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ARTHUR DESMOND HARRISON (24.12.1921 - 30.12.2007) – AN APPRECIATION

Arthur D. Harrison, the doyen of African limnology and studies of the Afrotropical Chironomidae, died in Canada over 3 years ago with little or no posthumous scientific recognition. This piece is an attempt to rectify the situation, and to recognise the significance of Arthur as a clear-thinking and often pioneering biogeographer, entomologist, educator and above all as a limnologist in the broadest sense. His life and career spanned Africa and Canada, although his influence remains very much associated with Africa, from Ethiopia to the Cape.



Arthur D. Harrison. Photo Helen James

Arthur was born in the Western Cape of South Africa, at Kalk Bay, on 24th December 1921, and he lived for a period at Fish Hoek (where he returned in retirement – see photograph). He attended school in Rondebosch and then studied at the University of Cape Town where he gained B.Sc and M.Sc. He then obtained teaching qualifications (B.Ed) and took up a teaching appointment before deciding that research was to be his career. He gained a po-

sition at CSIR (South Africa’s Council for Scientific and Industrial Research) undertaking limnological surveys in rivers and estuaries. This led to the award of a Ph.D. for his pioneering studies of the Great Berg River (of the Western Cape), published in two parts in the Transactions of the Royal Society of South Africa (Harrison 1958; Harrison & Elsworth 1958) and revisited subsequently (e.g. Harrison 1964). These papers (‘beacons’ in the literature according Allanson 2003) remain well-cited and show Arthur’s early recognition of the downstream effects (zonation) in river structure and function from headwaters to estuaries. From the outset Arthur balanced his limnological studies with the applied – one of his earliest papers concerned the effects of acidic mine pollution on the streams of the Transvaal. Throughout his career, by himself or others with his assistance, revealed a range of human impacts on aquatic ecosystems.



Fish Hoek. Photo P. Cranston

After relocations with CSIR (Witwatersrand University, then Pretoria) Arthur took up a Rockefeller-funded position studying *Bilharzia* at the University of Salisbury, in what was then (early-1960s) Rhodesia. Arthur clearly had some time on his hands aside from studying the effects of molluscicides. He observed the recovery of a Rhodesian stream, post-drought, including documenting

the chironomids, and finding the adults of the first known podonomine midge from Africa, described as *Afrochlus harrisoni* by Freeman (1964). Following the Unilateral Declaration of Independence (from the UK) in November 1965, Rockefeller funding was withdrawn under sanctions, and Arthur returned to South Africa to become Professor of Zoology at the University of Natal, in Pietermaritzburg.

This was a short-lived appointment as Arthur accepted an invitation to join the faculty of the University of Waterloo in Ontario, Canada, where under Noel Hynes he joined a dynamic group of tropical limnologists. At this time Arthur's deepening personal interest in the chironomids became more evident. Although he had collected the midges throughout his career, including finding in 1954 *Harrisonina petricola* Freeman in an ephemeral stream in Oliphants Valley and recognising it as curious, he passed many of his specimens onto others, first to Marjorie Scott, and then to Paul Freeman at the Natural History Museum, London (BMNH). However his own first publications on the group started to appear in the early 1970s, with his interest in the Tanypodinae evident when he took Sepp Fittkau's (1962) revision of the Tanypodinae and placed the somewhat neglected African species into the modern generic concepts (Harrison 1971). In the course of this study, he described his first midge genus (*Lepidopelopia*) for the 'one that didn't fit' the Fittkau scheme (Harrison 1970). It was at this time that I first met Arthur as he came through London to view the types of the African Tanypodinae held in the BMNH – he asked me to make microscope slide preparations in advance of his visit so that he could see features such as the spurs on the adult legs that characterised Fittkau's new taxa. Arthur was a stickler for correct preparations, and it gave me some pleasure to 'pass the test'. He was very alert to the 'modern' means of doing chironomid taxonomy, and made slides of most of his specimens as he collected them. Further, he reared much and tried to incorporate the immature stages.

For many subsequent years our paths did not cross, as Arthur spent his time either in Waterloo, or seconded to the University of Addis Ababa in Ethiopia. From 1981 to 1989 he was a major contributor to the Canadian International Development Agency (CIDA)-funded Institutional Enhancement project, spending 4 years living there. Another of the Waterloo faculty engaged in this project, Herbert Fernando, recalled 'At the best of times Ethiopia is not an easy country to work in. But these were not good times. We needed permission from

the highest government authorities to leave Addis Ababa even for field work.' Despite this situation, experienced Africa-hand Arthur succeeded in doing much publishable research, and he produced a series of papers on the Chironomidae of Ethiopian lakes, extending distributions of known taxa, and describing new species and new life histories. He managed to get himself to the high elevation streams as well as the Rift Valley lakes, and published general invertebrate reviews with Noel Hynes and some particular chironomid papers. Arthur published this work especially in *Archiv für Hydrobiologie* and *Spixiana*, and always he tried to get his research out to the appropriate audience. When *Aquatic Insects* started, he was a contributor and supporter from the outset (e.g. Harrison 2000). Further, he seemed never to decline an invitation to summarise his compendious and very broad understanding of the ecology and distribution of African invertebrates (e.g. Harrison 1978, 1995). He wrote fluently and with a highly readable style – and was a frequent correspondent and an early adopter of e-mail.

On his retirement from Waterloo, he lived on Vancouver Island for some years, but he felt the health of his wife, Jessie, might benefit from returning to South Africa where more help was available. Although she died in 1994, Arthur remained in Fish Hoek, making periodic visits to his family in Canada and to Perth, Australia. It was in the Western Cape, post-apartheid, that I resumed 'in person' acquaintance with Arthur as I started to visit the 'rainbow nation' and adjacent countries. Arthur guided me by hand-drawn maps and photographs and detailed verbal instructions to localities including for *Afrochlus* in Zimbabwe (see photograph of Ngoma Kurira) and *Aphrotenia* in the Western Cape. He had immense knowledge (and profound memory) of aquatic locations and their inhabitants throughout southern Africa. In the 1990s and early years of this century, this knowledge continued to be extended as he identified chironomids, seemingly for all aquatic research groups in South Africa. Fortunately he continued to publish from his immense collections and those provided by his collaborators, although his field work was curtailed. When Don Edward (University of Western Australia) and I visited the Cape in 1998, Arthur accompanied us to the upper Eerste River in Jonkershoek. We collaborated subsequently, including over an orthoclad, *Elpiscladius*, a member of the *Brillia* group for which Arthur had a pharate male (Harrison & Cranston 2007). Little did we know but the then-unknown larva was in the Eerste – mining in immersed wood as its phylogeny predicted (Cranston 2008).



Ngome Kurira. Photo: P. Cranston.

My last meeting with Arthur in person was in Fish Hoek in early 2004 when he announced that he was to return to be nearer to the trusted medical facilities of Vancouver. Arthur continued to write wonderful e-mails, full of biogeographic and taxonomic insights from the vast range of organisms with which he was familiar. If a communication silence went on too long he would write simply to enquire 'where in the world was I?'. The last silence though was on his part: the precursor to his death at the end of 2007, although sadly this news was slow to spread.

Arthur Harrison was an immensely knowledgeable, insightful and very productive scientist to the end. Justifiably, his major works continue to be well cited – he was a limnological pioneer in Africa at the time the field was in its infancy. His breadth of knowledge of invertebrates and their distributions was unrivalled, and his biogeographic insights (e.g. Harrison 1978) have stood the test of time. Further, although he had a tremendous empathy with local peoples, he showed that quality biological research can be produced under most arduous circumstances. We will not see his like again.

I am grateful to Ferdy de Moor for provoking this article – I hope that my heartfelt appreciation is better late than not at all.

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PAUL FREEMAN – AN APPRECIATION OF HIS STUDIES ON CHIRONOMIDAE



Paul Freeman, August 1960. Photo G.W. Byers

Dr. Paul Freeman died at the age of 94 at the end of July this year. To many contemporary chironomologists he will be known principally for his contribution to untangling the taxonomy of the sub-Saharan African Chironomidae. The results were published in 4 parts in the *Bulletin of the British Museum (Natural History)*, Entomology series, between 1955 and 1958 (Freeman 1955, 1956, 1957, 1958), followed by the Chironomidae of New Zealand (Freeman 1959) and of Australia (Freeman, 1961). One third of Freeman's scientific publications (of 86 in total) concerned the Chironomidae: the others ranged across several other families of nematoceros Diptera. After his first publication on chironomid midges (adding two new species to the United Kingdom list in 1948), the remainder concerned non-European species, especially, but not exclusively, from Africa, Australia and New Zealand. Freeman apparently never visited these countries but relied on an extensive network of colleagues who sent him adult midges. Amongst these scientists based in Africa were Arthur Harrison (whose commemoration can be found elsewhere in this issue) and Margaret (K.M.F.) Scott from the University of Cape Town, who are expressly thanked at the outset of the sub-Saharan studies for their big collection of adult midges 'in excellent condition'. From the Sudan, David (D.J.) Lewis is acknowledged for much material including the asthma-inducing Nile midge that Freeman named for its collector (*Cladotanytarsus lewisi* (Freeman, 1950)). From throughout colonial Africa people sent material to London, providing the impetus for a series of short papers on particular National Parks, especially those in central Africa. This material led Freeman to understand the problematic influence of the Abbe J.J. Kieffer – whose work

he described as 'very erratic', noting the 'very uncertain' concepts of genera, paucity of illustrations and redescription of the same species 'over and over again not only in different papers but even in the same one' (Freeman 1955: pp. 5–6). Although Freeman examined as many of Kieffer's types as could be found (many are lost amongst the 300 Kieffer described from the region), and he disentangled the taxonomic confusion as best he could, he concluded that more collecting was needed in type localities, picking out Kribi (tropical Cameroon) as especially important. Sadly this situation remains essentially as true today as it was during the 1950s.

Freeman's African studies were important in placing the midges of a large continent into more modern generic (including subgeneric) concepts, yet he published at a time of turn-over in our ideas and methods. Freeman used pinned adults, but prepared hypopygial mounts and drew quite detailed and accurate figures of these structures. The days of routine slide mounting of the complete adult were yet to come, but the warning that Freeman gave of the tendency of coverslips to 'distort' genitalia remains as pertinent today as then. The post-WWII years was the time when European entomologists were building on an increased understanding of the significance of the immature stages in classification – led by what has been termed the 'Thienemann school' of ecologists-turned-taxonomists. These disciples often reared their larvae to adulthood, retained the immature stages (the larvae and the quite critical pupal exuviae) and had sent the adults to Kieffer for description. The outcome became a more synthetic (and coherent) generic concept, often parallel to that derived from adults alone, but generally narrower. What is more, the Hennigian revolution was starting 'on the continent' with early adherents amongst some of the chironomid workers. One could cite Strenzke's (1960) explicit application to the chironomids (for *Clunio* and relatives), and phylogenetic thinking was evident earlier amongst the Thienemann group. Actually such thinking pre-dated Willi Hennig, as F.W. Edwards, one of Freeman's predecessors in studying Nematocera in the British Museum (Natural History), was remarkably prescient about these issues (Edwards, 1926). However Freeman's African studies were at the cusp of this transformation, and his higher level taxonomic work remained closer to the traditional adult-based scheme of Goetghebuer. This is not to criticise these studies for not being 'ahead of their time' from an ecological or phylogenetic perspective – history certainly has

been kind to Freeman's species concepts: his keys work, there is little or no synonymy, and the 'tidying-up' of so much of Kieffer's African concepts was of immense value to later taxonomists. For a more modern allocation of the taxa to genera, Freeman (with some help from an acolyte) did this in the *Catalogue of the Diptera of the Afrotropical Region* (Freeman & Cranston 1980) – his last publication on the family.

After the major African publication, Freeman continued to receive additional chironomids of interest, notably an Afromontane *Diamesa* from Mount Kenya, the southernmost representative of the genus (Freeman 1964a) and the first African species belonging to the 'cool stenothermic' subfamily Podonominae (Freeman 1964b). Paul recounted to me his astonishment when he referred Arthur Harrison's specimens of this first African podonome from Zimbabwe – the genus *Afrochilus* – to Lars Brundin who was revising the subfamily. Lars' postcard thanking Paul for the material was mailed from South Africa where Lars was already seeking more material. I am not sure if Freeman's astonishment concerned the ease with which the Head of Zoology at the Stockholm Museum could head south, or the cost, or both, but Lars was not only Head, but also in charge of the Museum's travel budget.

By this time Freeman had completed his immersion in Australasian Chironomidae – having produced first the study on New Zealand (Freeman 1959) and then his *Chironomidae of Australia* (Freeman 1961). These works differ from the African studies in several ways: the nomenclatural issues were more tractable (less of Kieffer), incompleteness of the survey material available to him was acknowledged (no Arthur Harrison!), more genera were described as new in the works (3 from New Zealand, 12 for Australia), and there was a strong visibility of some modern biogeographic thinking. Although Freeman did not publish on South American Chironomidae, he understood Edwards (1931) studies, and thus was able to recognise Neotropical elements in both New Zealand and Australia (e.g. *Stictocladius*, *Riethia*). Further, he reallocated some African species of Chironomini to groupings that he recognised and described as new from Australia, notably *Conochironomus* and *Skusella*. In the short summary in the introduction to the Australian work ('Distribution and affinities of the Australian Chironomidae'), there is scarcely an incorrect idea. Studies in both countries since Freeman's publications have extended the biogeographic ideas, notably through Brundin (1966) who encountered a much more diverse Podonominae fauna than Freeman had available to him, and

to myself including with Don Edward (e.g. Cranston & Edward 1999), who delved into the 'little black orthoclads' of the austral continents. Nevertheless, Freeman's new Antipodean genera hold up, including against the molecular data becoming available.

That Paul Freeman's research on Chironomidae slowed down, albeit almost ceased in the late 1960s was due to his promotion to lead the Entomology Department of the Natural History Museum (termed 'keeper'). His leadership skills were well demonstrated in 1964 when he organised the International Congress of Entomology, held in London. Further, he had a truly hands-on involvement in the sorely-missed 'new' Insect Gallery of the Museum that lured many a child, and perhaps adults too, with a celebration of insect diversity long before the term became popular. This was all before my time – when I interviewed for a lowly technical position in the Museum in the 'summer of mass unemployment' (1971) Freeman already had occupied the top floor Keeper's Office for 3 years. However he was the Departmental representative on the recruitment panel established for some vacancies, including the one that I had applied for: assistant scientific officer in the Ornithology section. On being told that the vacancy in birds was filled already, the Keeper put the 'soft sell' on me to consider working with insects, leveraging the Museum's generous policy on work release to pursue higher education and extolling the pathways that an enthusiastic junior member of the staff could pursue as a career. My negative experiences with entomology teaching during an incomplete undergraduate degree were no match for this persuasiveness, and so I declined other offers to control yeast quality in a brewery or culture cells in a cancer research hospital. Obituaries for Paul Freeman in the Guardian (<http://www.guardian.co.uk/environment/2010/aug/25/paul-freeman-obituary>) and the Telegraph (<http://www.telegraph.co.uk/news/obituaries/science-obituaries/7960471/Paul-Freeman.html>) both point to his support for his younger staff – he is quoted as stating "It is important to look after the junior staff, as the senior staff can look after themselves". I can affirm that this was especially so in my case – shortly after entry I was given the position of technical support for the nematocerous Diptera families, already a budding career trajectory for two assistants that later became Keepers – Dick Vane-Wright and Richard Lane. After familiarisation with the Diptera families and some work with both Tipulidae and Mycetophilidae I was encouraged, surely with the guiding hand of Paul Freeman, to curate the collections of Tanypodinae (which existed as pinned adults) in the light of Sepp Fittkau's *Die Tanypodinae* (Fittkau,

1962). There was a steep learning curve – it was in German (without Google translator to assist), dealt with features that could only be seen on good slide mounts with high power magnification, and described a plethora of genera compared to what was currently in use in English language guides. The visit to London of Arthur Harrison to review the African Tanypodinae against Fittkau’s work assured me not only that I was on the right track, but that I was not the only one interested in getting the subfamily into a modern framework.

When it came time to undertake a Ph.D., it was natural to stay with the Chironomidae, and I chose to work with the immature Orthocladiinae with guidance from ecologist Alan Hildrew and from Paul Freeman. This was before the days when Museums and like institutions saw a role for themselves in higher education, and certainly I was early into the system of having formal approval for Museum research to be directed towards the goal of a higher degree. As he had promised at outset, Paul Freeman was very supportive throughout the study and although not very conversant with immature stages he knew the broad and specific literature extremely well. Perhaps what has stayed with me most was his questioning of ‘publishability’ of research, long prior to the ‘publish or perish’ days. Simply put, he felt that if the taxpayer has paid for the research then there was an obligation to complete the work by publishing it. With the Keeper coming from a background in Diptera, I often heard it said that the cluster of staff Dipterists were the recipients of some favouritism. Although those were the days when budgets seemed to increase each year, and the Diptera section surely was blessed with a stream of very able technicians and some more senior recruits, Paul argued his strong support for the group was based on their publishing productivity. Amongst these was the multi-collaborative project led by Roger Crosskey’s editing of the *Catalogue of the Diptera of the Afrotropical Region* and for which Paul and I co-authored the Chironomidae contribution.

My career owes its entirety to that recruitment promise made by Paul Freeman, and delivered upon – support his junior staff he surely did, by deeds and example.

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