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Alan Jack Charig (1927–1997): an overview of his academic accomplishments and role in the world of fossil reptile research

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Abstract: Alan Jack Charig was Curator of Fossil Amphibians, Reptiles and Birds at the British Museum (Natural History) from 1961 to 1987. We here review his academic accomplishments and the impact of his work within vertebrate palaeontology. His position gave him considerable influence in the discussion of emerging theories and in how vertebrate palaeontology was portrayed to the public. His main areas of scientific interest included biogeography and faunal provinces, the evolution of an erect gait in archosaurs, the systematics and diversity of Triassic proterosaurs, erythrosuchians and their relatives, and the origin of dinosaurs. Besides Triassic archosaurs, ornithischian, theropod and sauropodomorph dinosaurs, he published on gastropods, amphisbaenians and plesiosaurs. While he did produce some lasting contributions to the literature, it is telling that he failed to publish the specimen-based analyses he apparently planned to, despite citations of ‘in press’ manuscripts. Between the 1970s and 1990s Alan opposed or offered alternatives to many emerging theories and schools of thought. He is best described as ‘conservative’ in terms of his views on palaeontological controversies and his opinions would not conform with those favoured by the majority of palaeontologists today. He was highly critical of the concept of dinosaur monophyly, the dinosaurian origin of birds, of the division of archosaurs into a crocodylian and bird-dinosaur clade, and of cladistics. Several of his papers are ICZN (International Commission on Zoological Nomenclature) submissions, published in order to clear up taxonomic problems, and they served to bring nomenclatural stability. Contradicting views exist of him as a scientist and a popularist. He has, not without contradiction, been described as intellectually arrogant, most clubbable, humorous, charming, an academic snob, political and meticulous. His lasting fame, however, is that very few of us live to be referred to as the ‘Carl Sagan of the BBC’ or have the good fortune to describe a dinosaur as important as *Baryonyx*.

Alan Jack Charig (1927–1997) (Fig. 1) was born of Jewish–Ukrainian parents. He was educated at Haberdashers’ Aske’s Boys’ School (Cox 1997) and was considered academically outstanding even in his earliest days of secondary education (R.C.H. Old Haberdashers Obits). Prior to joining the then British Museum (Natural History) he studied zoology at Emanuel College Cambridge and interrupted his degree to serve his National Service; first in The Royal Armoured Corps and then as an interpreter in the Russian Section of the British Army of Occupation in Germany. On leaving the forces he returned to Cambridge to complete his degree in Natural Sciences and to study for a PhD under Rex Parrington (1905–1981). Alan and A. W. (‘Fuzz’) Crompton were the first two students to work with Parrington.

Alan’s 1956 PhD thesis was titled ‘New Triassic archosaurs from Tanganyika, including *Mandasuchus* and *Teleocrater*’. He subsequently mentioned

these taxa – particularly *Mandasuchus* – in many of his publications and an ‘in press’ manuscript supposedly describing them (titled ‘Preliminary note on the archosaurs in the Manda Formation (Middle Trias) of Tanzania’, and cited as if appearing in a 1967 edition of *Palaeontology*) was cited in Appleby *et al.* (1967), the Reptilia chapter of the Geological Society of London’s (GSL’s) compendium *The Fossil Record* (Fig. 2). According to the latter article, *Mandasuchus* was a member of Prestosuchidae, a group noted by Appleby *et al.* (1967, p. 46) as being ‘probably ancestral to sauropodomorphs’. We discuss the possible significance of this proposed phylogenetic significance later on. *Teleocrater* was regarded as representing a new ‘family’, Teleocrateridae Charig, 1967 (Appleby *et al.* 1967, p. 46). Another taxon planned for the 1967 *Palaeontology* article – *Nyasasaurus cromptoni* – was also mentioned in Appleby *et al.* (1967). Although classified as a thecodontosaurid



Fig. 1. Alan J. Charig in 1977. Photograph © NHM.

sauropodomorph, Appleby *et al.* (1967, p. 712) noted that it 'might still be a prestosuchid pseudosuchian'. This again highlighted the fact that Alan regarded 'pseudosuchian thecodonts' and sauropodomorph dinosaurs as close allies. Finally, Appleby *et al.* (1967) included mention of another Manda Formation taxon, *Hypselorhachis mirabilis*: this was attributed to 'Charig 1966' (presumably another reference to the planned 1967 *Palaeontology* article) and suggested to be ancestral to Spinosauridae. Subsequent authors identified *Hypselorhachis* as a close relative of *Ctenosaurus koeneni*, a poorly known archosaur with tall neural spines (Krebs 1969, 1976; Nesbitt 2003, 2005). The same 'Preliminary note' article was also cited as 'in press' in Charig & Reig (1970). Alas, Alan never did publish proper descriptions of these taxa and they have persisted in the literature as *nomina nuda*. As we will see, Alan was to claim on

numerous additional occasions that his descriptive work had progressed further than it actually had.

After receiving his doctorate, Alan briefly lectured in zoology at Kumasi College (then Gold Coast, now Ghana) in 1955 and 1956. During this time he visited Timbuctu, Mali, in a Morris Minor, and later told of the time he saw lions in the Sahara.

In 1957 Alan joined the staff of the Palaeontology Department of the British Museum (Natural History) and initially worked in the Mollusca Section, publishing a paper on the gastropod *Thatcheria* in 1963, well after he had been transferred to Fossil Reptiles in 1961. It would appear, somewhat strangely, that the museum hierarchy had a policy of placing people outside their own speciality, as Bill Swinton (1900–1994) (who preceded Alan) initially worked on mammals before transferring to Fossil Amphibians, Reptiles and Birds. Swinton worked at the British Museum



Fig. 2. Maurice Wilson's reconstruction of the Manda Formation archosaur *Mandasuchus*, as published in the Brooke Bond *Prehistoric Animals* tea cards set.

(Natural History) from 1934 to 1961 and, like Alan, was skilled at portraying the wonders of dinosaurs to a dedicated audience. Similarly, Swinton's extracurricular activities were frowned upon by a conservative management. By the time Swinton had left for Canada and Alan had become Curator of Fossil Amphibians, Reptiles and Birds, Cyril Walker had also been moved to the section (via the library) to work alongside Barney Newman as technical officer.

During the quarter century he worked as Curator of Amphibians, Reptiles and Birds at the museum, Alan became the 'face' of palaeontology in the UK and was responsible for the popularization of dinosaurs throughout the 1970s. Alan was married in 1955 to Marianne Jacoby, his soul mate. He often said that she played a major role in his success, and he was very proud of their two sons and daughter. When he retired from the museum in 1987, Marianne was very poorly; she died later that same year.

His contributions to his science

In a career spanning four decades, Alan published on dinosaur origins and evolution, on the changing fortunes of Triassic tetrapod groups, and on the systematics and classification of non-dinosaurian archosaurs, the 'thecodonts'. He was also involved in descriptive work on exciting new specimens and taxa, some of which were the subject of great debate and of popular interest. He published on evolution, the fossil record and on the philosophy of cladistics. While several of his descriptive papers continue to be widely cited, many of his theoretical proposals have not stood the test of time.

One of Alan's earliest published works was his 1962 description of the early ornithischian *Heterodontosaurus tucki* from South Africa, published with Crompton (Crompton & Charig 1962). Fragments of similar dinosaurs had been known since 1911 (it is now known that both *Geranosaurus* Broom 1911 and *Lycorhinus* Houghton 1924

represent close relatives of *Heterodontosaurus*), but the discovery of a near-complete skull and lower jaw showed that these dinosaurs were remarkable heterodont ornithischians with prominent caniniform fangs. Alan was involved in work on the enigmatic heterodontosaurids later on in his career (Charig & Crompton 1974; Santa Luca *et al.* 1976), but a planned monographic collaboration on *Heterodontosaurus* with Crompton was never completed. 1962 also saw the publication of a brief article, co-authored with Barney Newman, on dinosaur tracks from the Purbeck Limestone (Charig & Newman 1962).

In 1963 Alan published a large study of the Indo-Pacific gastropods belonging to the genus *Thatcheria* Angas 1877 (this is an extant taxon but fossil species from the Miocene and Pliocene have been referred to it by various authors). Therein he named the new species *T. vitiensis* from the Pliocene of Fiji (Charig 1963).

Together with John Attridge and Crompton, Alan published 'On the origin of the sauropods and the classification of the Saurischia' in 1965 (Charig *et al.* 1965). The genesis of this paper was a presentation that Alan had given during the Palaeontological Association meeting at Bristol in 1961, although subsequent discoveries had caused him to modify several of his original conclusions. Incorporating a review of ideas on sauropodomorph evolution and classification, the paper is of historical interest to students of the Dinosauria in including the first mention of the 'Blikana dinosaur', later named *Blikanasaurus cromptoni* by Galton & Van Heerden (1985). Charig *et al.* (1965) stated that this dinosaur was described 'in press' by Crompton & Wapenaar, but, again, this manuscript never saw publication. Some of the contentions made in this paper repeated those made later on in Alan's work: it was argued, for example, that 'the anatomy of sauropods affords no suggestion that their ancestors were bipedal; the arguments generally advanced for the fundamentally bipedal nature of the archosaur stock will not bear critical examination' (Charig *et al.* 1965, p. 204). While it was admitted by Charig *et al.* (1965) that various 'pro-sauropod' lineages were at least partially bipedal, it was argued that such forms were divergent offshoots from a lineage of 'quadrupedal creatures which lay on or near the main sauropodomorph line' (Charig *et al.* 1965, p. 205), the evidence for which was wanting due to preservational bias. Phylogenetic arguments that invoke the existence of hypothetical taxa are, to put it mildly, suspect. The phylogenetic hypothesis that Charig *et al.* (1965) objected to (that bipedal sauropodomorphs were ancestral to the quadrupedal sauropods, and that the earliest sauropodomorphs inherited their bipedality from older bipedal saurischians and

bipedal 'pseudosuchians') was later supported by the discovery of the bipedal non-dinosaurian archosaurs *Lagosuchus* and *Lagerpeton* (Romer 1971, 1972; Bonaparte 1975). In contrast, the hypothesis of persistent quadrupedality in the sauropodomorph lineage did not win much support: as discussed below, it seems that the Tanzanian archosaurs described by Alan in his PhD thesis were integral to his ideas about persistent quadrupedality in early dinosaurs. As new discoveries eroded the potential significance of his discoveries, it is possible that Alan lost momentum in his plans to describe them.

By 1970 Alan had (together with Osvaldo A. Reig of the Universidad Central de Venezuela) published his first academic contribution on Triassic non-dinosaurian archosaurs: a review of the proterosuchians (Charig & Reig 1970). A lengthy, thorough and well-illustrated paper, it included a huge amount of information and concluded that all members of this group (which are not presently regarded as forming a clade) could be grouped into two 'families': Proterosuchidae and Erythrosuchidae. Another review of proterosuchians appeared in 1976 (see later).

In 1971 Alan published 'Faunal provinces on land', a review concentrating on the distribution of Permo-Triassic reptiles and on what this distribution might mean (Charig 1971). Mostly overlooked are his suggestions that *Tyrannosaurus* and *Tarbosaurus* might be congeneric (a concept that would be revisited by many palaeontologists, and one that remains the source of disagreement today), and his statement that Bakker's theory about endothermy in dinosaurs and pterosaurs is 'certainly worthy of consideration' (Charig 1971, p. 126). Also in 1971, Alan worked with John Horell in producing a brief report on the Fletton plesiosaur (Charig & Horell 1971). Excavated in 1970 and presented to the British Museum (Natural History) by Sir Ronald Stewart of the London Brick Company, this was a specimen of *Cryptoclidus eurymerus* described by Charig & Horell (1971, p. 39) as 'probably the best plesiosaur skeleton discovered since the days of the Leeds Collection'. Given this claim, it is fitting that the specimen was visited *in situ* by delegates from the Symposium of Vertebrate Palaeontology and Comparative Anatomy, held in 1970 in Cambridge, including A. S. Romer and his wife, and F. R. Parrington. The Fletton plesiosaur (NHMUK R8621) did become an important specimen of *Cryptoclidus eurymerus*, being both figured and discussed in Brown's (1981) comprehensive monograph on the taxon. Stewart would later be honoured by Alan in the naming of a new Jurassic sauropod.

Alan became well known for promoting the view that dinosaurs differed from other archosaurs by way of their erect-legged gait and in 1972 published

an influential article on this subject titled 'The evolution of the archosaur pelvis and hind-limb: an explanation in functional terms' (Charig 1972). This was Alan's contribution to Parrington's festschrift volume. Romer (1956) had stated that thecodonts displayed a tendency towards being bipedal and other workers (e.g. Colbert 1962) assumed that bipedality had arisen early on in the history of the Archosauria, with quadrupedal forms being secondarily quadrupedal. As discussed above in connection with Charig *et al.* (1965), Alan argued against this and stated in several publications that no such trend was apparent. He also argued that crocodylians and *Mandasuchus*-like archosaurs exhibited a 'semi-improved' stance that was intermediate between the sprawling stance of typical reptiles and the 'fully improved' stance of dinosaurs. Based on what was known about Triassic archosaurs, it was assumed that all early archosaurs had complex, crocodile-like ankles, but if this was correct, and if dinosaurs had descended from such forms, then dinosaur ancestors (with simple, hinge-like ankles) had undergone simplification of the ankle joint. Krebs (1965) argued for this in his description of the rauisuchian *Ticinosuchus* (thought at the time to be close to the ancestry of dinosaurs). The alternative possibility was that dinosaurs had not descended from forms with crocodile-like ankles at all. Alan remained non-committal on this debate (indeed, he can be charged with remaining non-committal on several areas of disagreement!) but saw the merits of a theoretical dinosaur ancestor that lacked a crocodile-like ankle (Charig 1972, p. 152). Non-dinosaurian archosaurs with simple, hinge-like ankles were later described (Romer 1971, 1972; Bonaparte 1975): rather than being primitive for archosaurs as a whole, it now seems that the crocodile-style ankle is unique to the clade that includes crocodylians and their relatives. Indeed, Alan's view that *Mandasuchus*-like archosaurs with a 'semi-improved' stance might be ancestral to 'fully improved' dinosaurs could only be maintained if there was a close phylogenetic affinity between these groups, and as evidence accrued it became clear to most workers that this was not the case.

In 1967 and 1969 Björn Kurtén proposed that the Cenozoic radiation of mammalian 'Orders' was driven by continental fragmentation, and that the large number of mammalian 'Orders' was directly related to the fact that, by the Cenozoic, there were several continents. In contrast, Kurtén proposed that the lower number of continents present during the Mesozoic has resulted in a lower number of reptilian 'Orders'. Alan took issue with this hypothesis, arguing in 1973 that 'ordinal variety' is not necessarily a reliable indicator of adaptive radiation (Charig 1973). Perhaps ironically

(given Alan's objections to cladistics), arguments over the usefulness of Linnaean categories like 'Orders' demonstrate the danger of assuming that such ranks are real. As reported in their 1974 paper on heterodontosaurids (Charig & Crompton 1974), Alan and Fuzz Crompton had by now made substantial progress on a detailed description of the skull of *Heterodontosaurus tucki*, citing 'The Triassic ornithischian *Heterodontosaurus tucki*: skull, dentition and systematic relationships' as 'in press' for *Annals of the South African Museum*, and writing 'The *Heterodontosaurus* holotype has now been completely developed and the detailed description of its skull (Charig & Crompton, in press) is likely to make it the most completely described dinosaur skull in existence' (Charig & Crompton 1974, p. 170). The paper never appeared and, again, it was not the last time that Alan would claim to have completed a major work that, in reality, was not as ready to appear as he had stated. During the late 1970s and possibly earlier, Alan planned to redescribe the type material of the Lower Jurassic pterosaur *Dimorphodon macronyx*, originally described by Buckland in the 1830s and monographed by Owen in 1870 (see Martill 2010). Kevin Padian discussed these plans with Alan when visiting the BM(NH) in 1978 and 1979; Alan planned to have the material acid prepared and hoped to work on it in his retirement (K. Padian pers. comm. 2009). These plans never came to fruition.

In 1974 Robert Bakker and Peter Galton published the claim that Dinosauria was a monophyletic group deserving of 'Class' status (Bakker & Galton 1974). They argued that Triassic dinosaurs exhibited a number of features not seen in other archosaurs, hence indicating descent from a single common ancestor. While Dinosauria had been regarded as a natural group during the nineteenth century and by several workers of the early twentieth century, this view was generally regarded as incorrect by the 1960s. 'Dinosaur' was, instead, a term used for two or even three distinct archosaur groups that had descended from different 'thecodontian' ancestors. Alan disagreed with Bakker & Galton's new arguments for monophyly, arguing that the characters supposedly shared by dinosaurs and not present in other archosaurs were either non-existent or erroneous, and that the two major dinosaur groups (saurischians and ornithischians) were more different than Bakker and Galton had admitted (Charig 1976a). His main conclusion seemed to be, however, that Bakker and Galton's suggestion of 'Class' status for Dinosauria was premature and would prove impractical for a community used to a 'Class Aves' (Aves would, of course, be included in 'Class Dinosauria' if Bakker and Galton were correct). This is a rather irrelevant criticism in that

it was surely the least important implication of Bakker and Galton's argument, and Alan's objections to the proposed monophyly of Dinosauria appear unsatisfactory to modern eyes. Alan also provided a detailed discussion of Bakker's idea that predator-prey ratios might be informative in determining physiology, but concluded that 'dinosaurs may well have been at least partly endothermic' (Charig 1976a, p. 96). He returned to these subjects later on. Incidentally, Alan was able to begin preparation of his response to Bakker & Galton (1974) long before its publication because he had obtained a copy of the article about a year beforehand. This explained how Alfred Romer, who had died in 1973, had been able to comment on an article that was itself critiquing another not published until 1974 (Charig 1976a, p. 102).

Also in 1976, Alan published with Hans-Dieter Sues the Proterosuchia volume of the *Handbuch der Paläoherpetologie* series (the same volume included Alan's historical review of Thecodontia: Charig 1976b). An introductory note inserted by the publisher explains how Hans-Dieter and Alan were both given the Proterosuchia section to do, and that 'this confusion led to the unfortunate situation, that neither author knew that the other was preparing an independent contribution' (Charig & Sues 1976, p. 11). On learning that their work was duplicated, they agreed to share authorship, but with Alan's more complete text being the version that saw publication. In addition to providing a diagnosis for each included taxon, this review also provides such data as holotype numbers and precise stratigraphic information. It might be assumed that this level of detail is provided across a series of volumes entitled *Handbuch der Paläoherpetologie*, as indeed it should be, but in fact some of the other contributions in the series (e.g. Steel 1969, 1970) are extremely superficial. 1976 also saw the publication (with Albert P. Santa Luca and Fuzz Crompton) of the first brief report on a new complete *Heterodontosaurus tucki* specimen (Santa Luca *et al.* 1976).

Alan's work on dinosaurs continued in 1980 when his contribution to the Colbert festschrift volume was published. Therein, he described a distinctive 'sled-shaped' sauropod chevron from the Wessex Formation of the Isle of Wight (Charig 1980a). Thought at the time to belong to a diplodocid (its identity has since been challenged (Upchurch 1998; Naish & Martill 2001) due to new ideas on the distribution of 'sled-shaped chevrons' within Sauropoda), it was suggested by Alan to provide biogeographical evidence linking the Lower Cretaceous dinosaur fauna of Britain with that of Upper Jurassic North America. Alan was highly critical of Peter Galton's suggestions that fossils from the Jurassic and Cretaceous of Europe and North America might provide evidence for

biogeographical connections between these areas. Alan also used this paper to indulge in some required nomenclatural action, and showed that von Huene had erred in giving the name *Cetiosauriscus leedsii* to an Oxford Clay sauropod first described by Woodward (1905). Because Woodward's specimen was not the type specimen for the species, it required a new species name, so Alan named it *Cetiosauriscus stewarti* (Charig 1980a). The specific name honours Sir Ronald Stewart (see earlier).

Alan was of the opinion that the erect-legged gait of dinosaurs made them competitively superior to other Mesozoic terrestrial tetrapods, and that key anatomical innovations allowed dinosaurs to rise to success and to replace other archosaurs and synsapsids as the dominant terrestrial animals of the Mesozoic (Charig 1980b). This view was popular at the time and was integral to Alan's work on dinosaur origins and success. Benton (1983) showed that the data did not support this view and that dinosaurs had not risen rapidly to success, but had instead remained rare and low in diversity until their competitors had been removed by mass extinction events: essentially, dinosaurs seemed to be 'victors by default'. The idea that dinosaurs were 'special' compared to other archosaurs was also to be challenged as it would eventually be shown that the erect gaits thought by Alan and colleagues to be unique to dinosaurs were more widespread among archosaurs. Again, Alan's cherished hypothesis about the evolution of 'semi-improved' and 'fully improved' archosaurs was under attack.

The 1980s saw some of Alan's most significant scientific publications, with both the discovery of the Lower Cretaceous English theropod *Baryonyx* and the famous forgery charge against *Archaeopteryx* occupying his research time. He continued to write about more philosophical issues, however, and in 1981 published 'Cladistics: a different point of view' in *Biologist* (Charig 1981). He followed this with a lengthy paper in 1982: 'Systematics in biology: a fundamental comparison of some major schools of thought', in which he argued that paraphyletic groups – while not permitted in Hennigian systematics – are practical, and hence should be retained (Charig 1982a). On cladistics, Alan sometimes sided in debate with the more idiosyncratic Beverly Halstead (1933–1992) and so drew the wrath of committed cladist Colin Patterson (1933–1998), a colleague at the BM(NH) who worked on fossil fish.

In 'Problems in dinosaur phylogeny: a reasoned approach to their attempted resolution', Alan drew attention to the limits of the information then available on early dinosaurs. He continued to argue that proposals of dinosaur monophyly were problematical, that good shared characters uniting

dinosaurs to the exclusion of other archosaurs were weak and that more convincing ones would be needed to make a more robust case. He implied that all three major dinosaur groups might have separate origins, and he remained non-committal on avian origins (Charig 1982b). By now such views were very much behind the times, and Alan's complaints failed to win adherents. The hypotheses of dinosaur monophyly, of a division of Archosauria into a crocodylian clade and bird-dinosaur clade, and of the theropod ancestry of birds were already better supported than the rather vague alternative proposals, and became increasingly so in the years that followed. Indeed, what makes Alan particularly interesting is that he was among the last of the 'old guard'; in the face of substantial opposition, he tried to maintain the status quo of the pre-cladistic era.

In 1985 Alan published 'Analysis of the several problems associated with *Archaeopteryx*' in Hecht *et al.*'s *The Beginnings of Birds*. This was a cursory contribution, but included comments on how the term Aves should be limited and defined (Charig 1985). Ironically (given Alan's views on cladistics), his proposal that the name Aves be formally restricted to 'the clade that is demarcated from its antecedents by the appearance of the evolutionary novelty 'feathers'' (p. 26) has recently been noted as a phylogenetic apomorphy-based definition for Aves (Senter 2005). Alan's non-committal stance on bird origins seems peculiar (given that he was an archosaur specialist); in his various discussions of the subject he generally cited both non-dinosaurian and dinosaurian origin hypotheses as if they were equally worthy, and at times he even seemed hostile to the idea that birds might be derived theropods (e.g. Charig 1979, p. 140). Rather than holding a strong opinion on this subject himself, it seems that Alan was influenced by the fact that his colleagues (such as Alick Walker and John Ostrom) held divergent views. Again, Alan can perhaps be charged with trying to maintain the status quo. Alternatively, Alan's sense of fair play and gentlemanly behaviour may have seemed more important to him than resolving the debate, and his discussions of avian origins seem more concerned with the overarching philosophy than the raw palaeontological data.

A far more noteworthy contribution on *Archaeopteryx* was to appear in 1986 when Fred Hoyle and Chandra Wickramasinghe's claims that the London *Archaeopteryx* must be a fake demanded a response. Together with Frank Greenaway, Angela Milner, Cyril Walker and Peter Whybrow, Alan published a demonstration of the non-fraudulent nature of the London *Archaeopteryx* in *Science* (Charig *et al.* 1986). We discuss this episode further later.

Perhaps Alan's most significant contribution was his work, co-authored with Angela Milner, on a remarkable new theropod that had been discovered by amateur collector William Walker in 1983. Preliminary information on this animal had been presented at the Dinosaur Systematics Symposium, held at the Tyrrell Museum of Palaeontology in June 1986, and so surprising was the combination of features present in this new animal that there was apparently some discussion of the possibility that it might represent a late-surviving rauisuchian or an aberrant crocodylian rather than a theropod. Already, however, some workers (specifically P. Taquet) had begun to compare the Surrey dinosaur with *Spinosaurus* (Dodson 1987). Published in *Nature* in 1986, *Baryonyx walkeri* was hailed as an entirely new kind of theropod deserving of its own 'family', Baryonychidae (Charig & Milner 1986). The final monographic description of *Baryonyx* was published in *Bulletin of the Natural History Museum, Geology Series* (Charig & Milner 1997). Of all Alan's technical publications, this monograph is arguably the one that has stood the test of time, and it remains widely cited in the dinosaur literature.

Like so many scientists who specialize on dinosaurs, Alan sometimes published comments on the Cretaceous–Tertiary (K–T) boundary and its associated extinction event. In 1989 he published 'The Cretaceous–Tertiary boundary and the last of the dinosaurs' (Charig 1989). While the notion of a global cataclysm caused by a bolide impact (Alvarez *et al.* 1980) had become popular by this time, Alan's perspective might, again, be regarded as 'conservative' or 'traditional': he argued that stratigraphical correlations worldwide were not good enough for scientists to be confident that a synchronized mass global dieing had occurred, and he considered it plausible that non-avian dinosaurs in some regions had survived beyond the end of the Cretaceous. Some of Alan's thoughts on this issue had previously been announced at meetings: he mentioned (Charig 1989, p. 388) an 'unpublished paper' presented at the Lyell Meeting of the Geological Society of London, and a 1987 talk on the subject given at the Palaeontological Association meeting 'Catastrophes and the history of life'. In contrast to the majority of his colleagues, Alan sometimes drew attention to the minority opinion that non-avian dinosaurs might not have gone extinct at all, but that mystery animals such as the Congolese mokele-mbembe might be surviving dinosaurs; in Charig (1989, p. 392), he cited two pro-mokele-mbembe articles and mentioned the mokele-mbembe-hunting research expeditions led by Chicago University cryptozoologist and biochemist Roy Mackal. However, Alan was by no means sympathetic to these suggestions.

During the 1990s Alan's academic work focused on dinosaurs, although research on Triassic archosaurs and other reptiles continued in the background. The decade began with the publication of a substantially delayed paper, co-authored with Carl Gans, on two new fossil amphisbaenians ('worm lizards') collected from the Lower Miocene of Rusinga Island, Lake Victoria, Kenya (Charig & Gans 1990). These represented two new taxa, *Listromycter leakeyi* and *Lophocranium rusingense*, both of which had been collected by L. S. B. Leakey in 1947 and sent to the British Museum (Natural History) in 1950. With a skull estimated at 36 mm long when complete, *Listromycter leakeyi* remains the largest known amphisbaenian.

1990 also saw the appearance of Alan's paper (co-authored with Angela Milner) on the affinities of *Baryonyx walkeri*. Published within *Dinosaur Systematics: Approaches and Perspectives* (edited by Kenneth Carpenter and Philip Currie), Charig & Milner (1990) provided a critique of Gauthier's recently published phylogenetic analysis of theropods (Gauthier 1986), and responded to recent claims from Paul (1988) and Buffetaut (1989) that *Baryonyx* might be a spinosaurid. Buffetaut (1989) noted that *Baryonyx* and *Spinosaurus* both possessed long-rooted teeth that were subrounded in cross-section and emerged from circular (rather than rectangular) alveoli, a vertical expansion at the tip of the dentary, and enlarged third and fourth dentary teeth. Charig & Milner (1990, p. 133) concluded that the characters shared by the two taxa did 'suggest a phylogenetic relationship between them' and, hence, agreed with Buffetaut somewhat, but they felt that the differences, rather than the similarities, carried more weight. This phenetic approach may have been favoured by Alan because it emphasized the apparent uniqueness of *Baryonyx*, and the fact that any conclusions on the morphology of *Spinosaurus* were based on lost material (Stromer's original *Spinosaurus* specimens had been destroyed during World War II) may, in Alan's view, have weakened the case. Ultimately, however, suggestions of an affinity between *Baryonyx* and *Spinosaurus* were to prove correct.

Relatively little known is that Owen's holotype for the armoured ornithischian *Scelidosaurus* is not the quadrupedal animal represented by a near-complete skeleton (specimen NHMUK R1111), but a knee joint and other fragments now known to belong to a theropod, as had been established by Newman (1968) (see also Charig 1972, p. 139). In order to officially associate the generic name with the armoured ornithischian, Charig & Newman (1992) made NHMUK R1111 the neotype. Of incidental interest is that a full monograph on *Scelidosaurus* was noted at this time as being under preparation: in a comment similar to that made

earlier about unpublished work on *Heterodontosaurus*, Charig & Newman (1992) wrote 'When the osteology of *Scelidosaurus* is eventually published it will be better known than that of almost any other dinosaur, and considerably better known than that of many extant reptiles' (pp. 281–282). Once again, Alan never completed his work on this taxon. In another act of nomenclatural tidying, Alan completed the work he had started in his 1980 sauropod paper by petitioning the ICZN to make the sauropod *Cetiosauriscus stewarti* the type species of *Cetiosauriscus* (Charig 1993a).

In response to the increasing number of cladograms depicting the evolutionary relationships of archosaurs (or archosauriforms) that were appearing during the 1980s and 1990s, Alan argued that there was little or, indeed, no evidence for progress, and that there seemed to be no indication of a consensus (Charig 1993b). Despite the flurry of new work produced by various authors, Alan argued that 'the recent analyses have told us **nothing** [emphasis in original] that we did not know thirty-five years ago' (Charig 1993b, p. 55). This rather pessimistic perspective stood in marked contrast to Benton's (1984) claim of a 'radical new consensus' and solicited a comprehensive response from Gower & Wilkinson (1996). While certain practices employed by some workers (e.g. the naming of groups whose phylogenetic reality remained doubtful) were, undeniably, worthy of the criticism that Alan heaped upon them, strong evidence for a 'current consensus' could, indeed, be found (Gower & Wilkinson 1996). One interpretation of Alan's response to this work is that it further undermined his proposal, discussed earlier, that *Mandasuchus*-like archosaurs with a 'semi-improved' stance were in some way ancestral to the 'fully improved' dinosaurs. While a new generation of workers was promoting the view that tree-based thinking and a quest for shared derived characters had begun to resolve archosaur phylogeny, Alan still seemed reluctant to change his views and appeared staunchly 'traditional'. Alan's 1993 paper on archosaur phylogeny was yet another in which he alluded to a manuscript that was never to appear: when discussing new phylogenetic work on ornithischians, he described how comparative work (presented at the Palaeontological Association meeting of 1987) had shown 'only one significant improvement over the phylogenetic tree given by Romer in 1956 in his *Osteology of the Reptiles*' (Charig 1993b, p. 45). The resulting manuscript, planned for *Palaeontology*, was titled 'A review of cladistic methods of phylogeny reconstruction and classification, as applied to the ornithischian dinosaurs'.

Alan's last paper was published posthumously, and was another nomenclatural paper published in

the ICZN Bulletin (Charig & Chapman 1998). It is somewhat fitting that this article presented a new solution to a problem afflicting the nomenclature of one of the very earliest named dinosaurs: *Iguanodon*. While *Iguanodon* had become well known for its Belgian representative (*I. bernissartensis*, named in 1881) and for *I. atherfieldensis* from the Isle of Wight (named in 1925, and recently renamed *Mantellisaurus atherfieldensis*: Paul 2007), Mantell's original material – named *Iguanodon anglicum* (later changed to *I. anglicus*) in 1829 – consisted of non-diagnostic teeth discovered in the Grinstead Clay Formation (of middle Valanginian age) of the Hastings Beds Group. *Iguanodon* was therefore a *nomen dubium*, and action was needed if the name were to be preserved. Charig & Chapman (1998) argued that *I. bernissartensis* should be made the type species for the genus. There are two perspectives on this decision. One is that it may have been inappropriate given that the large, robust taxon *I. bernissartensis* (which may be as young as Barremian–Aptian in age) is, apparently, a very different animal from whichever taxon is represented by the Grinstead Clay Formation remains (Naish & Martill 2008; Paul 2008). A second is that, given the relatively early discovery of *I. bernissartensis*, its good representation in collections and the literature, and its frequent use as 'exemplar' for the genus, making *I. bernissartensis* the type species was the most sensible course of action. Because the latter decision was supported by the majority of palaeontologists who expressed an interest, it was officially accepted by the ICZN in 2000.

Research expeditions

Alan took part in several collecting expeditions both during and prior to his time at the BM(NH), some of which resulted in the recovery of significant specimens. Cox (1997) recorded that Alan was a member of a joint expedition with London University in 1963 to Zambia (then northern Rhodesia) and Tanzania (Fig. 3). This expedition lasted for 4 months and collected five tons of material. In 1966–1967 Alan took part in the Joint BM(NH), University of London and South African Museum expedition to Basutoland (Lesotho) (Figs 4 & 5). The field team included John Attridge (Birkbeck College, University of London), Peter Whybrow (BM(NH)), Ionie Rudner (South African Museum) and Alan Charig. These expeditions resulted in some significant discoveries, including material of the Triassic mammal *Megazostrodon*, later worked on by Fuzz Crompton and Farrish Jenkins (Crompton & Jenkins 1968), anomodonts later studied by Barry Cox (Cox 1969), and prosauropod material later studied by Paul Sereno (Sereno 1991).



Fig. 3. 1963 Joint BMNH–University of London expedition to northern Rhodesia (Zambia) and Tanganyika (Tanzania). John Attridge (Birkbeck College, University of London) and Alan Charig completing a plaster jacket around the skull of the thecodontian ‘*Pallisteria*’ from the Early Triassic, Tanzania. Photograph © H. W. Ball.



Fig. 4. 1967 Joint BMNH–University of London and South African Museum expedition to Basutoland (Lesotho). The field team included, from left to right: John Attridge (Birkbeck College, University of London), Peter Whybrow (BMNH), Ionie Rudner (South African Museum) and Alan Charig. Photograph © NHM.



Fig. 5. 1967 Joint BMNH–University of London and South African Museum expedition to Lesotho. Excavation of prosauropod material in the Late Triassic–Early Jurassic Red Beds near Pokane. From left to right: Peter Whybrow (BMNH), Ionie Rudner (South African Museum) and Alan Charig. Photograph © NHM.

Other specimens collected on these trips have yet to be described and are the subject of current research (A. Milner pers. comm. 2009).

In 1978 the Joint BM(NH), University of London and Queensland Museum expedition to Queensland, Australia, took place. Alan was accompanied by John Attridge, Barry Cox (King's College), David Norman (then at Queen Mary College) and Cyril Walker (Figs 6 & 7). Fossil herring, representing the oldest known members of the group known at the time, were discovered on this expedition and were due to be described by Colin Patterson: these were never published, however (A. Milner pers. comm. 2009), and an older member of the group, *Spratticeps gaultinus*, was later reported in any case (Patterson 1970). A Lower Cretaceous ichthyosaur (Wade 1984) was also discovered.

Alan was proud of his first visit to China in 1979 as a guest of the British Council and vividly described some of the meals he ate during his visit. He published an article in *Biologist* magazine that was as much about his personal recollections of China and its people as about its palaeontological wealth (Charig 1980c). He was to return in 1982 as a leading member of a BM(NH) and Institute of Vertebrate Palaeontology and Palaeoanthropology, China (IVPP) expedition to Sichuan Province (Figs 8 & 9). The party included Dong Zhi-Ming, Li Jin-Ling, Sun Ai-ling, Ron Croucher and

Angela Milner. Work was undertaken in the Upper Jurassic Upper Shaximaio Formation of Wang Cang County in Sichuan, and sauropod and stegosaur material was collected.

Popularization and the public

Like Bill Swinton before him, Alan was the dinosaur expert at the BM(NH) and was the great popularizer of his day, writing several semi-popular books that were highly praised for bringing a substantial amount of new information to the public. In 1970 Alan wrote the text for the Brooke Bond Picture Cards series *Prehistoric Animals* (Fig. 10). While this seems trivial, it had a significant impact on young people and their interest in prehistoric animals. Featuring art by Maurice Wilson and cover art by Michael Bell, it included an illustration of *Mandasuchus* and one of the earliest life restorations of *Deinonychus*. Because the work included some brief text on *Mandasuchus* it has jokingly been said that it is the only fossil reptile defined on the basis of a tea card (C. Walker pers. comm. 2009). As noted earlier, the name *Mandasuchus* had been used earlier on in the technical literature (e.g. Appleby *et al.* 1967), but published data remained scant.

In 1975 Alan published *Before the Ark* (with C. M. B. Horsfield), a book written to accompany



Fig. 6. 1978 Joint BMNH–University of London and Queensland Museum expedition to Queensland, Australia. Excavation of an ichthyosaur skeleton in Early Cretaceous beds. From left to right: John Attridge (Birkbeck College, University of London), Cyril Walker (BMNH), Barry Cox (King's College, London), Alan Bartholomai (Director, Queensland Museum) and Alan Charig. Photograph © NHM.



Fig. 7. Joint BMNH–University of London and Queensland Museum expedition to Queensland, Australia. Alan Charig and John Attridge (Birkbeck College, University of London) cataloguing finds in camp. In the background are Dave Norman (far left, then at Queen Mary College, University of London) and Cyril Walker (BMNH). Photograph © NHM.



Fig. 8. 1982 BMNH and IVPP expedition to the Upper Jurassic, Sichuan Province, People's Republic of China. Among others from left to right: (5th) Sun Ai-lin, (6th) Alan Charig, (7th) Li Jin-ling, (8th) Dong Zhi-ming, (9th) Angela Milner and (11th) Ron Croucher. Photograph © Angela Milner.



Fig. 9. 1982 BMNH and IVPP expedition to the Upper Jurassic, Sichuan Province, People's Republic of China. Li Jin-Ling, Ron Croucher and Alan Charig at the field site in the Upper Shaximaio Formation, Wang Cang. Photograph © Angela Milner.

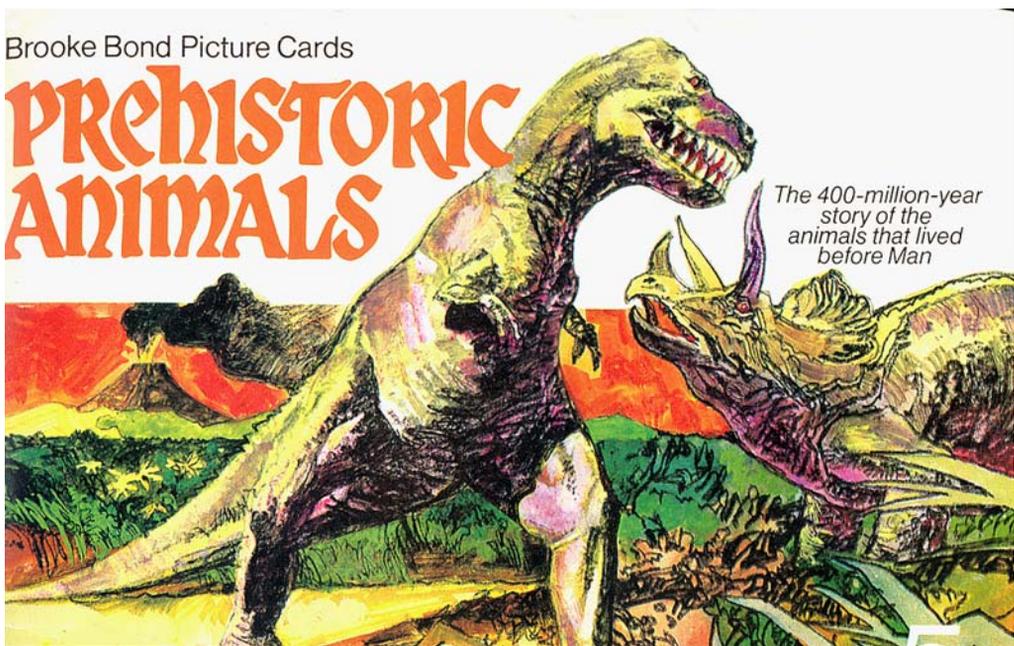


Fig. 10. Alan wrote several books that were highly praised for bringing a substantial amount of new information to the public. In 1970 Alan wrote the text for the Brooke Bond Picture Cards series *Prehistoric Animals*, which had a significant impact on young people and their interest in prehistoric animals. Featuring art by Maurice Wilson, it included an illustration of *Mandasuchus* and one of the earliest life restorations of *Deinonychus*.

a 10-part TV series of the same name that Alan presented (Fig. 11).

His best-known book, and one which saw several reprintings as well as translation into several languages, was his 1979 *A New Look at the Dinosaurs*. Aimed at interested lay-people and illustrated with excellent photographs, line drawings and colour plates, the volume included some entirely new data. Examples include photographs of a tiny juvenile of the South American sauropodomorph *Mussaurus*, one of its first appearances in print

(the specimens were described by Bonaparte & Vince 1979). Alan's scepticism towards the idea that birds might be theropods was apparent. The volume included double-page coloured scenes produced by Peter Snowball, and including dinosaurs of different faunal assemblages (including the Morrison Formation, Wealden Supergroup and Hell Creek Formation). These paintings were reproduced by the BM(NH) as postcards and as large posters for children, and were still available for sale in the museum as late as the 1990s.

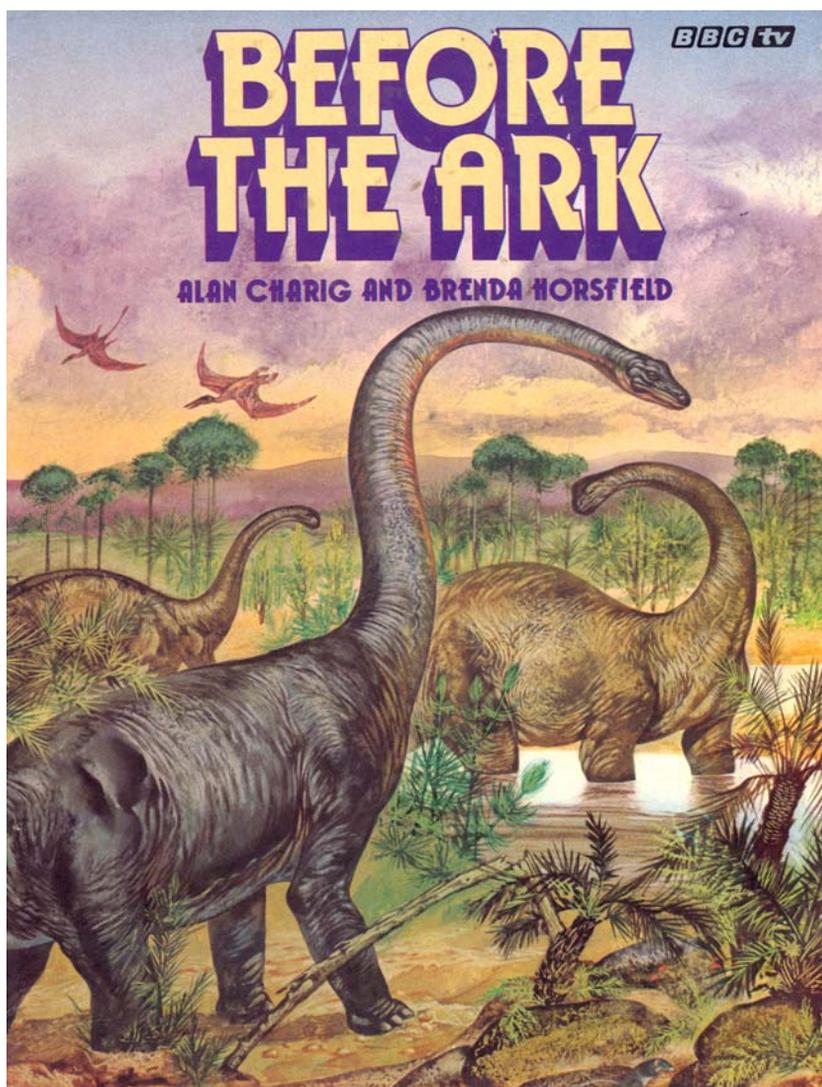


Fig. 11. In 1975 Alan Charig published *Before the Ark* with Brenda Horsfield. The book was written to accompany a 10-part TV series that Alan presented. His best-known book, and one which saw several reprintings, was his 1979 *A New Look at the Dinosaurs*.

The 1986 announcement of *Baryonyx walkeri* proved to be an area of enormous interest to the media and the public. Nicknamed 'Claws' by journalists (in reference to the fictional shark 'Jaws'), both *Baryonyx* and its discoverer (William Walker) were featured widely in the national and international newspapers, and even formed the focus of a BBC television documentary broadcast in February 1987 (Milner & Croucher 1987).

Alan was soon to be featured in the media again, but this time for controversial reasons: namely, Sir Fred Hoyle and Professor Chandra Wickramasinghe's bizarre claim of 1986 that the London *Archaeopteryx* must be a forgery, and one that had been made in the 1860s and later covered up by the staff at the BM(NH). The technical paper that Alan and colleagues published as a response (Charig *et al.* 1986) refuted in detail all of the evidence alleged to support the claim. Stating at the outset that they 'reject this forgery hypothesis unequivocally' (p. 623), the authors pointed to the many methodological and philosophical problems inherent to the idea, showing time and again how the supposedly suspicious details raised by Hoyle and Wickramasinghe could not be taken as evidence of forgery, but were instead genuine geological features or artefacts resulting from decades of preparation (Charig *et al.* 1986). The '*Archaeopteryx* is a forgery' idea remains popular among creationists and those on the lunatic fringe, but even they fail to appreciate the bizarre logic behind Hoyle and Wickramasinghe's argument. As explained in their book, *Archaeopteryx The Primordial Bird: A Case of Fossil Forgery*, Hoyle and Wickramasinghe sought to show that *Archaeopteryx* was faked because it proved an obstacle to their idea that dinosaurs and other Mesozoic vertebrates had been transmogrified by bacterial storms that had rained down on the Cretaceous world from outer space, grafting new genetic information onto the animals, and causing them to change into the birds and mammals of the Cenozoic (Hoyle & Wickramasinghe 1986). As a pre-Cenozoic bird, *Archaeopteryx* did not fit and had to be explained away (Hoyle and Wickramasinghe were generally unaware of other pre-Cenozoic birds, and ignored Mesozoic mammals entirely). Had this entertaining scenario been presented to the public at the same time as the '*Archaeopteryx* is a forgery' claim, it is doubtful whether it would have been taken as seriously as it was in some circles. A short popular book produced to accompany an exhibition about the charges, titled *The Feathers Fly!*, was produced by the museum. David Norman (1987) described how annoyed Alan was 'at having to waste his time with such refutations', but noted that 'they fed on many of his scientific attributes: notably a keen eye for detail and a constantly questioning,

almost nagging persistence, for information and ultimate 'proof'".

Alan also wrote short sections on fossil reptiles for various popular or semi-popular books including the *The Collins Atlas of Animal Evolution* (1986) and *The Encyclopaedia of Reptiles and Amphibians* (1986).

Remembering Alan

As Curator of Fossil Amphibians, Reptiles and Birds, Alan was, of course, encountered by most active researchers in these fields. He was always reported to be extremely kind and helpful, making many suggestions that were to assist his colleagues in their pursuit of palaeontology. Alan also played a major role in social events of the UK palaeontological community and was an eminent member of the Tetrapods Club, an unofficial group that met up for occasional meals. The meetings and meals organized by this body were, apparently, unforgettable. A walrus baculum (rumoured to have been passed down from Thomas Huxley) was used as a sceptre by the chair.

However, Alan's relationships with other members of the Department of Palaeontology were sometimes strained. Barney Newman was a disciple of Bill Swinton but found it difficult to work with Alan as his new section head. Barney was larger than life and 'one of the museum's distinguished toppers' (Fortey 2008); Alan was not! During his latter years at the museum, Bill Swinton gave Barney the task of writing letters on behalf of the section. Barney wrote them and signed them! When Alan took over, Barney asked him if this arrangement was satisfactory: in reply, Alan said that Barney could continue to write them, but that he would sign them. The explosive response was 'You sign em', you write 'em'. Barney's paper on the stance and gait of *Tyrannosaurus rex* (Newman 1970) did nothing to improve relations between the two. The *T. rex* specimen (the type of the junior synonym *Dynamosaurus imperiosus*, sold to the BM(NH) in 1960) was mounted in the museum's old dinosaur gallery in a rather 'modern' pose: that is, with its body and tail near-horizontal and its tail well up off the ground. It is generally assumed that Barney wanted to depict the animal in a dynamic, modern pose, and he said as much in his technical paper (Newman 1970). In fact, Alan revealed all by writing that the specimen 'was mounted with its body in a far too horizontal position: this was done because it would otherwise have been too tall for the Gallery. Newman, who made the mount, has attempted to rationalise this (1970) by stating that the posture was much more bird-like than is suggested by earlier mounts'

(Charig 1972, p. 137). Ultimately, Barney accepted a museum post in South Africa; his wife Margaret Lambert Newman survives him and is known as the illustrator of several books by Björn Kurtén.

People who have memories of Alan note that:

Alan had a clinical mind and an outstanding memory which enabled him to ‘pick the bones’ out of other people’s arguments.

Cyril Walker

He had the annoying habit of re-correcting his corrections until he had almost returned to the original text. He could also destroy your confidence by suddenly falling into a deep sleep whilst reading your thesis or manuscript.

Dick Moody

He will probably be best remembered for his involvement in the discovery and description of one of the most extraordinary dinosaurs to have been discovered on these shores: the curious fish-eating, gaff-clawed, *Baryonyx walkeri*. This dinosaur skeleton, now on display in the dinosaur gallery of the Natural History Museum, was discovered in a clay pit just south of London in the early 1980s. One of the most extraordinary facts about this dinosaur, apart from its remarkable diet, is that it was discovered in rocks that have been explored for well over 200 years – during which time not the slightest inkling of its existence had been gained; this is perhaps a salutary lesson for all we fossil researchers. It is gratifying, to himself and his memory, that the long-awaited monograph on *Baryonyx* was published just before he died.

David Norman (1997)

He was also unstinting in his efforts to popularise his area of interest and research through public lecturing tours both in this country and abroad; in this area he too was a consummate expert, bringing to his lectures not only his breadth and depth of knowledge, but also a delightful facility for the anecdote or happy (some times positively hilarious) reminiscence which showed him to be a scientist with a very humane side. Alan’s public face was what he considered to be a necessary adjunct to his scientific rôle within a museum which prided itself on its scientific reputation and its public accessibility. Such public and (in a sense) private rôles are not always easy bed-fellows and there were times when the tension between these two facets of his life caused some difficulties during his career.

David Norman (1997)

Above all Alan Charig was a charming, witty, kindly, savagely critical, blinkered, biased, and at times absolutely infuriating man – so how could you do anything other than like the man. Who of us that knew him can ever forget those damned phone calls? How much he must have underpinned the profitability of the telecommunications industry, I shudder to think. Alan is gone now, he has left a hole by departing, but he has enriched us in many ways by what he left behind and he will be missed.

David Norman (1997)

When, as a fledgling palaeontologist, I first visited the fossil reptile collection of what was then the BM(NH), he was very friendly and made me feel at home. He even invited me to a meeting of the Tetrapods Club, and suggested that I should attend the SVPCA later that year. This was a suggestion I definitely followed, and I have missed very few since then (it must have been in 1976) and have organised a few of them myself.

Eric Buffetaut

In all – Alan Charig was a fascinating character: he was good company and was always ready with a tale or joke. He was – in the language of dining clubs – most ‘clubbable’ and thoroughly enjoyed his evenings at the Tetrapods and the Geological Society Dining Club.

Conclusions

For four decades Alan Charig produced research on dinosaurs and other fossil archosaurs, and also contributed to knowledge on plesiosaurs, molluscs and other groups. A large number of popular articles and technical papers kept his name in the journals and helped promote the role of the BM(NH)–NHM in the global research community. Similarly, his popular books brought research on dinosaurs and their world to a huge audience. His research on new taxa, most notably *Heterodontosaurus* and especially *Baryonyx*, resulted in important publications that remain highly regarded.

However, he was definitely guilty of sitting on certain projects that were never to see fruition, even after decades of work: among them the planned descriptions of *Heterodontosaurus*, *Scelidosaurus* and *Dimorphodon*, and on his Tanzanian Triassic taxa. In fact, despite his many references to on-going work and in press manuscripts, his list of notable publications is short and it is difficult not to conclude that he avoided writing about specimens if he could! In recent years, renewed interest in archosaur morphology and phylogeny has resulted in progress on his planned projects, much of which has been carried out by Alan’s academic ‘descendants’: *Heterodontosaurus* and *Scelidosaurus* are currently under study by David Norman, and the *Dimorphodon* holotype was studied by Sarah Sangster for her PhD thesis (Sangster 2001, 2003). Kitty Thomas studied *Mandasuchus* for the purposes of her PhD thesis (Thomas 2004); Sterling Nesbitt and Paul Barrett are currently working on *Nyasasaurus* and other Tanzanian material; and *Hypselorhachis* has been re-examined by Richard Butler and colleagues, and does, indeed, appear to be a ctenosauriscid (Butler *et al.* 2009).

During his research career Alan was strongly associated with his ideas on the evolution of archosaur gaits and on the changing fortunes of the

different Mesozoic tetrapod groups. Ultimately, however, his arguments on these subjects were unconvincing and have been mostly falsified. The hypothesis that dinosaurs evolved from quadrupedal, crocodylian-like ‘pseudosuchian thecodonts’ with a ‘semi-improved’ stance proved incorrect, both because fossils intermediate between quadrupedal crocodile-line archosaurs and early dinosaurs were never discovered, because such animals were later shown to belong to distinct lineages, and because other finds (such as *Lagosuchus*) indicated an evolutionary history for dinosaurs somewhat different from that Alan envisaged. It is tempting to suggest that the increasing realization that his theoretical model was at odds with the evidence explains, in part, Alan’s failure to publish on his Manda Formation taxa, as he stated in the popular literature that they would somehow be of special relevance to the subject of stance and gait in archosaur evolution. However, his excessive sense of perfectionism contributed to his slow progress on these projects, and he stated on occasion that he was saving some of this planned work for retirement.

Alan remained a conservative voice throughout the years of the ‘dinosaur renaissance’, resisting arguments proposing monophyly of Dinosauria and of the dinosaurian origin of birds. Ultimately, his position on these issues (which have not been supported by recent research) have meant that much of his work is now ignored and regarded as being primarily historical in interest. Alan’s position on archosaur phylogeny as a whole – that a division of Archosauria into a bird-dinosaur clade and a crocodile clade was suspect, and that no significant progress had been made since the 1960s – also stands in marked contrast to the views of virtually all current workers. Similarly, his objections to cladistics did little to slow the revolution in ‘tree-based thinking’ and few working systematists agree with his view that paraphyletic groups and Linnaean ranks should be retained. In a sense, Alan could be regarded as one of the last members of the ‘old school’: he did not embrace or popularize the views promoted by the ‘dinosaur renaissance’ nor by the cladistic movement, and he gave no indication of giving up on the views that would have been regarded as mainstream in the 1950s and early 1960s.

One could argue that Alan’s role as a popularizer of dinosaurs and palaeontology was inevitable given his professional position, and that the books, popular articles and television appearances that he was involved in are not therefore a consequence of any great skill as a communicator. Indeed, some colleagues are of this opinion. However, as Dave Norman (1987) stated, Alan was unstinting in his efforts as a communicator of science; he excelled as an extremely thorough reviewer of other

people’s work, and he was highly skilled at combining an enormous breadth of knowledge with a very ‘human side’, sometimes presenting anecdotes and reminiscences that were amusing and even downright hilarious.

Many people provided anecdotes, comments and information that contributed to this article. We are especially grateful to C. Walker (1939–2009), A. Milner, D. Norman and E. Buffetaut for discussion and data. P. Forey (via A. Milner) provided information on Colin Patterson’s fossil herrings. A. Milner and D. Martill are thanked for their careful reviews of the manuscript. We also extend sincere thanks to K. Padian, P. Barrett, R. Butler, S. Nesbitt and H.-D. Sues for providing information and for sharing unpublished data.

Appendix: The scientific works of

A. J. Charig

This list is given in chronological order.

- CHARIG, A. J. 1956. *New Triassic Archosaurs from Tanganyika, Including Mandasuchus and Teleocrater*. PhD dissertation, University of Cambridge.
- CHARIG, A. J. 1957. New Triassic archosaurs from Tanganyika including *Mandasuchus* and *Teleocrater*. *Abstracts and Dissertations of the University of Cambridge*, **1955–56**, 28–29.
- CHARIG, A. J. 1960. Dr G. H. Francis [obituary]. *Nature*, **187**, 284–285.
- CROMPTON, A. W. & CHARIG, A. J. 1962. A new ornithischian from the Upper Triassic of South Africa. *Nature*, **196**, 1074–1077.
- CHARIG, A. J. & NEWMAN, B. H. 1962. Footprints in the Purbeck. *New Scientist*, **14**, 234–235.
- CHARIG, A. J. 1963. The gastropod genus *Thatcheria* and its relationships. *Bulletin of the British Museum (Natural History), Geology*, **7**, 257–297.
- CHARIG, A. J. 1963. Stratigraphical nomenclature in the Songea Series of Tanganyika. *Records of the Geological Survey of Tanganyika*, **10**, 47–53.
- ATTRIDGE, J., BALL, H. W., CHARIG, A. J. & COX, C. B. 1964. The British Museum (Natural History)–University of London Joint Palaeontological Expedition to northern Rhodesia and Tanganyika, 1963. *Nature*, **201**, 445–449.
- CHARIG, A. J., ATTRIDGE, J. & CROMPTON, A. W. 1965. On the origin of the saurpods and the classification of the Saurischia. *Proceedings of the Linnean Society, London*, **176**, 197–221.
- CHARIG, A. J. 1965. Stance and gait in the archosaur reptiles. *Liaison Reports of the Commonwealth Geological Liaison Office*, **86**, 18–19 (Abstract).
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- CHARIG, A. J. 1966. The role of vertebrate palaeontology in modern biology. *Biology and Human Affairs*, **32**, 31–41.

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- ATTRIDGE, J. & CHARIG, A. J. 1967. Sediments and skulls. *New Scientist*, **35**, 260.
- CHARIG, A. J. & REIG, O. A. 1970. The classification of the Proterosuchia. *Biological Journal of the Linnean Society*, **2**, 125–171.
- CHARIG, A. J. 1970. New names for two species of *Viviparus*. *Annales Musée Royal d'Afrique Centrale*, **8**, *Sciences Géologique*, **67**, 79–80.
- CHARIG, A. J. & HORELL, J. 1971. The Fletton plesiosaur, 1970. *Report of the Huntingdon Flora and Fauna Society*, **23**, 37–40.
- CHARIG, A. J. 1971. *Prehistoric Animals*. Brooke Bond, London.
- CHARIG, A. J. 1971. Faunal provinces on land: evidence based on the distribution of fossil tetrapods, with especial reference to the reptiles of the Permian and Mesozoic. In: MIDDLEMISS, F. A., RAWSON, P. F. & NEWALL, G. (eds) *Faunal Provinces in Space and Time: Proceedings of the 17th International University Geological Congress Held in Queen Mary College (University of London) – 17, 18, 19 December 1969*. Seel House Press, Liverpool, 111–128.
- CHARIG, A. J. 1971. Archosauria; Eosuchia; Euryapsida; Lepidosauria; Ornithischia; Reptilia; Rhynchocephalia; Saurischia. In: LAPEDES, D. N. (ed. in Chief) *McGraw-Hill Year Book Encyclopedia of Science and Technology*. McGraw-Hill, New York, **1**, 570–571, one text-fig.; **5**, 33, two text-figs; **5**, 134–135, one text-fig.; **7**, 534, three text-figs; **9**, 471; **11**, 510–512, six text-figs; **11**, 589; **12**, 58–59.
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