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BY A.J. CHARIG

FRANCIS REX PARRINGTON (1905–1981) ('Rex' to his friends) was regarded worldwide as one of the most distinguished vertebrate palaeontologists and comparative anatomists of his generation. Noted for his studies on all vertebrate classes except birds, he is also renowned for his teaching and for having established and fostered a thriving research school in the Zoology Department at Cambridge during the period from 1951 to 1970. Indeed, many of today's professional vertebrate palaeontologists, serving in museums and universities around the world, can trace their 'academic ancestry' – directly or indirectly – back to Parrington.

### FAMILY HISTORY

His paternal grandfather was a Yorkshireman, born in 1877 in the small village of Dent, situated among some of the highest peaks of the Pennines in the northernmost corner of the West Riding (now transferred to the new county of Cumbria). Dent, incidentally, was also the birthplace of the celebrated geologist Adam Sedgwick. Grandfather Parrington migrated to Liverpool, where he and a Mr Harding – both, according to Rex Parrington, of humble origin – became partners in a brewery. Mr Parrington's son Frank Harding Parrington (despite the middle name, there is no evidence of any relationship between the two families) followed his father into the business and married Mr Harding's daughter Bessie May. She bore him two sons and a daughter; the youngest of the three was Francis Rex, born at Bromborough, near Neston in Cheshire, on 20 February 1905. It is amusing to note that the most famous of all fossil reptiles, *Tyrannosaurus rex*, was named in the same year! Only two years later, in 1907, Frank Parrington died at the age of 30.

Young Rex's earliest memories were of Grandfather Harding's home at Huyton, near Liverpool. It was a large house with spacious gardens, and there he and his sister were cared for by a 'nanny' until he was about four years old. His mother then married again, this time to a physician named Robinson. Dr Robinson was so brilliant that he had become medically qualified before he was 21 and head of a mental hospital near London at the age of 30; indeed, he was regarded so highly in his profession that Liverpool University conferred upon him an honorary M.D. degree. Alas, a neighbouring mental hospital had been destroyed by fire and many of the patients – trapped behind locked doors and barred windows – had perished in the flames; this tragedy had led to a severe breakdown in Dr Robinson's own



health and he had resigned his post, buying in its stead a general practice in the heart of Liverpool.

After the marriage (in about 1909) the whole family lived in what Rex described as 'an insalubrious part of Liverpool with a back yard in place of a garden'. He was evidently very fond of his stepfather, who was of an extremely quiet, retiring disposition and showed great kindness to his young stepson. His mother bore one more son, Harry Armitage Robinson, who was of course Rex's half-brother. Later they moved to better houses in the Liverpool area, but Rex was still unable to indulge his burgeoning interest in natural history except during the annual summer holiday; he suspected that his love of the outdoors and of nature stemmed from his dislike of living in the heart of Liverpool. While still a boy he began his career as a natural history collector: he first collected wild flowers, then Coleoptera (beetles), and finally fossils.

During World War I Dr Robinson ran three practices, but his health was ruined. He retired in 1920 and the family moved to North Wales, where Rex was able to pursue his interests more freely and where he was much happier. Alas, Rex's mother died in 1926, and his stepfather followed only a few weeks later.

#### SCHOOLDAYS

In 1914 Rex Parrington went as a boarder to the Merchant Taylors' School in Crosby, where his elder brother was already a Senior. His parents, however, were concerned that at a boarding school he might not be fed properly because of the food shortages caused by the War, so in 1916 – when he was 11 years old – he was taken away and sent to Liverpool College as a day boy. Another shortage caused by the War was of trained teachers; thus Rex was taught physics for one year only (heat, light, sound, electricity and magnetism, all in three short terms!), after which the physics laboratory was closed for the duration. It was not reopened until about the time of Rex's leaving school. During his first year at the school his chemistry master was such a good teacher that Rex became really interested and made the subject his hobby for some years, even though his subsequent teachers were poor and taught without proper discipline. One particular teacher, however, whom he remembered with great respect and affection was the mathematics master A.R. Prestwich. Prestwich was a first-class teacher and gave great encouragement to members of the Chemistry Society, the Geological Society and all biologists; he must have been partly, even largely responsible for the later success of C.S. Elton, F.R.S., the Oxford ecologist, and of G.H. Mitchell, F.R.S., Deputy Director of the Geological Survey.

#### UNDERGRADUATE DAYS

In 1924 Parrington was accepted by Sidney Sussex College, Cambridge, to read Natural Sciences. He was reputed to be an 'indrawn' young man, but he fancied that his early life had given him an independence that was later to prove of great value. It was in the middle of his three years as an undergraduate, when he was only 21 years old, that he lost both his mother and his stepfather.

At Cambridge Parrington's zoological studies were initially supervised by Munro Fox; at that time the lectures on vertebrates were given by Hans Gadov and Clive Forster-Cooper



(Director of the University Museum of Zoology). However, Munro Fox soon left to take up a Chair in London; with the consequence that Parrington, who had been fascinated by Forster-Cooper's superb lectures, managed to get Forster-Cooper as his supervisor instead. This move, so he said, was the greatest good fortune of his life, for the supervisions were as stimulating as the lectures. Parrington was greatly surprised when, after a few months, Forster-Cooper offered him the post of his Assistant at the end of his course – provided that he did sufficiently well in the Tripos; and Parrington, feeling that Forster-Cooper had so much charm that any job with him would be well worth having, gladly accepted. He took Part I of his Tripos in 1927, but unfortunately developed influenza in the middle of the examinations and had to be content with an aegrotat degree.

#### UNIVERSITY MUSEUM OF ZOOLOGY (PRE-WAR)

Thus, in 1927, Rex Parrington began his career as Assistant to the Director of the University Museum of Zoology at Cambridge. The Museum, together with the Department of which it formed part, was to occupy the whole of his working life: another 43 years of full-time work (including World War II), followed by several years of part-time work in retirement.

His first task in the Museum was to curate the exhibition of testudinales (turtles and tortoises) and then the other amphibians and reptiles. Fossils were few (in the 19th century they had mainly been the concern of geologists, not zoologists), and this virtual lack of extinct forms made it difficult to appreciate their living successors. The following year, 1928, Parrington was appointed Strickland Curator and began to help Forster-Cooper with the Part II Zoology lectures, taking over all the teaching on amphibians and reptiles. In 1929 the British Museum (Natural History) (B.M. (N.H.)) asked that he should take part in their series of palaeontological expeditions (run annually since 1924) to Tendaguru. Tendaguru is a famous locality in Tanganyika, not far from the coast; it had been extensively worked by the Germans in the first decade of this century and, from a level that approximated to the Jurassic-Cretaceous boundary, had yielded a varied terrestrial fauna that included the most enormous dinosaurs ever found. The biggest of all was a specimen of *Brachiosaurus*, a nearly complete skeleton that stands 12 m high in the Museum für Naturkunde in East Berlin and remains to this day the largest mounted dinosaur skeleton in the world; its weight has been estimated at more than 80 tons. Unfortunately Forster-Cooper was ill at that time, which meant that Parrington, as his Assistant, could not be spared from his everyday duties.

The next year, however (1930), Parrington was again invited to go to Tendaguru with the B.M.(N.H.), and this time Forster-Cooper – now in better health – agreed that he might do so, going on to work in the South African Karoo for another six months. Parrington, still a novice in such matters, took advice from Professor D.M.S. Watson – always one of his idols, and later his friend – as to where to go, what to look for and whom to meet. The leader of the expedition (replacing the very experienced collector W.E. Cutler, who had died of blackwater fever) was a gentleman named Migeod, who claimed extensive knowledge of many branches of natural history. Parrington, however, soon discovered that Migeod's pretensions concealed a profound ignorance of many subjects, and thereafter he delighted in setting deliberate verbal traps for Migeod: into which Migeod invariably fell. Parrington's



diaries of the period make amusing reading; Migeod's likewise! Unfortunately the expedition (no fault of Parrington's) was ill-conceived and ill-prepared. They did collect the greater part of the skeleton of a huge brachiosaurid dinosaur; but even that was left for decades to rot in the basements of South Kensington, the only elements that were ever prepared and exhibited being two gigantic vertebrae. (Interestingly enough, it was later discovered that this Tendaguru material was appreciably radioactive.)

Parrington then travelled to Nyasaland, finding *en route* the jaw of a mammal-like reptile from the Permian, and continued southwards to South Africa. There he learned that a survey geologist named Stockley had been finding surface remains of Permian and Triassic reptiles at several sites in the Ruhuhu Valley of southwestern Tanganyika, to the east of Lake Nyasa. Alas, amoebic dysentery soon brought Parrington's collecting in the South Africa Karoo to an untimely end, and in January 1931 he arrived back in England, some three stones lighter than when he left.

In the summer of 1931 Parrington decided that Palaeozoic fishes were badly needed for teaching purposes, and that he would try to collect them from the classic localities of Scotland. He would thus extend the Cambridge Museum's collections and, at the same time, his own field experience. Again he received much helpful advice from D.M.S. Watson, who also lent him his field maps; on the tour itself he was joined by Forster-Cooper and the latter's elder son. They had little success until they reached Thurso in Caithness, where they collected a great deal of excellent material from the famous Achanarras locality and were visited by the great Henry Fairfield Osborn from New York. That was the beginning of years of work at Achanarras by Forster-Cooper.

In 1933 Parrington was elected to the Balfour Studentship and embarked upon what was to prove the most important field event of his entire career. Following Stockley's accidental discoveries of Permian and Triassic material in the Ruhuhu Valley of Tanganyika (which had meanwhile been published by Houghton), Parrington decided to see what could be found in the Ruhuhu by someone whose specific intention was the collection of fossils. He was alone there for six months (some description of the expedition is given below under 'Personality') and his results were spectacularly successful. There was an Upper Permian fauna (in what is now known as the Kawinga Formation) that was closely related to the contemporary fauna of the South African Karoo; but also, higher in the succession in the Manda Formation, there was a varied and abundant Middle Triassic fauna that seemed to consist entirely of animals new to science. It provided a fine illustration of an early stage in the replacement of the mammal-like reptiles by the archosaurs. These Ruhuhu collections later supplied excellent research material for all seven of Parrington's research students. After leaving Tanganyika Parrington went again to South Africa, but again he was thwarted by illness (this time bacterial dysentery) and again he returned home with very little done.

Back in Cambridge, in 1934, Parrington continued teaching his Part II Zoology course and began to prepare his Ruhuhu material. Hearing that D.M.S. Watson was about to visit North America, a continent that he himself had never been to, Parrington asked if he might be allowed to accompany him; he was very pleased when Watson agreed to this suggestion. After working together in New York (in the American Museum of Natural History) they travelled on to Chicago, Ann Arbor, Toronto, Yale, Harvard, Amherst and Washington;



Watson, all the while, teaching Parrington in the most kindly fashion. Thus, for example, they spent many hours together examining the Cope collection of Lower Permian vertebrates. Both were greatly impressed by the North American dinosaur collections, but were nevertheless agreed that they preferred animals that could be studied with the aid of a microscope rather than with a stepladder!

In 1935 Parrington was appointed Demonstrator in Zoology and began teaching Part I undergraduates (Vertebrate Morphology and Evolution) as well as Part II. This meant giving up the Balfour Studentship, but it led to his promotion to Lecturer in 1938 and to his simultaneous appointment as Director of the University Museum of Zoology, Forster-Cooper having been appointed Director of the British Museum (Natural History). He was an inspiring teacher, whose well-organized, beautifully delivered, and – above all – enthusiastic lectures must have been responsible for attracting many students into a zoological or palaeontological career. (This certainly includes his biographer.)

Throughout the 1930s, Parrington also cultivated some professional links with continental Europe. Early in the decade he visited Professor Stensiö's laboratories in Stockholm, mainly to see his wonderful new equipment for the preparation of fossils (he felt that, applied to Karoo material, it would yield far better results than the old hammer-and-chisel methods. He was right!) In 1936 he went to Munich to see the work of Broili and Schröder and in 1937 to Moscow to attend the 17th International Geological Congress. Then, in 1939, he made the acquaintance of Walter Kühne, an impoverished refugee from Nazi Germany who, at that time, was collecting tiny isolated mammal teeth from Rhaetic fissure deposits in the Mendips. Parrington's private means enabled him to buy some of the teeth, thus providing support for Kühne and material for his own research. This opened up an extremely interesting new line of research, into the minute creatures that, by the end of the Triassic and the beginning of the Jurassic, had undergone the transition from reptile to mammal. More similar material was found after the War, in Lesotho, South Africa, and South Wales. It was unfortunate that divergent views on these earliest mammals provoked some controversy and (uncharacteristically for Parrington) some personal hostility towards certain colleagues.

#### WAR SERVICE

His visit to Germany in 1936 had convinced Parrington that war was inevitable. This gave him three years to think about the matter; so that, when Hitler invaded Poland on 1 September 1939, his mind was already made up. He joined the Army two days later; the very day on which Britain declared war on Germany.

Parrington was commissioned into the Royal Artillery. His first two postings were to Light Anti-Aircraft Regiments, supposedly equipped with Bofors guns (but which, according to Parrington, were not always available!). Then, in 1940, he was transferred to the Staff of Brigade HQ as Air Intelligence Officer. From the middle of 1941 until the beginning of 1944 he served in G.S.O.3, the section responsible for the organization of the Maritime AA gunners who travelled on merchant ships and defended them against enemy air attack; the first six months and the last six months of that period were spent in London at the War Office, but for the 18 months or so in between (essentially the whole of 1942 and



the first half of 1943) Captain Parrington was given a free hand to travel anywhere in the world where he might be needed to arrange for the care of his gunners. Finally, in January 1944, he was promoted to Major and sent to Scotland as second-in-command of the 1st Maritime Anti-Aircraft Regiment, Royal Artillery. He was released from the Army on 15 August 1945, the day the Japanese surrendered.

Parrington was fortunate in that, during his 18-month world tour of 1942–43 – following the Japanese attack on Pearl Harbour – he saw no military action. His written comments on his travels were typical of the man. A few referred to overseas palaeontologists whom he was able to visit while ashore; thus he remembered calling at Cape Town, where his Afrikaner colleague Lieuwe Boonstra refused to receive him because he was dressed in the hated uniform of a British Army officer. Most of his recollections, however, were of natural phenomena: thousands of huge sea-snakes (probably breeding) swimming on the top of the water in the Persian Gulf; a kangaroo in its native Australian environment; a few large trout caught in New Zealand at Christmas 1942. Far more interesting, he said, than the daily trudge up Whitehall to the War Office, and probably far less dangerous!

#### UNIVERSITY MUSEUM OF ZOOLOGY (POST-WAR)

Rex Parrington returned to Cambridge in the autumn of 1945 to pick up the threads of a life that had been so rudely interrupted six years earlier. Once more he threw himself wholeheartedly into his lecturing, many of his students being fellow ex-Servicemen. He continued his research, most of it on material from Scotland and Tanganyika that he himself had collected. But in 1951 a new element entered his daily schedule, coming to occupy an increasingly large part of his time. This was his own research school, a small group of postgraduate students working under his supervision for a Cambridge Ph.D.; not all, however, were Cambridge graduates, some having been attracted from distant lands by Parrington's excellent reputation as a palaeontologist and a teacher.

The first pair were Alan Charig (later Chief Curator of Fossil Amphibians, Reptiles and Birds in the B.M. (N.H.)) and the South African 'Fuzz' Crompton (subsequently Director of the South African Museum in Cape Town, of the Peabody Museum of Natural History at Yale and of the Museum of Comparative Zoology at Harvard). They were followed in 1953 by a second pair, Barry Cox (later Professor of Zoology and then Assistant Principal at King's College, London) and Alec Panchen (now Reader in Vertebrate Zoology at the University of Newcastle upon Tyne). The fifth student was Arthur Cruickshank, who later became Assistant Director of the Bernard Price Institute for Palaeontological Research in Johannesburg. Finally came another pair, Tom Kemp (now Curator of the Zoological Collections in the Oxford University Museum) and the Australian Anne Warren, née Howie, who returned to university posts in Melbourne.

Rex Parrington would visit his current research students every day, arriving in their shared study/laboratory in time for morning coffee and rarely leaving until lunch-time. He would review their progress in a manner critical yet kindly; he taught them everything he knew about palaeontology, about the art of writing papers (today, nearly 40 years later, his style inevitably seems a little long-winded and old-fashioned) and, most important of all, about scientific integrity. He would drink their coffee and regale them with oft-repeated tales of



his own expeditions, of Smith Woodward, Forster-Cooper, Broom, D.M.S. Watson, and other palaeontological 'giants' both past and present. But once the students had reached the stage of actually *writing* their dissertations he would help them no more, so that there could be no breath of suspicion that he had done any of the writing for them.

These seven students, once they had obtained their doctorates, all helped produce a third and even a fourth 'generation' of vertebrate palaeontologists and comparative anatomists. Together they constitute a 'Parringtonian school' that must have had a significant and beneficial impact upon the worldwide development of the science.

In the summer of 1952 he took his first two research students, Charig and Crompton, on an extended tour of the classic fossil localities of Scotland; from Muirkirk in the south to Thurso in the far north. That was the only field work that he and his students ever did together during their student days, but, for the two concerned, it remains an unforgettable experience. Towards the end of his career, by which time he had been elected to Fellowship of the Royal Society, he would invite one of his former students to accompany him to the Annual Dinner of the Society, an honour that was always much appreciated.

Parrington had another claim to fame. In 1953, together with two colleagues – Angus Bellairs and Charles Shute – he organized a 'Symposium of Vertebrate Palaeontology and Comparative Anatomy' (V.P. & C.A.) in Cambridge; they invited the participation of all those people, both inside and outside the University, who they thought might be interested. This initial meeting was not large but was highly successful. From this small beginning has stemmed an unbroken series of 38 similar, though larger, meetings that has prospered mightily and is now one of the outstanding institutions of British V.P. & C.A. The five-day Symposium is held every year in the second or third week of September, in one or other university or museum on the British mainland; recent departures from this established procedure have been meetings in Belfast (1986) and Boulogne (1988). Although the Symposium was originally meant to be an entirely domestic gathering, it is now attended regularly by several people from Continental Europe, North America and elsewhere. There is no society or organization, no officers or secretariat; the proceedings are informal, and nothing is published. The programme always consists of lectures on days 2–4 (often accompanied by vigorous debate), demonstrations, a field trip on day 5, a reception or two and a semi-formal dinner. The 'Father' of this Symposium was, without doubt, Rex Parrington.

In 1964–65 Parrington was granted sabbatical leave. This enabled him to spend a month in the U.S.A., where he was able to strengthen his friendship with Al and Ruth Romer. A second month was spent in South Africa, part of it in the Orange Free State doing field work with 'Fuzz' Crompton; other people he got to know there were Ian Brink, James Kitching and Barney Hirschson.

Rex Parrington was never one for self-advertisement, rather the opposite; it might fairly be said that he hid his light under a bushel. Remarkably for someone so distinguished and eminent in his field, he was never elected a Fellow of his college (Sidney Sussex). But recognition came at last. In 1958 he was admitted to the degree of Doctor of Science in the University of Cambridge; in 1962 he was elected a Fellow of the Royal Society; in 1963 he was appointed Reader in Vertebrate Zoology in the University of Cambridge; in 1967 he



was President of the Zoology Section of the British Association for the Advancement of Science; and in 1972 he was elected an Honorary (Life) Member of the Society of Vertebrate Paleontology (a North American organization). He also, in the early 1960s, was offered the Directorship of the British Museum (Natural History), but, probably very wisely, he declined the offer; the post was far too political for him. In any case, his wife was chronically ill.

In 1970 Rex Parrington reached the age of 65 and retired from his full-time appointments. The Annual Symposium of Vertebrate Palaeontology and Comparative Anatomy for that year was held in Cambridge; thus the semi-formal Symposium Dinner (in Clare College) became the Rex Parrington Retirement Dinner, attended by his friends and colleagues from across the world. The first of his research students gave a eulogy; a surprise (to Rex) announcement was made that a 'Festschrift' in his honour was in course of preparation; and, perhaps for the very first time, he was made aware of the enormous esteem and affection in which he was held by everyone. The Festschrift consisted of 15 invited essays, seven by his own former students and eight by other close colleagues, and it was published in 1972 (reference at end of bibliography below).

Retirement led to the realization of a long-held dream. Rex gave up his palaeontology and retired to his cottage at Lochwinnoch in the south of Scotland, to fish and to grow roses. But dreams fulfilled are not always quite as delightful as we expect them to be; after 18 months or so he developed hypertension, having grown tired of the trout and the heather and his own company, and he yearned for the cut-and-thrust of palaeontological debate. In 1972, therefore, he returned to Cambridge and bought a maisonette in Great Shelford from which he could drive every day to the University Museum of Zoology. Thanks to the kindness of his successor Kenneth Joysey and of Professor Weis-Fogh he was able to continue his work on Triassic mammals, just as though he had never left it. Six months showed that this was the right treatment for all his troubles!

In 1974–75 Parrington wrote (together with Stanley Westoll) two Biographical Memoirs for the Royal Society, one on his own dear mentor and friend D.M.S. Watson and the other on the best-known vertebrate palaeontologist of our age, the American Alfred S. Romer (also a great friend). In 1976 he collaborated with another (much younger) American, Farish Jenkins Jr, in writing a paper on the postcranial skeletons of Triassic mammals. It is a remarkable fact that, throughout his entire career, Parrington wrote only four joint papers (the three just mentioned, and one jointly with Westoll (published in 1940) on the evolution of the mammalian palate).

Also in 1976 Parrington visited China under the auspices of the Royal Society; doubtless a tentative, uncontraversial exercise by the Society (and probably the Foreign Office) to test the post-Cultural Revolutionary waters in that vast country. He enjoyed the visit hugely; he was deeply impressed, not only by the fossils, but also by a brain operation under acupuncture that he was permitted to witness.

One man, above all others, helped Parrington in his daily activities throughout the whole of his long post-war career in Cambridge. Douglas Norman, officially his Technical Assistant, was in every way his loyal and devoted right-hand man. Parrington would not have wished that his immense gratitude to 'Doug' should go unrecorded.



Eventually, however, Parrington's health began to fail. In 1977 he retired a second time – this time for good – and moved to Weybridge in Surrey so that he might be close to his daughter and her family. Also in Surrey, not far away, were the homes of two of his former students (Charig and Cox); they, likewise Kemp from Cambridge, were able to visit him occasionally and keep him abreast of palaeontological affairs. Even under these difficult conditions Rex continued to produce well-written scientific papers; his last work, on the *Tritylodontoidea*, was published in the year of his death (1981).

## RESEARCH

It was probably true of Parrington (as, indeed, of most natural historians) that his particular areas of specialization were not chosen by him; at least, not consciously. Rather was he influenced by the nature of the problems that were generally current during the earlier part of his career, by the interests of the senior people with whom he came into contact, and, most of all, by the availability of fossil material, which of course depended to a considerable extent upon what places he had chanced to visit in the course of his travels.

His professional life began with the Reptilia, and was always centred on that Class. His particular interests, however, extended far beyond the reptiles, ranging up and down the family tree of the vertebrates from agnathans to mammals in a more or less linear fashion. He never bothered much with diversionary sidelines like modern amphibians or the marine reptiles of the Mesozoic or dinosaurs or birds, or even the various groups of reptiles still extant today. His real interests within the vertebrates began right at the bottom, among the agnathans and early jawed fishes; but, though he collected them in Scotland and lectured on them to his undergraduates, he published on them only once. The next lowest group on which he published were the sarcopterygian fishes (crossopterygians and lungfishes), which include – somewhere – the ancestors of the tetrapods. His interests continued up the tree into the labyrinthodonts, the armoured amphibians of the Palaeozoic, and onwards into the primitive reptiles known as cotylosaurs. From there he entered the Synapsida, the 'mammallike reptiles' of the Permian and Trias. The pelycosaurs of the Lower Permian were not much favoured, probably because there is practically no pelycosaur material anywhere in Europe; but the therapsids of the Middle to Upper Permian and the Lower to Upper Triassic (of which he collected countless excellent specimens in eastern and southern Africa) were the group that he loved most of all. Stimulated by Kühne's discovery of early mammal teeth in the Mendips, Parrington's interest in mammal-like reptiles extended into the earliest mammals themselves, minute creatures almost invariably represented by little more than teeth (highly complex and taxonomically distinctive) and fragments of jaws.

Within this taxonomic framework certain unifying themes presented themselves. Perhaps the most conspicuous were the evolutionary transitions from one Class to another: sarcopterygian fishes to amphibians, amphibians to reptiles, mammal-like reptiles to true mammals. Another theme embraced various aspects of the anatomy of the skull, among them the identification of the dermal bones of the head and their relationship to the lateral line canals; the evolution of the middle ear; the development of the secondary palate; the musculature and operation of the jaws; and tooth development and replacement. Postcranial topics touched upon were the vertebrae (including intercentra), the evolution of the femur,



and digital formulae. Transcending all these was a general interest in phylogenetic relationships and classification. Of course, many of these topics overlapped each other.

Parrington was a good collector in the field and a skilled worker in the laboratory, keeping abreast of current techniques and putting them into practice with patience and thoroughness. Indeed, most of the fossils that he studied had been collected and prepared by himself. His intellectual approach to each problem placed great emphasis on a careful and very detailed physical description, on comparative anatomy, on a well considered functional interpretation (which generally involved the musculature) and on an unimpeachable objectivity in reaching his conclusions. Since most palaeontological material is incomplete and inadequate, it followed that his uncompromising honesty and natural caution often led him to express his ideas in a somewhat tentative fashion; he would never force a firm conclusion where, in his opinion, the evidence did not warrant it.

Parrington's Part II lectures were mostly centred on his own research interests; well planned and delivered, they were evidently designed to demonstrate to his undergraduate audience how vague and insubstantial was much of our factual knowledge of vertebrate palaeontology, how controversial our interpretations, how subjective our classifications. His explicit philosophy – unusual among researchers – rested upon his vision of teaching and research as two integrated aspects of the same thing: teaching generated research problems, and research created teaching subjects. As for his postgraduate students, they were all (as already mentioned) supplied with excellent material from the Ruhuhu Basin of Tanganyika: two were put to work on labyrinthodonts, two on dicynodonts, one on gorgonopians, one on cynodonts and one on pseudosuchians. All except the last were groups on which Parrington himself had written.

Most of his earlier works, published between 1933 and 1939, were concerned with theriodont reptiles from the Karoo; more specifically, they dealt mainly with cynodonts. Parrington's very first article described various points of the anatomy of *Thrinaxodon* (1)\*. He noted that, in a few cynodonts, the parasphenoid bone retains a processus cultriformis; he therefore suggested that the origin of mammals should be sought among such forms. His next paper gave a detailed description of the skeleton of the cynodont *Galesaurus* (2), to which was appended a well-presented argument on the functional significance of the evolutionary changes in the theriodont skull. Subsequent articles on theriodonts dealt with the parasphenoid of *Thrinaxodon* (4), and tooth replacement (5), which he claimed to be alternate ('distichical') in the post-canine series. Parrington's final publication in this series was on digital formulae (8) where, with better material, he confirmed Broom's earlier conclusion that cynodonts and gorgonopians show an intermediate stage in the mammalian reduction of the number of phalanges in the third and fourth digits of both manus and pes, from four and five respectively to three and three. However, whereas Broom had stated that the three 'lost' phalanges remained as vestiges in cynodonts and gorgonopians, Parrington showed that in cynodonts one of those three had actually been lost altogether.

\* Numbers in this form refer to entries in the bibliography at the end of text.



Another pre-War publication was a description of a small eosuchian skull from the *Lystrosaurus* zone of South Africa (3), in which the lower arcade of the lower temporal fenestra (formed from the quadratojugal) had lost its anterior portion. Parrington claimed that this represented an intermediate stage in the evolution of the lizards, which have lost the entire lower arcade, and he therefore named the creature *Prolacerta*. 'Further notes on tooth replacement' (6) was based on two fragments of mosasaurs (gigantic marine lizards) collected by Parrington himself from the Upper Cretaceous of Kansas. He also attempted to solve the question of whether a small bone in the temporal area of early diapsid reptiles, still present in modern lizards, is the supratemporal or the tabular (7). Parrington's last pre-War work, which did not appear until 1940, was a joint publication with T.S. Westoll that made important corrections to the homologizing of the palatal elements in reptiles and mammals (9); *inter alia*, it used the theriodonts to show that the reptilian 'prevomer' was in fact the true vomer. Even during the War Captain Parrington managed to publish a preliminary account of two mammal teeth found by Kühne in the Rhaetic of Somerset, which he named *Eozostrodon parvus* and *E. problematicus* respectively (10).

After the War had ended, back in Cambridge, Parrington resumed his researches. First he described the stapes of *Lystrosaurus* (11), confirming that the synapsid stapes was very similar to that of modern lizards. His next paper began with new information on the cynodont skull, obtained from five specimens of *Thrinaxodon*, and, from the Manda Formation of Tanganyika, one *Trirachodon* skull and two unnamed (12). This enabled him to make a reconstruction of the cynodont middle ear and compare it with the modern *Lacerta* and the cotylosaur *Captorhinus*. He then went back to the Rhaetic mammal teeth from Somerset (13), concluding that his *Eozostrodon* was a triconodont; he suggested that the microcleptids bore some affinity to the multituberculates, and, more generally, he discussed the phylogeny of the advanced theriodonts and the earliest mammals of the time.

Subsequent papers dealt with: the quadratojugal of synapsids, in which he concluded that that element did not form the lateral articulating condyle but merely rested upon it (14); the labyrinthodonts of South Africa, in which he redescribed parts of the skull of *Lydekkerina*, described a new labyrinthodont *Limnoiketes*, and expressed his belief that the preponderance of aquatic and semi-aquatic forms in the large-animal fauna indicated a swamping of the geosyncline in which the Beaufort rocks were being deposited (15); and the evolution of the tetrapod middle ear (16).

Parrington's next paper is one of his most celebrated. It contended that, in early fishes and amphibians, the positions of the future centres of ossification of the dermal bones were also the centres of hypothesized fields that were able to attract the courses of developing lateral-line primordia (17). This was the exact opposite of the view held previously, and, in every way, it provided a more satisfactory explanation of the observed phenomena. The theory was tested successfully in a subsequent paper on the skull of *Dipterus* (18). In this connection it was claimed by Parrington some years later that the important factors affecting the patterns of dermal bones in the skulls of primitive vertebrates were the relative positions of their rudiments and their manner of growth; even or elliptical (22); he believed that the similarities and differences in the patterns were likely to be of taxonomic value.



He turned next to a description of a new and problematical reptile from the Lower Triassic of the Orange Free State, to which he gave the name *Aenigmasaurus grallator* (19); he regarded it as 'a very late survivor of extremely primitive captorhinomorph-synapsid stock'. Three years later he described another problematical reptile, this time from the Upper Permian of Tanganyika, and this time he refrained from naming the somewhat inadequate remains which, despite their early age, hinted at archosaurian affinities (21). Meanwhile he had returned to his favourite topic (the cranial anatomy of theriodonts) with an article on the skulls of the gorgonopids *Scylacops* and *Dixeya*, on jaw musculature, and on the nature of the typical synapsid middle ear (20).

Parrington's interest in the jawless Agnatha was manifested by his next publication, in which he described new material of *Lasanius*, made a restoration of that poorly-known genus, and discussed the mode of life of the anaspids (23). 'The problem of the classification of reptiles' (24) – regarded by some as one of his most important works – pointed out that the twofold division of the amniotes into Theropsida and Sauropsida rests largely upon the interpretation of the middle ear of early reptiles and on the relationships of millerettids; Parrington's detailed discussion of those two subjects led him to conclude that there were two dominant reptile lineages, the Synapsida and the Diapsida, but that there were many other groups that could be fitted into neither. (His only foreign-language publication, in French, reviewed this area of knowledge and also the origin of the testudines (28).) There followed short articles on the middle ear of the labyrinthodonts (25) and the angular process of the dentary (26), the latter casting some light upon the jaw musculature during the evolution of the mammals from the theriodonts and upon the interrelationships of the earliest mammals. A study of femora and pelves, together with the musculature of the thigh region, led Parrington to the conclusion that advanced cynodonts (as well as anomodonts) were similar to primitive therian mammals in respect of those structures; gorgonopids, however, were still largely reptilian, therocephalians and scaloposaurid bauriamorphs were intermediate, and tritylodonts and monotremes were specialized (27).

Parrington's next interest was in vertebrae, specifically the great variety of amphibian vertebrae, which had been used as a basis for taxonomy but which were poorly known and understood. He endeavoured to interpret them from a functional point of view (29). A subsequent paper reverted to the subject of the dermal bones of the head of lower vertebrates, in which he gave his full support to Westoll's earlier identification of the 'frontal' and 'parietal' of the primitive crossopterygian skull as the parietal and postparietal respectively, and likewise to Westoll's methods in doing so (30).

After writing the last-mentioned paper (published in 1967) Parrington confined his attention, for the rest of his career, to his beloved mammal-like reptiles and early mammals. The only exceptions to this were the Biographical Memoirs of two dear friends, Professor D.M.S. Watson (37) and Professor Alfred Romer (38), both written jointly with Professor T.S. Westoll. The last paper published before his retirement was a review of 'The origins of mammals', in which he concluded that, although mammalian monophyly looks tempting at first sight, the diphyletic evolution of mammals seems probable, and even polyphyly is possible (31); this was the paper that he delivered in his capacity as President of the Zoology Section of the British Association for the Advancement of Science for 1967.



His first post-retirement article was mainly a history to date of the early mammal material and a critical synthesis of all the more important publications thereon, together with new descriptions of the teeth of *Eozostrodon* and of their replacement (32). (The titles of this and of some later papers refer to 'Triassic' mammals, but all modern workers would now date the containing deposits as basal Jurassic.) This work differed significantly from a paper by Mills, on much the same subject, published in the same year (1971); Parrington attempted a refutation of the reasons for Mills's differing conclusions (33). He next published a short note in which he attacked Kühne's use of his junior synonym *Morganucodon* in place of Parrington's senior synonym *Eozostrodon*, ignoring the latter's priority (34). The possibility of the monotremes' having evolved independently of the marsupials and placentals but also from the cynodonts was suggested in another article (35); and a new genus of gorgonopid from the Kawinga Formation of Tanganyika, *Cephalicustriodus*, was described in yet another (36). This last was an invited contribution to the volume of the *Annals of the South African Museum* that was dedicated to his old friend Lieuwe Boonstra.

F.A. Jenkins Jr collaborated with Parrington in the production of an extensive work on the postcranial skeletons of the three triconodont mammals *Eozostrodon*, *Megazostrodon* and *Erythrotherium* (39). This evaluated the skeletons in both comparative and functional terms and discussed the habits of the animals. Parrington's next paper considered the retention of intercentra in the neck of cynodonts, in particular their functional significance (40). There followed another work on the early mammals, chiefly *Eozostrodon*, that came to a variety of conclusions on their anatomy, tooth replacement, taxonomy and phylogeny (41). His penultimate work likewise reached a number of varied conclusions on the evolution of the middle and outer ears of mammals; in particular he confirmed the theory, advanced long before by Westoll, that the contacts and attachment processes on the tetrapod stapes could be homologized with contacts and attachment processes on the hyomandibular bone of crossopterygian fishes (42). His last paper gave a history of the palaeontology of the tritylodonts and confirmed Romer's belief that they merited classification as an independent infraorder of the Theriodontia rather than as a mere family of the Cynodontia; it also commented on Kühne's views on the relationships of the monotremes to the marsupials (43).

## THE MAN AND HIS FAMILY

### *Personality*

Rex Parrington personified all that is good in our understanding of the term 'English gentleman'. He was a man of impeccable honesty and integrity, both in scientific matters and in every other aspect of his life; his word was undoubtedly his bond. Indeed, honesty and integrity were the greatest of the virtues that he imparted to his students, supporting his belief that the unequivocal search for truth is the only worthwhile philosophical activity. He was of a reserved and retiring disposition; it might fairly be said of him that he did not wear his heart on his sleeve and that it was difficult to get to know him beyond a superficial level. (Yet once he came to regard you as his friend he gave of his friendship unstintingly and for life.) One might even describe him as shy, his shyness manifesting itself as a certain



awkwardness in the company of strangers (especially women). On the other hand, he was a great talker. A much-loved anecdote relates how, one sunny morning long ago, he was treating two of his research students to a never-ending discourse; perhaps on the anatomy of the dicynodont skull, or some other topic of an equally esoteric nature. The more assertive of the students ventured to interpolate some relevant comment. Parrington paused in mid-flow, glared at the offender, and, with some asperity in his voice, remarked 'Don't interrupt, Cox, I am *discussing* it with you!'. He was likewise well able to keep his end up in conversation with his peers, especially those with whom he was on intimate terms. He had many favourite anecdotes of his own, each of them triggered off by a key word in the conversation; once the trigger had been pulled, no power on Earth could divert him from relating the appropriate story, usually for the umpteenth time.

Parrington was intensely conservative (in every meaning of that word); politically he would have been most aptly described as a 'good old-fashioned English Tory'. Although he detested the cruel aspects of socialism and communism, a view strengthened by his visit to Stalinist Russia in 1937, he nevertheless admired the Welfare State with its National Health Service and free education, and he held surprisingly liberal views on South Africa, a country he knew well. Today he would probably be regarded as a 'wet' Conservative; we may be sure that he would have had precious little time for Thatcherism. And he was the epitome of everything British, not least in his firm belief that any foreigner could understand English perfectly well, provided that one spoke it sufficiently loudly and clearly! That approach, however, was based on neither arrogance nor laziness but on humility; he simply believed that the English were generally no good at learning other peoples' languages (he was right!) so it was better all round to rely upon their learning ours. Parrington's other outstanding features were his great kindness (generally applied as unobtrusively as possible) and the thoroughness and attention to detail that characterized everything he did. He was not much interested in sport (apart from fishing) but he had an all-pervading love of nature.

A reliable measure of Rex Parrington's essential worth is the great esteem and affection that he engendered in his students. This applied in particular to his seven research students, who knew him so much better than did anyone else. To be sure, they were all a little afraid of him at first; but they soon plucked up sufficient courage to tease him – gently and respectfully – about his little idiosyncrasies. It was very evident that he greatly enjoyed this intimate relationship, which, in some cases at least, persisted and deepened as the one-time students advanced into middle age.

Perhaps the most delightful story of all about Rex Parrington – which also speaks volumes about his character – concerns his famous Ruhuhu expedition of 1933. This contrasted in every way with the follow-up expedition to the same region, made 30 years later (in 1963) by four of his erstwhile research students and three other scientists; their journey was motivated at least in part by sentiment. Parrington had marched alone into the Ruhuhu, accompanied by a train of native bearers with boxes on their heads, and he had stayed there for six months on a diet of tinned goods and hard tack; the 1963 expedition, lasting only two months, consisted of seven white men in four four-wheel-drive vehicles, well equipped with refrigerators and every type of food and drink that anyone could wish for. (On one dreadful occasion they nearly ran out of peeled baby shrimps.) Parrington had been isolated



in the bush, several days' march from the nearest township and expert assistance, without radio and with only such limited medical materials as he himself could administer; on the other hand, the 1963 party, which in any case would have been able to drive to a well-equipped hospital in an hour or so, included a qualified doctor and ample supplies of the most up-to-date drugs and instruments. Yet Parrington collected far more interesting fossils than did his successors and in much greater quantity (although, to be fair, that may have been partly due to his thorough cleaning-up of the previously unexplored fossiliferous exposures and the low rate of subsequent erosion). But now for the point of this anecdote. Every evening, when the seven members of the 1963 expedition sat down together to eat their delicious dinner, cooked by their native servants, the hot and humid climate induced them to come to table in nothing more than a pair of shorts. But in 1933, when Parrington sat down to dine alone on bully beef and biscuit, he wore a dinner jacket and black tie. As someone remarked, in genuine admiration: 'By such men was the British Empire created!'.

#### *Business interests*

In essence there were two Rex Parringtons – the university don, and the businessman – the former, to him, was by far the more important of the two. But he eschewed the tweed jackets, the corduroy trousers, the polo-necked sweaters that were then regarded as typical of the breed; on the contrary, his cleanshaven appearance, his slightly expanded waistline, his well tailored suits would together have convinced almost anyone that here we had a pillar of the financial establishment. And, indeed, such a belief would have been partly true. The brewing firm of Messrs John Joule, of Stone in Staffordshire (formerly the property of the family that had included James Prestcott Joule, F.R.S., famous for his work on the conservation of energy) had been bought by his two grandfathers towards the end of the 19th century; they had intended that it should supply their Liverpool business, but when the latter was sold they retained the brewery firm in Stone and built it up most successfully.

Rex Parrington became a director of the company in 1945 and Deputy Chairman in 1962; this involvement necessitated regular journeys from Cambridge to Stone over the period concerned. At the time of his service as Deputy Chairman the brewing industry was undergoing rationalization by the amalgamation of many small, uneconomic firms, and the firm of John Joule was threatened with takeover. Because of differences concerning the management of the firm Rex Parrington resigned in 1964; in 1966 his worst fears were confirmed by Bass Worthington's announcement that they held 49% of the shares. A few years later they closed the John Joule brewery altogether, to the considerable detriment of the people of the small country town of Stone.

#### *Hobbies*

Throughout his adult life he had three great hobbies (apart, of course, from natural history in general, and palaeontology in particular). Fly-fishing was one of those hobbies; another was growing roses; and the third was collecting English water-colours of the 18th and 19th centuries. He was also very interested in red wines (mainly clarets) and in motorcars (for many years he ran a beautiful old Bentley). Indeed, he was an excellent driver; he even went to Advanced Driving School and practised the initiation and control of skids. One of the



stories that his research students were told over and over again was how Parrington, caught by the outbreak of the 1939 war on a fishing holiday in the far north of Scotland, had leapt into his Bentley and rushed back to Cambridge (to join the Army) in an incredibly short period of time.

### Family

On 7 August 1946 Rex married Margaret Aileen Knox Johnson, a Scottish woman, at Lochwinnoch, Renfrewshire; she had been what was then known as a 'mannequin'. A son, Francis Glen, was born in November 1947; he was followed by a daughter, Rayne Mary Knox, in September 1949. Sadly, the marriage was dissolved in 1963, and Mrs Parrington died shortly afterwards.

Glen is involved in the building business (in Suffolk) and has inherited his father's love of fly-fishing. Rayne became a good secretary and then, having gained in self-confidence, she too worked very successfully as a fashion model; in 1974 she married David Shaun Hope McAlister, an actor who often works on radio and television but has also a degree in business studies. They have two children, Amy born in 1976 and Kieran in 1979.

### Death

Rex Parrington died on Good Friday, 17 April 1981, in Surrey, at the age of 76. He was cremated at Woking a few days later.

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The portrait photograph was taken by Edward Leigh in 1962.

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