (Pa16)
	Gomphodontosuchus	SAm (Pa16)
	Exaeretodon	SAm (I 16)
	Ischignathus	SAm (I 16)
	Scalenodontoides	SAf (K20)
	TRITYLODONTIDAE	
	Bienotherium	SEAs (Y20)
	Lufengia	SEAs (Y20)
	Tritylodon	SAf (K20,1)
	Oligokyphus	WEu (C20; E20.1)
	(incertae sedis)	SAm (I 20); USA (Ar20)
	INCERTAE SEDIS	
	Dromatherium	USA (At18)
	Microconodon	USA (At18)
	Tricuspes	WEu (C1)
	MAMMALIA	
	'PROTOTHERIA'	
	ALLOTHERIA	
	?MULTITUBERCULATA	
	HARAMIYIDAE	
	Haramiya	WEu (E20.1)
	EOTHERIA	
	TRICONODONTA	
	MORGANUCODONTIDAE	
Simps. 71	Megazostrodon	SAf (K20)
(Mills 71)	Erythrotherium	SAf (K20)
(Cromp. 74)	Sinoconodon	SEAs (Y20)
	Eozostrodon	SEAs (Y20); WEu (E20.1)
	THERIA	
	PATRIOTHERIA	
	SYMMETRODONTA	
	KUHNEOTHERIIDAE	
	Kuhneotherium	WEu (E20.1)

CHART 4.1 PERMO-TRIASSIC TETRAPODS. GENERIC AUTHORS
(Includes all and only those genera listed in Chart 3)

EDOPIDAE	
Edops	Romer & Witter 42
COCHLEOSAURIDAE	
Chenoprosopus	Mehl 13
TRIMERORHACHIDAE	
Acroplous	Hotton 59
Neldasaurus	Chase 65
Trimerorhachis	Cope 1878
Isodectes	Cope 1878
Slaughenhopia	Olson 62
Nannospondylus	Olson 65
Chalcosauras	Meyer 1866
DVINOSAURIDAE	
Dvinosaurus	Amalitzky 24
ERYOPIDAE	
Actinodon	Gaudry 1867
Chelyderpeton	?
Haptosaurus	?
Onchiodon	Geinitz 1861
Osteophorus	Meyer 1860
Sclerocephalus	Goldfuss 1847
Eryops	Cope 1878
DISSOROPHIDAE	
Platyhystrix	Williston II
Tersomius	Case 10
Aspidosaurus	Broili 04
Conjunctio	Carrol 64
Broiliellus	Williston 14
Brevidorsum	Carrol 64
Dissorophus	Cope 1895
Longiscitula	De Mar 66
Alegeinosaurus	Case 11
Cacops	Williston 10
Fayella	Olson 65
Zygosaurus	Eichwald 1848
TREMATOPSIDAE	
Ecolsonia	Vaughn 69
Acheloma	Cope 1882
Trematops	Williston 09
Trematopsis	Olson 56
PARIOXYIDAE	
Parioxys	Cope 1878
ZATRACHEIDAE	
Acanthostoma	Credner 1883
Dasyceps	Huxley 1859
Zatrachys	Cope 1878
ARCHEGOSAURIDAE	
Archegosaurus	Goldfuss 1847
Platyops	Trautsch. 1844
Prionosuchus	Price 48
MELANOSAURIDAE	
Melanosaurus	Meyer 1860
Tryphosuchus	Konzhukova 55
Jugosuchus	Riabinin 62
INTASUCHIDAE	
Intasuchus	Konzhukova 55
Syndiodosuchus	Konzhukova 55
TREMATOSAURIDAE	
Gonioglyptus	Huxley 1865
Trematosuchus	Watson 19
Trematosaurus	Braun 1842
Lyrosaurus	Lehman 66
Ifasaurus	Lehman 66
Wantzosaurus	Lehman 55
Aphaneramma	Sm. Woodw. 04
Stosschiosaurus	Save-Sodeb. 35
Lyrocephalus	Wiman 15
Platystega	Wiman 15
Tertrema	Wiman 15
Inflectosaurus	Shishkin 60
Microposaurus	Haughton 25
Laidleria	Kitching 57
RHYTIDOSTEIDAE	
Rhytidosteus	Owen 1884
Derwentia	Cosgriff 74
Deltasaurus	Cosgriff 65
Peltostega	Wiman 16
RHINESUCHIDAE	
Rhinesuchus	Broom 08
Rhineceps	Watson 62
LYDEKKERINIDAE	
Lydekkerina	Broom 15
Chomatobatrachus	Cosgriff 74
URANOCENTRODONTIDAE	
Laccosaurus	Watson 19
Uranocentrodon	v. Hoepen 17
Sclerothorax	v. Huene 13
BRACHYOPIDAE	
Austrobrachyops	Colb. & Cosg.74
Bothriceps	Huxley 1859
Blinasaurus	Cosgriff 69
Batrachosuchus	Broom 03
Brachyops	Owen 1855
Hadrokkosaurus	Welles 57
Notobrachyops	Cosgriff 67
CHIGUTISAURIDAE	
Pelorocephalus	Cabrera 44
BENTHOSUCHIDAE	
Gondwanosaurus	Lydekker 1855
Pachygonia	Huxley 1865
Benthosuchus	Efremov 37
Parabenthosuchus	Otschev 58
Thoosuchus	Efremov 40
CAPITOSAURIDAE	
Kestrosaurus	Haughton 25
Parotosaurus	Jaekel 22
Paracyclotosaurus	Watson 58
Cyclotosaurus	Fraas 1889
MASTODONSAURIDAE	
Mastodonsaurus	Meyer 1844
Promastodonsaurus	Bonaparte 63
METOPOSAURIDAE	
Metoposaurus	Lydekker 1890
PELTOBATRACHIDAE	
Peltobatrachus	Panchen 53
PLAGIOSAURIDAE	
Plagiosuchus	v. Huene 22
Plagiosternum	Fraas 1896
Plagiosaurus	Jaekel 13
Gerrhothorax	Nilsson 34
INCERTAE SEDIS	
Lysipterygium	Branson 35
Tungussogyrinus	Efremov 39
Enosuchus	Konzhukova 55
Indobrachyops	v. Huene & Sahni 58
Tupilakosaurus	Nielsen 54
Boreosaurus	Nilsson 43
Plagiorophus	Konzhukova 55
Rewana	Howie 72
Almasaurus	Dutuit 72
Limnoiketes	Parrington 48
Micropholis	Huxley 1859
EOGYRINIDAE	
Memonomenos	Steen 38
Neopteroplax	Romer 63
ARCHERIIDAE	
Archeria	Case 15
SEYMOURIIDAE	
Seymouria	Broili 04
Rhinosaurus	Fischer 47
Gnorhimosuchus	Efremov 51
KOTLASSIIDAE	
Nyctiboetus	Tchudinov 55
Kotlassia	Amalitzky 21
Buzulukia	Vjuschkov 57
Bystrowiana	Vjuschkov 57
DISCOSAURISCIDAE	
Discosauriscus	Kuhn 33
Letovertebron	Spinar 52
Melanerpeton	Fritsch 1878
Lusor	Steen 38
CHRONIOSUCHIDAE	
Chroniosuchus	Vjuschkov 57
NYCTEROLETERIDAE	
Nycteroleter	Efremov 38
WAGGONERIIDAE	
Waggoneria	Olson 51
Helodectes	Cope 1880
LANTHANOSUCHIDAE	
Lanthanosuchus	Efremov 46
TSEAJAIIDAE	
Tseajaia	Vaughn 64
DIADECTIDAE	
Phanerosaurus	Meyer 1860
Diasparactus	Case 10
Diadectes	Cope 1878
Belebey	Ivachnenko 73
UROCORDYLIDAE	
Crossotelos	Case 03
KERATERPETONTIDAE	
Diploceraspis	Romer 52
Diplocaulus	Cope 1877
Peranedon	Olson 70
PHLEGETHONTIIDAE	
Phlegethontia	Cope 1871
MOLGOPHIDAE	
Megamolgophis	Romer 52
LYSOROPHIDAE	
Lysorophus	Cope 1877
MICROBRACHIDAE	
Paramicrobrachis	Kuhn 59
GYMNARTHRIDAE	
Pariotrichus	Cope 1878
Pantylus	Cope 1881
Cardiocephalus	Broili 04
Euryodus	Olson 39
Goniocara	
Goniorhynchus	Olson 70
Cymatorhiza	Olson & Bargh. 62
TUDITANIDAE	
Ostodolepis	Williston 13
TRIADOBATRACHIDAE	
Triadobatrachus	Kuhn 62
INCERTAE SEDIS	
Broilisaurus	Kuhn 38
Palaeosiren	Geinitz 1864
LASALIDAE	
Lasalia	Vaughn 65
LIMNOSCELIDAE	
Limnosceloides	Romer 52
Limnoscelis	Williston 11
Limnoscelops	Lewis & Vaughn 65
ROMERIIDAE	
Protorothyris	Price 37
Romeria	Price 37
Protocaptorhinus	Clark & Carroll 73
Pleuristion	Case 02
CAPTORHINIDAE	
Captorhinus	Cope 1896
Labidosaurus	Cope 1896
Captorhinoides	Olson 51
Labidosaurikos	Stovall 50
Captorhinikos	Olson 54
Kahneria	Olson 62
Rothioniscus	Kuhn 62
Rothia	Olson & Beerb. 53
Moradisaurus	Taquet 69
Gecatogomphius	Vjusch. & Tchud. 56
INCERTAE SEDIS	
Petrobates	Credner 1890
Sphenosaurus	Meyer 1847
Chamasaurus	Williston 15
Puercosaurus	Williston 16
Batroptes	Carroll & Gask. 71
ARAEOSCELIDAE	
Kadaliosaurus	Credner 1889
Araeoscelis	Williston 10
Dictybolos	Olson 70
BOLOSAURIDAE	
Bolosaurus	Cope 1878
ACLEISTORHINIDAE	
Acleistorhinus	Daly 69
EUNOTOSAURIDAE	
Eunotosaurus	Seeley 1892
MILLERETTIDAE	
Broomia	Watson 14
Elliotsmithia	Broom 37
Milleretta	Broom 48
Millerosaurus	Broom 44
Milleropsis	Gow 72
NYCTIPHRURETIDAE	
Nyctiphruretes	Efremov 38
PROCOLOPHONIDAE	
Owenetta	Broom 39
Spondylolestes	Broom 37
Estherrophagus	Novojilov 48
Procolophon	Owen 1876
Barasaurus	Piveteau 55
Santaisaurus	Koh 40
Phaanthosaurus	Tchud. & Vjusch. 56
Tichvinskia	Tchud. & Vjusch. 56
Burtensia	Ivachnenko 75
Contritosaurus	Ivachnenko 74
Koiloskiosaurus	v. Huene 11
Anomoiodon	v. Huene 39
Orenburgia	Ivachnenko 75
Coelodontognathus	Otschev 67
Kapes	Ivachnenko 75
Macrophon	Ivachnenko 75
Vitalia	Ivachnenko 73
Sclerosaurus	Meyer 1857
Thelegnathus	Broom 05
Neoprocolophon	Young 57
Paoteodon	Chow & Sun 60
Candelaria	Price 47
Leptopleuron	Owen 1851
Hypsognathus	Gilmore 28
Sphodrosaurus	Colbert 60
RHIPAEOSAURIDAE	
Leptoropha	Tchudinov 55
Parabradysaurus	Efremov 54
Rhipaeosaurus	Efremov 40
PAREIASAURIDAE	
Bradysaurus	Watson 14
Embrithosaurus	Watson 14
Parasaurus	Meyer 1857
Pareiasaurus	Owen 1876
Anthodon	Owen 1876
Scutosaurus	Hartm.-Weinb. 30
Shihtienfenia	Young & Yeh 63
Elginia	Newton 1892
MESOSAURIDAE	
Mesosaurus	Gervais 1864
PROGANOCHELYIDAE	
Proganochelys	Baur 1887
Proterochersis	Fraas 13
Triassochelys	Jaekel 18
Saurischiocomes	Kuhn 40
YOUNGINIDAE	
Galesphyrus	Broom 15
Heleosaurus	Broom 07
Youngina	Broom 14
TANGASAURIDAE	
Hovasaurus	Piveteau 26
Tangasaurus	Haughton 24
Kenyasaurus	Harris & Carroll 77
UNDESIGNATED	
Coelurosauravus	Piveteau 26
Daedalosaurus	Carroll 78

CHART 4.2 PERMO-TRIASSIC TETRAPODS. GENERIC AUTHORS

THALATTOSAURIDAE	
Askeptosaurus	Nopcsa 25
Nectosaurus	Merriam 05
Thalattosaurus	Merriam 04
WEIGELTISAURIDAE	
Weigeltisaurus	Kuhn 39
PROTOROSAURIDAE	
Protorosaurus	Meyer 1830
Trentinosaurus	v. Huene 56
Adelosaurus	Watson 14
TRACHELOSAURIDAE	
Trachelosaurus	Broili 18
TRILOPHOSAURIDAE	
Doniceps	Otscher & Rykov 68
Anisodontosaurus	Welles 47
Gomphiosaurus	
Trilophosaurus	Case 28
Tricuspisaurus	Robinson 57
Variodens	Robinson 57
SPHENODONTIDAE	
Schargengia	v. Huene 40
Palacrodon	Broom 06
Glevosaurus	Swinton 39
Brachyrhinodon	v. Huene 10
Polysphenodon	Jackel 11
Pachystropheus (aff. Glevosaurus)	v. Huene 35
RHYNCHOSAURIDAE	
Noteosuchus	Broom 25
Mesosuchus	Watson 12
Howesia	Broom 05
Stenaulorhynchus	Haughton 32
Rhynchosaurus	Owen 1842
Scaphonyx	Woodward 08
Hyperodapedon	Huxley 1859
Paradapedon	v. Huene 38
CLARAZIIDAE	
Clarazia	Peyer 36
Hescheleria	Peyer 36
PALIGUANIDAE	
Saurosternon	Huxley 1868
Palaeagama	Broom 26
Paliguana	Broom 03
KUEHNEOSAURIDAE	
Kuehneosaurus	Robinson 62
Kuehneosuchus	Robinson 67
Icarosaurus	Colbert 70
FULENGIDAE	
Fulengia	Carroll & Galton 77
PROLACERTIDAE	
Prolacerta	Parrington 35
Macrocnemus	Nopcsa 31
TANYSTROPHEIDAE	
Tanystropheus	Meyer 1847
GALEOPSIDAE	
Galeops	Broom 12
Galechirus	Broom 07
INCERTAE SEDIS	
Aenigmasaurus	Parrington 53
Mesenosaurus	Efremov 38
Eifelosaurus	Jaekel 04
Gwynnedosaurus	Bock 45
PROTEROSUCHIDAE	
Archosaurus	Tatarinov 60
Proterosuchus	Broom 03
Chasmatosuchus	v. Huene 40
ERYTHROSUCHIDAE	
Erythrosuchus	Broom 05
Shansisuchus	Young 64
EUPARKERIIDAE	
Euparkeria	Broom 13
Turfanosuchus	Young 73
PROTEROCHAMPSIDAE	
Chanaresuchus	Romer 71
Gualosuchus	Romer 71
Cerritosaurus	Price 46
Proterochampsa	Reig 59
PHYTOSAURIDAE	
Paleorhinus	Williston 04
Mystriosuchus	Fraas 1896
Angistorhinus	Mehl 13
Rutiodon	Emmans 1856
Belodon	Meyer 1844
Nicrosaurus	Fraas 1866
Parasuchus	Lydekker 1885
Pachysuchus	Young 51
AETOSAURIDAE	
Typothorax	Cope 1875
Desmatosuchus	Case 20
Stegomus	Marsh 1896
Aetosauroides	Casamiquela 60
Neoaetosauroides	Bonaparte 69
Aetosaurus	Fraas 1877
Stagonolepis	Agassiz 1884

PRESTOSUCHIDAE	
Pallisteria	Charig 67
Mandasuchus	Charig 56
Stagonosuchus	v. Huene 38
Ticinosuchus	Krebs 65
Luperosuchus	Romer 71
Cuyosuchus	Reig 61
Prestosuchus	v. Huene 42
Rauisuchus	v. Huene 42
Hoplitosaurus	v. Huene 42
Saurosuchus	Reig 59
ORNITHOSUCHIDAE	
Gracilisuchus	Romer 72
Venaticosuchus	Bonaparte 71
Riojasuchus	Bonaparte 69
Ornithosuchus	Newton 1894
SCLEROMOCHLIDAE	
Scleromochlus	Woodward 07
ERPETOSUCHIDAE	
Erpetosuchus	Newton 1894
INCERTAE SEDIS	
Teleocrater	Charig 67
Parringtonia	v. Huene 39
Lagerpeton	Romer 71
Lagosuchus	Romer 71
Lewisuchus	Romer 72
Hesperosuchus	Colbert 52
Triassolestes	Reig 63
Saltoposuchus	v. Huene 21
Malerisuchus	Chatterjee 78
Dibothrosuchus	Simmons 65
Dyoplax	Fraas 1867
INCERTAE SEDIS	
Seemannia	v. Huene 58
Ctenosauriscus	
Crenelosaurus	Ortlam 67
Hypselorhachis	Charig 67
Arizonasaurus	Welles 47
Ocoyuntaia	Rusconi 47
Typothorax	Cope 1875
Spondylosoma	v. Huene 42
PROTOSUCHIDAE	
Protosuchus	Brown 34
Stegomosuchus	v. Huene
Erythrochampsa	Haughton 24
Orthosuchus	Nash 68
Notochampsa	Broom 04
Platyognathus	Young 44
Microchampsa	Young 51
SPHENOSUCHIDAE	
Hemiprotosuchus	Bonaparte 67
Sphenosuchus	Haughton 15
Pedeticosaurus	V. Hoepen 15
INCERTAE SEDIS	
Pseudohesperosuchus	Bonaparte 67
PROCOMPSOGNATHIDAE	
Halticosuchus	v. Huene 08
Procompsognathus	Fraas 13
PODOKESAURIDAE	
Avipes	v. Huene 32
Velocipes	v. Huene 32
Dolichosuchus	v. Huene 32
Saltopus	v. Huene 10
Spinosuchus	v. Huene 32
Coelophysis	Cope 1889
Lukousaurus	Young 48
Syntarsus	Raath 69
POPOSAURIDAE	
Poposaurus	Mehl 15
ANCHISAURIDAE	
Efraasia	Galton 73
Anchisaurus	Marsh 1885
Thecodontosaurus	Riley & Stutch. 1836
PLATEOSAURIDAE	
Plateosaurus	Meyer 1937
Ammosaurus	Marsh 1891
Lufengosaurus	Young 41
Euskelesaurus	Huxley 1866
Massospondylus	Owen 1854
Aristosaurus	v. Hoepen 20
MELANOROSAURIDAE	
Melanorosaurus	Haughton 24
Riojasaurus	Bonaparte 67
Roccosaurus	v. Heerden 78
?Sinosaurus	Young 48
?Avalonianus	Kuhn 61
INCERTAE SEDIS	
Arctosaurus	Adams 1875
Ischisaurus	Reig 63
Herrerasaurus	Reig 63
FABROSAURIDAE	
Fabrosaurus	Ginsburg 64
HETERODONTOSAURIDAE	
Pisanosaurus	Casamiquela 67
Lycorhinus	Haughton 24
Abrictosaurus	Hopson 75
Lanasaurus	Gow 75
Tatisaurus	Simmons 65
Geranosaurus	Broom 11
Heterodontosaurus	Crompt. & Charig 62

NOTHOSAURIDAE	
Nothosauravus	Kuhn 60
Metanothosaurus	Yabe & Shikama 48
Kwangsisaurus	Young 59
Sanchiosaurus	Young 65
Keichousaurus	Young 58
Nanchangosaurus	Wang 59
Chinchenia	Young 65
Nothosaurus	Munster 1834
Proneusticosaurus	Volz 02
Deirosaurus	?
Ceresiosaurus	Peyer 31
Paranothosaurus	Peyer 30
Lariosaurus	Curioni 1847
Parthanosaurus	Skuphos 1893
Pontopus	
Micronothosaurus	Haas 63
PACHYPLEUROSAURIDAE	
Neusticosaurus	Seeley 1882
Pachypleurosaurus	Broili 27
SIMOSAURIDAE	
Elmosaurus	v. Huene 57
Simosaurus	Meyer 1842
Corosaurus	Case 36
PISTOSAURIDAE	
Pistosaurus	Meyer 1839
CYMATOSAURIDAE	
Cymatosaurus	Fritsch 1894
Rhaeticonia	Broili 27
Sulmosaurus	Linck 56
PLESIOSAURIDAE	
Plesiosaurus	Conybeare 1821
HELVETICOSAURIDAE	
Helveticosaurus	Peyer 43
PLACODONTIDAE	
Placodus	Agassiz 1833
Paraplacodus	Peyer 31
PLACOCHELYIDAE	
Saurosphargis	Volz 03
Psephosaurus	Fraas 1896
Cyamodus	Meyer 1863
Placochelys	Jaekel 02
Psephoderma	Meyer 1858
HENODONTIDAE	
Henodus	Huene 36
MIXOSAURIDAE	
Mixosaurus	Baur 1887
OMPHALOSAURIDAE	
Grippia	Wiman 28
Omphalosaurus	Merriam 06
SHASTASAURIDAE	
Chonespondylus	
Cymbospondylus	Leidy 1868
Pessosaurus	Wiman
Shastasaurus	Merriam 1595
Toretocnemus	Merriam 03
Merriamia	Boulenger 04
OPHIACODONTIDAE	
Ophiacodon	Marsh 1878
Varanosaurus	Romer 37
Basicranion	?
EOTHYRIDIDAE	
Baldwinosaurus	Romer & Price 40
Stereophallodon	Romer 37
Oedaleops	Langston 65
Bayloria	Olson 41
Eothyris	Romer 37
Tetraceratops	Matthew 08
VARANOPSIDAE	
Aetosaurus	Romer 37
Scoliomus	Willist. & Case 13
Varanops	Williston 14
Varanodon	Olson 65
SPHENACODONTIDAE	
Haptodus	Gaudry 1886
Cutleria	Lewis & Vaughn. 65
Secodontosaurus	Romer 36
Neosaurus	Napcsa 23
Sphenacodon	Marsh 1878
Dimetrodon	Cope 1878
Ctenospondylus	Romer 36
Bathygnathus	Leidy 1854
Thrausmosaurus	?
NITOSAURIDAE	
Mycterosaurus	Williston 15
Nitosaurus	Romer 37
Glaucosaurus	Williston 15
Colobomycter	Vaughn 60
Delorhynchus	?
LUPEOSAURIDAE	
Lupeosaurus	Romer 37
EDAPHOSAURIDAE	
Edaphosaurus	Cope 1882
CASEIDAE	
Trichasaurus	Williston 13
Casea	Williston 10
Caseoides	Olson & Beerb. 53
Phreatophasma	Efremov 54
Caseopsis	Olson 62
Cotylorhynchus	Stovall 37
Angelosaurus	Olson & Beerb. 53
Ennatosaurus	Efremov 56

CHART 4.3 PERMO-TRIASSIC TETRAPODS. GENERIC AUTHORS

PHTHINOSUCHIDAE	
Gorgodon	Olson 62
Knoxosaurus	Olson 62
Steppesaurus	Olson & Beerb. 53
Ivantosaurus	Tchudinov 72
Eotitanosuchus	Tchudinov 60
Biarmosaurus	Tchudinov 64
Biarmosuchus	Tchudinov 60
Phreatosuchus	Efremov 54
Phreatosaurus	Efremov 54
Phthinosaurus	Efremov 38
Phthinosuchus	Efremov 54
DRIVERIIDAE	
Driveria	Olson 62
MASTERSONIIDAE	
Mastersonia	Olson 62
TAPPENOSAURIDAE	
Tappenosaurus	Olson & Beerb. 53
BRITHOPODIDAE	
Eosyodon	Olson 62
Archaeosyodon	Tchudinov 60
Chthomatopus	Tchudinov 64
Brithopus	Kutorga 1838
Notosyodon	Tchudinov 68
Syodon	Kutorga 1838
Titanophoneus	Efremov 38
ANTEOSAURIDAE	
Admetophoneus	Efremov 54
Deuterosaurus	Eichwald 1861
Doliosauriscus	Kuhn 63
Anteosaurus	Watson 21
Paranteosaurus	Boonstra 54
TITANOSUCHIDAE	
Jonkeria	v. Hoepen 16
Titanosuchus	Owen 1876
TAPINOCEPHALIDAE	
Struthiocephalus	Haughton 15
Struthiocephaloides	Boonstra 52
Struthionops	Boonstra 52
Taurocephalus	Broom 28
Avenentia	Boonstra 52
Criocephalus	Broom 28
Delphinognathus	Seeley 1892
Moschops	Broom 11
Riebeekosaurus	Boonstra 52
Keratocephalus	v. Huene 31
Mormosaurus	Watson 14
Phacosaurus	Seeley 1888
Tapinocephalus	Owen 1876
STYRACEPHALIDAE	
Styracephalus	Haughton 29
ESTEMMENOSUCHIDAE	
Anoplosuchus	Tchudinov 68
Estemmenosuchus	Tchudinov 60
Molybdopygus	Tchudinov 64
VENYUKOVIIDAE	
Dimacrodon	Olson & Beerb. 55
Otsheria	Tchudinov 60
Venyukovia	Amalitzky 22
ENDOTHIODONTIDAE	
Endothiodon	Owen 1876
PRISTERODONTIDAE	
Emydops	Broom 12
Pristerodon	Huxley 1868
Tropidostema	Seeley 1889
Brachyuraniscus	Broili & Schrod. 35
Palemydops	Broom 21
DICYNODONTIDAE	
Diictodon	Broom 13
Dicynodon	Owen 1844
Kingoria	Cox 59
Kombuisia	Hotton 74
Daptocephalus	v. Hoepen 34
Dinanomodon	Broom 38
Odontocyclops	
CISTECEPHALIDAE	
Cistecephalus	Owen 1876
Kawingasaurus	Cox 72
AULACEPHALODONTIDAE	
Aulacephalodon	Seeley 1898
Pelanomodon	Broom 38
CRYPTODONTIDAE	
Oudenodon	Owen 1860
Rhachiocephalus	Seeley 1898
Propelanomodon	Toerien 55
INCERTAE SEDIS	
Gordonia	Newton 1892
Geikia	Newton 1892
MYOSAURIDAE	
Myosaurus	Haughton 17
LYSTROSAURIDAE	
Lystrosaurus	Cope 1870
KANNEMEYERIIDAE	
Kannemeyeria	Seeley 08
Rhadiodromus	Efremov 51
Sanguasaurus	Cox 69
Wadiasaurus	R. Chowd. 70
Sinokannemeyeria	Young 37
Shansiodon	Yeh 59
Rhinodicynodon	Kalandadze 70
Dolichuranus	Keyser 73
Dinodontosaurus	Romer 43
Stahleckeria	v. Huene 35
Ischigualastia	Cox 62
Placerias	Lucas 04
Jackeleria	Bonaparte 71
Elephantosaurus	Vjuschkov 68
GORGONOPSIDAE	
Watongia	Olson 74
Broomisaurus	Joleaud 20
Galesuchus	Haughton 15
Eoarctops	Haughton 29
Gorgonops	Owen 1876
Aelurosaurus	Owen 1881
Arctognathus	Broom 11
Aloposaurus	Broom 10
Scylacops	Broom 13
Scylacognathus	Broom 13
Arctops	Watson 14
Aelurognathus	Haughton 24
Lycaenops	Broom 25
Paragalerhinus	Sigogneau 70
Cerdorhinus	Broom 36
Cyonosaurus	Olson 37
Leontocephalus	Broom 40
Sycosaurus	Haughton 24
Prorubidgea	Broom 40
Clelandina	Broom 48
Gorgognathus	Haughton 15
Dinogorgon	Broom 36
Rubidgea	Broom 38
Broomicephalus	Brink & Kitch. 53
ICTIDORHINIDAE	
Hipposaurus	Haughton 29
Ictidorhinus	Broom 13
Lycaenodon	Broom 25
Lemurosaurus	Broom 49
Rubidgina	Broom 42
BURNETIIDAE	
Proburnetia	Tatarinov 68
INOSTRANCEVIIDAE	
Inostrancevia	Amalitzky 22
Pravoslavlevia	Vjuschkov 53
Sauroctonus	Bystrow 55
PRISTEROGNATHIDAE	
Porosteognathus	Vjuschkov 52
Pristerognathus	Seeley 1895
EUCHAMBERSIIDAE	
Euchambersia	Broom 31
MOSCHORHINIDAE	
Annatherapsidus	Kuhn 63
Cthonasaurus	Vjuschkov 55
Moschorhinus	Broom 20
WHAITSIIDAE	
Whaitsia	Haughton 18
Moschowhaitsia	Tatarinov 63
INCERTAE SEDIS	
Urumchia	Young 52
Hexacynodon	Tatarinov 74
Scylacosaurus	Tatarinov 68
ICTIDOSUCHIDAE	
Icticephalus	Broom 15
Ictidosuchoides	Broom 15
Silphoictidoides	v. Huene 50
Ictidosuchops	Broom 38
Oliviera	Brink 65
SCALOPOSAURIDAE	
Tetracynodon	Broom & Robins. 48
Scaloposaurus	Owen 1876
Scalopognathus	Tatarinov 74
BAURIIDAE	
Bauria	Broom 09
Sesamodon	Broom 05
Herpetogale	Keyser 78
Dongusaurus	Vjuschkov 68
Nothogomphodon	Tatarinov 74
PROCYNOSUCHIDAE	
Procynosuchus	Broom 37
Parathrinaxodon	Parrington 36
Dvinia	Amalitzky 22
Nanocynodon	Tatarinov 68
GALESAURIDAE	
Cynosaurus	Schmidt 27
Galesaurus	Owen 1859
Thrinaxodon	Seeley 1894
Platycraniellus	v. Hoepen 17
Tribolodon	Seeley 1894
CYNOGNATHIDAE	
Cynognathus	Seeley 1895
CHINIQUODONTIDAE	
Aleodon	Crompton 55
Probelesodon	Romer 69
Probainognathus	Romer 70
Chiniquodon	v. Huene 36
Belesodon	v. Huene 36
TRITHELEDONTIDAE	
Tritheledon	Broom 12
Pachygenelus	Watson 13
DIADEMODONTIDAE	
Diademodon	Seeley 1894
Ordosiodon	Young 61
Trirachodon	Seeley 1894
Sinognathus	Young 59
Cricodon	Crompton 55
Pascualgnathus	Bonaparte 66
Andescynodon	Bonaparte 67
Luangwa	Brink 63
Scalenodon	Crompton 55
Antecosuchus	Tatarinov 73
Massetognathus	Romer 67
Colbertosaurus	Minoprio 57
Traversodon	v. Huene 36
Gomphodontosuchus	v. Huene 28
Exaeretodon	Colbert 43
Ischignathus	Bonaparte 63
Scalenodontoides	Crompt. & Ellenb. 57
TRITYLODONTIDAE	
Bienotherium	Young 40
Lufengia	Chow & Hu 59
Tritylodon	Owen 1884
Oligokyphus	Hennig 22
INCERTAE SEDIS	
Dromatherium	Emmons 1857
Microconodon	Osborn 1886
Tricuspes	v. Huene 33
HARAMIYIDAE	
Haramiya	Simpson 47
MORGANUCODONTIDAE	
Megazostrodon	Crompt. & Jenk. 68
Erythrotherium	Crompton 64
Sinoconodon	Patters. & Olson 61
Eozostrodon	Parrington 41
KUHNEOTHERIIDAE	
Kuhneotherium	Kermack et al 68

CHART 5.1 PERMO-TRIASSIC TETRAPODS. No. of GENERA INTRODUCED PER YEAR

Chronological histograms for the World Permo-Triassic.

(1 mm. = 1 genus)

Considers only those named genera in current use (ie. those incl. in Charts 3+4)
Synonyms + nomena dubia are excluded.
Those few genera for which we have not established the authors + dates are excluded.
The component regional histograms consider only those genera introduced for the region.

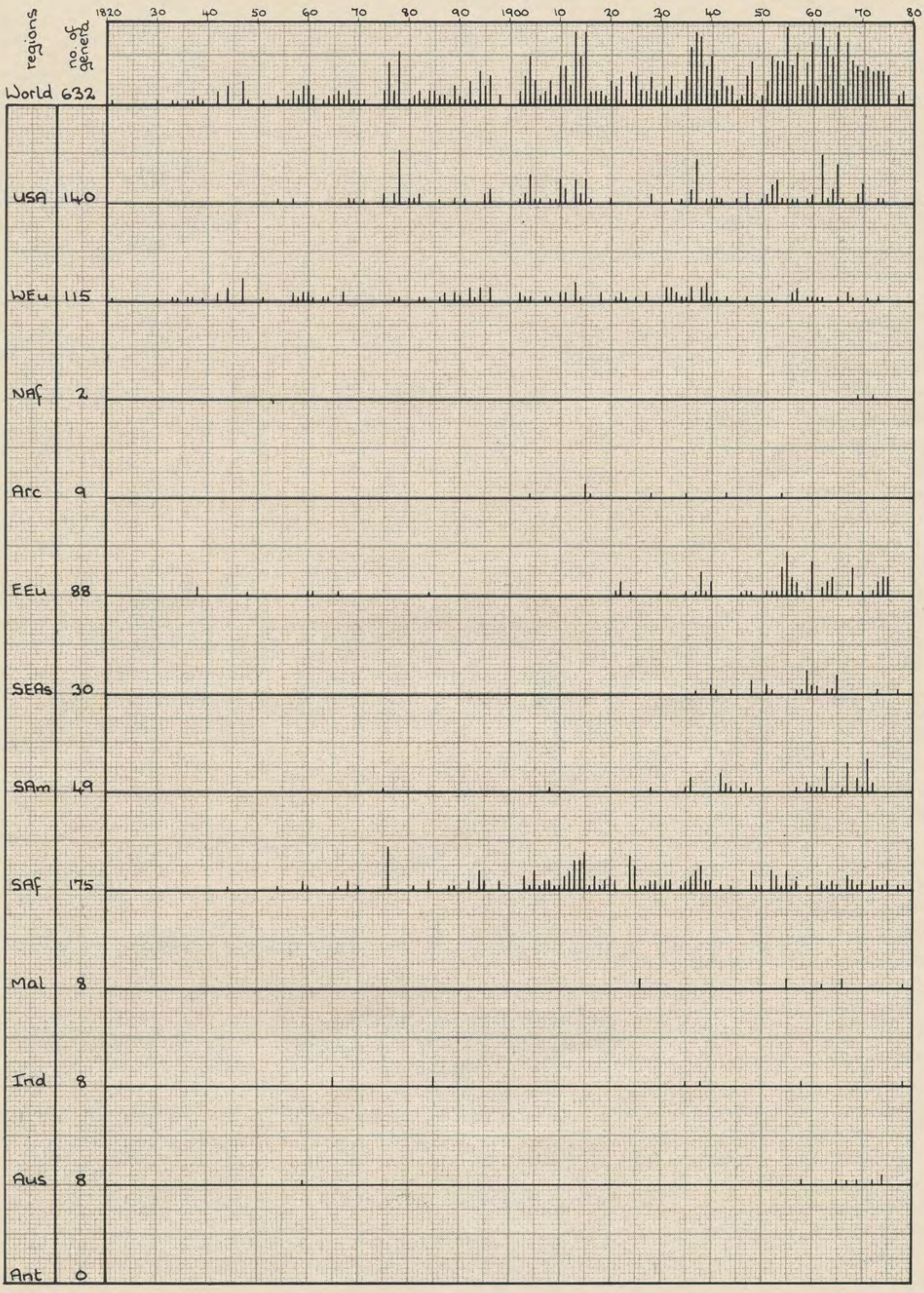


CHART 5.2 PERMO-TRIASSIC TETRAPODS. No. of GENERA INTRODUCED PER YEAR.

Chronological histograms for Southern African (SAf) Permo-Triassic.

Considers all genera established on the basis of southern African material.
Junior synonyms + nomena dubia are included.

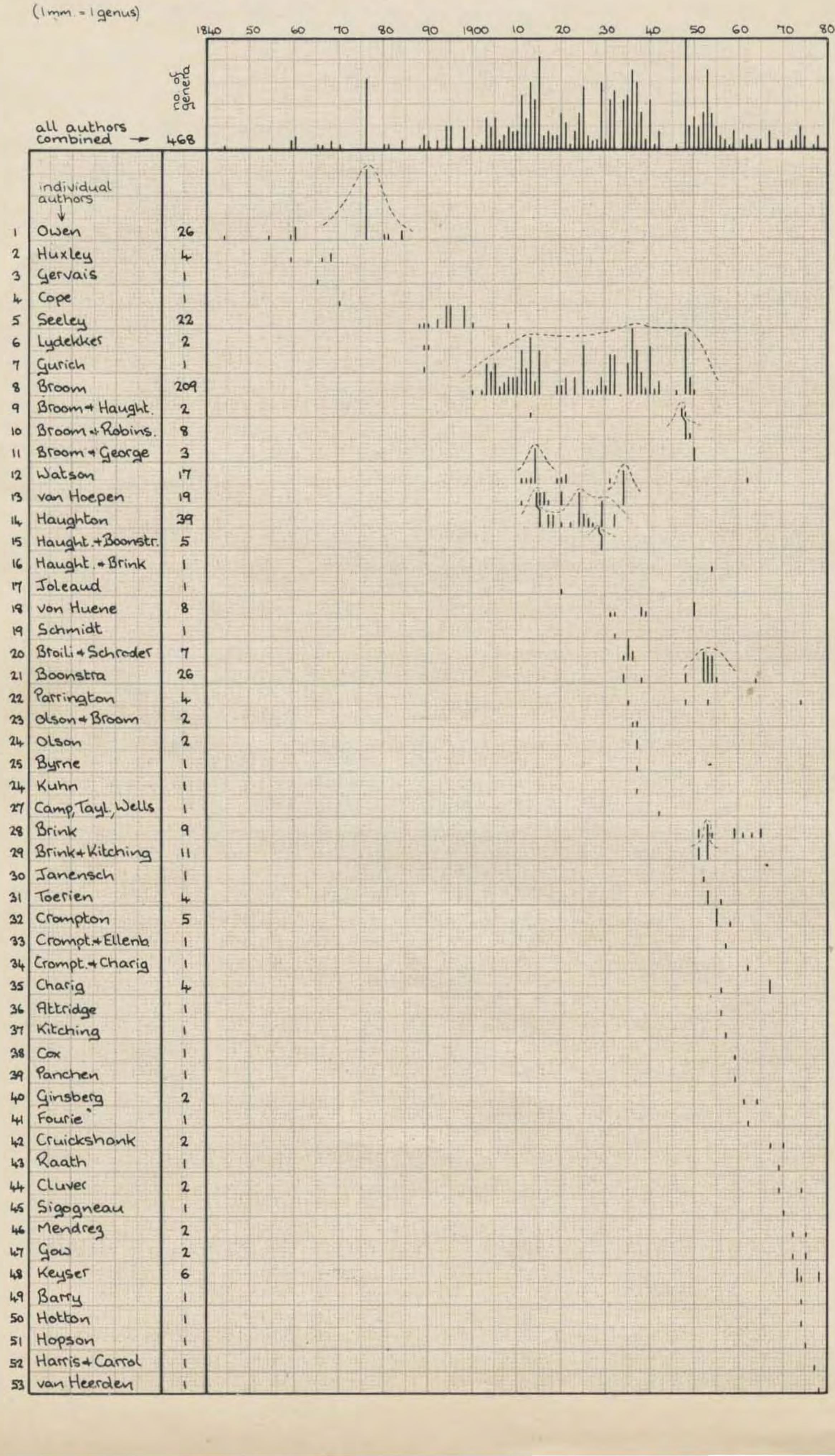


CHART 6.1 PERMO-TRIASSIC TETRAPODS. EMPIRES & PROVINCES

(a) Pangaea reconstruction after Briden *et al.*, '70. No attempt is made to show possible significant internal plate movements (see Irving '78, And. & Schwyz. '78).

(b) Equator approximated from Irving '78, And. & Schwyz. '78, Schm. & McE. '78.

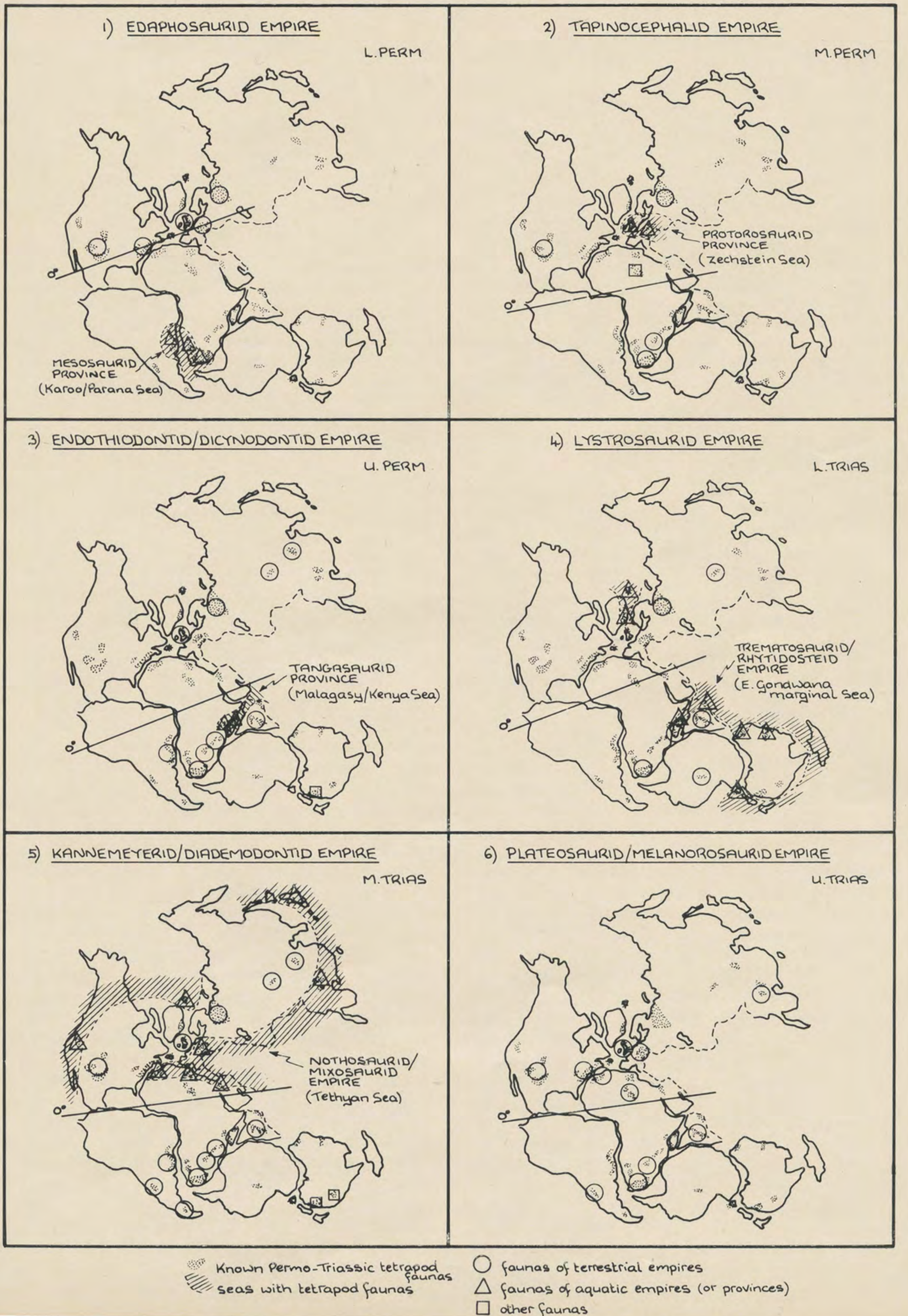


CHART 6.2 PERMO-TRIASSIC TETRAPODS. EMPIRES & PROVINCES
(Regional and zonal distribution of characteristic families)

The regional and zonal distribution of those cosmopolitan families particularly unique to each empire (or province) is plotted. Families which are common, but restricted to a particular region or occur commonly also in preceding or succeeding empires are not noted.

Terrestrial empires

		USA	WEu	Naf	Arc	EEu	SEAs	SAm	SAf	Mal	Ind	Aus	Ant
1) EDAPHOSAURID EMPIRE (L. Perm, Zones 1–10)													
RHACHITOMI	ERYOPIDAE	1–10	1										
"	ZATRACHEIDAE	2–8	1										
SEYMOURIAMORPHA	SEYMOURIIDAE	3–8				✓							
"	DISCOSAURISCIDAE		1			✓							
"	DIADECTIDAE	1–9	1										
CAPTORHINOMORPHA	ARAEOSCELIDAE	4–8	1										
PELYCOSAURIA	OPHIACODONTIDAE	1–8	1										
"	SPHENACODONTIDAE	1–9	1										
"	EDAPHOSAURIDAE	1–9	1										
2) TAPINOCEPHALID EMPIRE (M. Perm, Zones 11–15)													
PELYCOSAURIA	CASEIDAE	11,12				13,14							
PHTHINOSUCHIA	PHTHINOSUCHIDAE	11,12				13,14							
DINOCEPHALIA	TAPINOCEPHALIDAE					14			15				
"	(8 families)	11				13,14			15				
VENYUKOVIAMORPHA	VENYUKOVIIDAE	11				13,14							
THEROCEPHALIA	PRISTEROGNATHIDAE					14			15				
3) ENDOTHIODONTID/DICYNODONTID EMPIRE (U. Perm, Zones 16,17)													
ENDOTHIODONTIA	ENDOTHIODONTIDAE							16	16		16		
DICYNODONTIA	DICYNODONTIDAE						17		16,17				
"	(5 families)		17			17	17		16,17		16		
GORGONOPSIA	(4 families)					17			16,17				
THEROCEPHALIA	(4 families)					17	17		16,17				
CYNODONTIA	PROCYNOSUCHIDAE					17			16,17				
4) LYSTROSAURID EMPIRE (L. Trias, Zone 1)													
PROTEROSUCHIA	PROTEROSUCHIDAE						1		1		1		
DICYNODONTIA	LYSTROSAURIDAE					1	1		1		1		1
5) KANNEMEYERIID/DIADEMODONTID EMPIRE (M. Trias, Zones 5–17)													
RHYNCHOSAURIA	RHYNCHOSAURIDAE		10,17					16	5,7		17		
PROTEROSUCHIA	ERYTHROSUCHIDAE					5	5		5		6		
PSEUDOSUCHIA	PRESTOSUCHIDAE		9.10					12–16	7				
DICYNODONTIA	KANNEMEYERIIDAE	16,17				6,12	5	5–16	5–7		6		
BAURIAMORPHA	BAURIIDAE					6			5,6				
CYNODONTIA	CYNOGNATHOIDEA					5		5–16	5–7				
"	DIADEMODONTIDAE					6	5	5–16	5–7		6		
6) PLATEOSAURID/MELANOROSAURID EMPIRE (U. Trias, Zones 18–20; L. Jur, Zone 1)													
CROCODYLIA	(2 families)	19					20	20	20,1				
PROSAUROPODA	ANCHISAURIDAE	19	18–1						20,1		20		
"	PLATEOSAURIDAE	19	18–20	18			20	20	20,1		20		
"	MELANOROSAURIDAE		20				20	20	20				
CYNODONTIA	TRITYLODONTIDAE	20	20.1				20	20	20.1				
MAMMALIA	MORGANUCODONTIDAE		20.1				20		20				

Aquatic empires (or provinces)

		USA	WEu	Naf	Arc	EEu	SEAs	SAm	SAf	Mal	Ind	Aus	Ant
1) MESOSAURID PROVINCE (L. Perm, Zone 6)													
MESOSAURIA	MESOSAURIDAE							6	6				
2) PROTOROSAURID PROVINCE (M. Perm, Zone 15)													
PROTOROSAURIA	PROTOROSAURIDAE		15										
3) TANGASAURID PROVINCE (U. Perm, Zone 17)													
EOSUCHIA	TANGASAURIDAE								17	17			
4) TREMATOSAURID/RHYTIDOSTEID EMPIRE (L. Trias, Zones 2,3)													
RHACHITOMI	TREMATOSAURIDAE				2,3					2	2		
"	RHYTIDOSTEIDAE				3							3	
5) NOTHOSAURID/MIXOSAURID EMPIRE (M. Trias, Zones 5–14)													
NOTHOSAURIA	NOTHOSAURIDAE		6–15	7,8			5–11						
PLACODONTIA	(4 families)		6–14	7,8									
ICHTHYOSAURIA	MIXOSAURIDAE	11	6–10		5		6,7						
"	(2 families)	11–14	?		5–13								