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Historical Records of Australian Science

John Michael Arthur Chappell, 1940–2018

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ABSTRACT

John Chappell was a geoscientist whose work on Quaternary sea-level change, landscapes, and climate helped to link Earth's ice volume, sea levels, and past climates. Elected a Fellow of the Australian Academy of Science in 1992, he made enduring contributions in geomorphology, coastal science, and environmental history. Colleagues describe him as a polymath, gifted with a prodigious memory, always ready to explain complex ideas with clarity, and unfailingly generous in his support of students and peers. Beyond his professional achievements, he was a devoted family man and a loyal friend to many.

Keywords: Antarctica, Australia, climate change, coral reefs, geomorphology, New Guinea, New Zealand, Quaternary, sea-level.

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Early life and education

John Michael Arthur Chappell (Fig. 1) was born on 24 April 1940 in Auckland, New Zealand. His father was Noel Colin Lewis Chappell (journalist with *New Zealand Herald*, later associate editor), and his mother was Muriel Lillian Cooney. They had three children, from oldest to youngest: John, Anthea, and Heugh.

The family lived in Auckland where John attended Grafton School, then Auckland Grammar, a state secondary school for boys that was known for high academic standards.

According to his younger brother Heugh, John's major interest in his early teenage years was building radios and amplifiers. One corner of his bedroom became festooned with boxes of resistors, coils, transformers, valves of all shapes and sizes, speakers, masses of thin plastic covered copper wire, metal cases, circuit boards, a soldering iron, as well as a large Meccano-style metal frame and shelving. A Second World War air force veteran lived nearby, who in his spare time, was a radio ham, and from whom John used to get parts every so often. John would spend hours busying himself in his room, but always took the time to explain to his brother Heugh, if asked, what he was doing, including what the different colours on resistors meant. When Heugh was about seven John made him a crystal set that had a huge copper wire coil and an aerial that ran from above a bedroom window for about 35 m to the back of the garden and up a high galvanised iron pipe. It was so powerful it was able at night to pick up radio stations all over the North Island of New Zealand.

John's passion for making radios and amplifiers was so great that in the first term of his fifth form year (the second-to-top form), his exam results were so poor that his parents made him put all his radio gear under the house. There was a major turnaround in the second term exams and John topped the class.

John's sister, Anthea, paints a similar picture:

> Making and constructing things all over his bedroom floor: Hornby trains, myriad Meccano marvels some of which incorporated propelling devices, plus crystal sets, a valve radio. Solder and a soldering iron came into all this somehow because melted solder in the floor rug wasn't popular with our mother. He had a book—*How it Works and How it's Done* (by Ellison Hawks, published in the 1940s, still available!) which engrossed him so greatly that he could explain in detail the workings of many a device (often boring to younger ears), and have a go at such as destructing a clock and putting

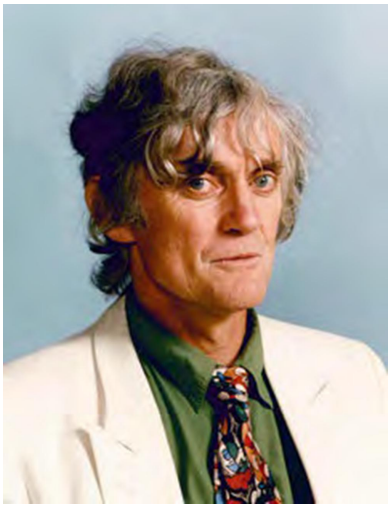

Fig. 1. John Chappell, wearing a favourite colourful tie. Photo courtesy of the Australian Academy of Science.

it back together. [Following Anthea's advice, I bought a copy of this book in 2023. Indeed, it is a truly marvellous exposition on the workings of anything from steam engines to power stations.]

Experiments with chemicals, exciting stuff! The local chemist sold John the ingredients I think (no internet then to find out how to make a flash-and-bang); tests were carried out at the bottom of the garden in the chook run. The culmination of such activities would come on Guy Fawkes night when the homemade concoctions joined the fireworks we'd saved up to buy for the back lawn bonfire complete with guy in sacks and some of the family's old clothes.

Construction pursuits included model planes—kits, balsa, precision cutting, the thinnest of papers and of course doping glues and redolent fumes. Rubber band drives, steady launching hands, clever repairs after crashes. Newmarket shop 'ModelAir' was a mecca. Grandparents maternal lived across the road from Rotorua aerodrome, and during holiday family visits John was a constant disappearing act, spending hours in the hangars and workshop being helpful making cups of tea, sweeping floors, tidying and doubtless blissfully fiddling with who knows what. Good blokes, those pilots and maintenance workers—sometimes John was treated to a spare seat in a Tiger Moth or a Fokker, up with the tourists over town and lakes, geysers and beyond. Was the occasional tale of wave-hopping, geyser-zooming, hedge-skimming an exaggeration born from the enthusiasm for reading Biggles books?

Occasional picnics under the lemon tree were accompanied by our favourite friend, the big box gramophone, with the HMV picture inside the lid of the dog listening to the speaker horn. The Song of the Flea would always send us into gales of laughter as we tried to keep up with all the he-he-he lines. Mussorgsky? Goethe? Never a clue about such names did we have. More serious musical tutelage was the radio and our mother encouraging us to identify the different instruments in the classical lineup. Instrumental tuition was available at our grammar schools; John's yearning desire to learn the bagpipes was denied … (was that even on the list?).

When John was in his last year at Auckland Grammar, he made a plan for his first year at Auckland University to study for what was, in those days, called 'An Engineering Intermediate'. If he passed then the intention was to attend the Ardmore Engineering School (a branch of the university located south of Auckland), and study for several more years for an engineering degree.

The Engineering Intermediate consisted of stage one units in Mathematics, Advanced Mathematics, Physics and Chemistry, all of which John had excelled in at Auckland Grammar. However, at the end of year exams in 1958 John passed three subjects, but failed Physics.

John's failing Physics 1 was really serendipity for the scientific world of geology and geomorphology—in his second year at Auckland University, John signed up again for Physics 1, as well as Stage 2 in Chemistry and Maths, but added Geology 1 as a fill in subject. The rest is history—John fell in love with geology.

Peter Barrett, who went on to become Professor and Director of the Antarctic Research Centre at Victoria University of Wellington, enrolled in geology at Auckland University in 1958, the same year that John started engineering. After John enrolled in geology the next year, they became life-long friends with shared interests in geology, caving, and motor bikes. The Department of Geology was then led by white-haired Argentinian Professor Arnold Lillie, educated in Edinburgh with a PhD on the structure of the Swiss Alps, and a distinctive European accent that John could mimic perfectly when telling Arnold stories. Classes were small and each summer Professor Lillie would take the best students to undertake field geology investigations in the Southern Alps. The group was always accompanied by an experienced alpine guide, who on one occasion (1961) was none other than Sir Edmund Hillary who, with Tensing Norgay, had made the first ascent of Mount Everest in 1953. John was part of the 1961 group (Fig. 2), which also included Phillipa (Pip) Black, David Skinner, Peter LeCouteur, and Evan Leitch, all of whom went on to complete Masters degrees at Auckland University and then PhD degrees (Phillipa and David at Auckland, John and Evan in Australia, and Peter in Canada).

Even as an undergraduate, Peter Barrett recalls that John's knowledge of geology seemed boundless. According to Peter, John was outstanding in talking things through

Fig. 2. Field mapping party, Southern Alps, New Zealand, 1961. From left to right: John Chappell, Philipa (Pip) Black, David Skinner, Peter LeCouteur, Evan Leitch, and Sir Edmund Hillary. Photo taken by Professor Arnold Lillie.

from first principles, patient and generous with his time, and gifted with an unusually good memory.

In 1964 John completed his MSc in geology, supervised by palaeontologist Jack Grant-Mackie on Pleistocene coastal deposits on the west coast of the North Island (Chappell 1964), results from which were later published (Stipp and others 1967; Chappell 1970, 1975). In a single-author letter to *Nature* in 1968, that both built on and greatly extended his MSc thesis results, John demonstrated his growing interest in the chronology and mechanisms of Pleistocene global climate changes (Chappell 1968)—a portent of things to come.

From stone axes in New Guinea to malaria in Antarctica

In late 1963 and early 1964, during the time he was doing his MSc, John spent three months in the New Guinea Highlands (Fig. 3) tracing sites where stone axes had been made. This was a collaborative project with Marilyn Strathern at Cambridge University Museum of Archaeology & Ethnology in the UK. The work resulted in John's first published paper (Chappell 1966).

Rumour has it that Auckland University bought John a one-way air ticket because there was some doubt as to whether he would return from the wilds of New Guinea. Indeed, the fieldwork was arduous, often dangerous, and John was lucky to survive when he became lost in montane forest, on Mt Wilhelm, ultimately surviving on Vegemite broth after his food ran out.

Fig. 3. John Chappell, in the field in Papua New Guinea, 1963. Photo by Andy Pawley.

I also recall John telling me a story about 'singing earthworms'—according to villagers at Kaironk, local

earthworms made singing noises in the ground. A keen observer of nature, John set about digging in the soil where the noises were coming from, eventually concluding that it was small frogs that were responsible for the 'singing'. The locals would not hear of it, however, and continued to believe that worms were doing the 'singing'.

After completing his MSc thesis at Auckland University, John undertook geological fieldwork in Antarctica in late 1964, mapping the geology of the Nimrod Glacier area with a New Zealand Geological Survey party comprising Malcolm Laird (Leader), Graham Mansergh, and Dave Massam (see Laird and others (1971) for the results). Part way through the fieldwork John was evacuated to Scott Base, suffering from malaria. The malaria was, of course, not contracted in Antarctica, but rather on a recent trip to New Guinea. [John was likely only the second person to suffer a bout of malaria in Antarctica. The first may have been James McIlroy, a doctor on the 1914–6 Shackleton expedition—McIlroy was certainly suffering from malaria when he was interviewed for the doctor's job.] Graham Mansergh recalled that on one occasion the field party was split into two pairs and carried out field observations during the course of a day. On return to camp, John confessed that he had forgotten to take his field notebook, but was still able to write down all the field observations from memory, including dips, strikes and lithologies of outcrops—a tribute to his prodigious memory, which he displayed on numerous occasions throughout his life. At times, his recall of detail was almost as if he was turning the pages of a book in his head.

John was very mechanically minded, and it was natural that he should hang around the Scott Base workshop and get involved in mechanical repairs. Somehow, he and some of his friends laid their hands on a JATO bottle—the solid fuel jet thrusters used on aircraft for extra lift off the sea ice runway. A JATO bottle was duly strapped to a sledge and there was discussion about someone getting on the sledge for a fast ride. At the last minute, it was decided to have a test run without a passenger. The JATO bottle was fired and the sledge 'disappeared over the horizon'. Workplace health and safety was less rigid in those days!

Academic career and scientific contributions

Early career at ANU

John's early career at the Australian National University (ANU) was in the Faculties of Science and Arts. In 1963, John's brother-in-law, Jim Whitelaw, drew John's attention to the possibility of undertaking a PhD in the Geology Department at ANU—Jim, who was married to John's sister, Anthea, was a lecturer in the ANU Geography Department at that time. In due course, John acted on Jim's advice and entered the Department of Geology as a PhD scholar in May 1965. Then, in January 1967, he was appointed to a lectureship in the Department of Geography, where he taught until 1979 as lecturer, senior lecturer, and reader. He established entry-level and advanced courses in geomorphology; taught in courses on climatology, quantitative geography, natural hazards, and the geography of energy, and co-founded an innovative course that integrated physical geography and geoscience-based environmental history. Through radiocarbon-based research associated with his PhD, he became acting manager of the ANU Radiocarbon Laboratory in 1970, and was involved in advancing radiocarbon and Quaternary dating at ANU through to the end of his career. His research during this period was centred around the analysis of past sea levels and climates that had begun with his PhD studies on coral terraces in New Guinea. For several years he also embraced coastal processes, supported by a series of grants and an array of instruments, when he and his students collaborated with colleagues at Sydney University.

The main game: Huon Peninsula, Papua New Guinea

In May 1965 John began fieldwork for his PhD thesis on Huon Peninsula coral terraces, on the north coast of Papua New Guinea. His supervisors were Keith Crook (Geology Department, ANU) and Eric Bird (Geography Department, ANU). [After Bird left ANU to take a position at the University of Melbourne, Joe Jennings (Department of Biogeography & Geomorphology, ANU) took over as John's supervisor.]

John had been initially attracted to the Huon Peninsula field area by an oblique aerial photograph in Fairbridge (1960), showing a spectacular flight of coastal terraces. The photo (Fig. 4) was taken by Allied Intelligence during the Second World War, and Fairbridge had worked with the Royal Australian Air Force (RAAF) in General MacArthur's headquarters from 1943 to 1945, as Deputy Director of Intelligence (Mackey 2007). It is unlikely that Fairbridge ever set foot on the terraces—the caption to the photograph in his paper says, 'each [terrace] contains fossil plants and shells that indicate the date and temperature of the ancient shore' (Fairbridge 1960, p. 71)—a completely speculative description of what turned out to be coral terraces. That John recognised the significance of the terraces shown in the picture, and his subsequent determination to study them, irrevocably changed the course of Pleistocene sea level studies.

While in the field, often for months at a time, John stayed in local villages, having quickly mastered Melanesian pidgin, the local lingua franca, and often involved local people in acquisition of field data. A case in point was a sailing boat, constructed by John in 1966, to map the topography of the sea floor and collect submarine samples. The resultant 'research' vessel was christened the 'Esvanu I' (Fig. 4). In John's own words:

> I decided to utilize a New Guinean ocean-going canoe … two canoes harnessed as a catamaran. This came to pass

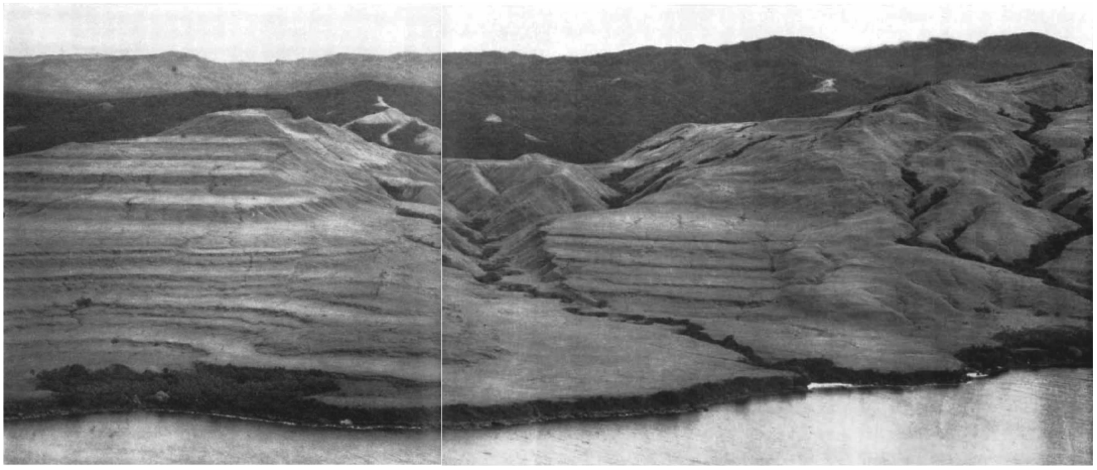

Fig. 4. Oblique arial view of coral terraces on Huon Peninsula, Papua New Guinea (from Fairbridge 1960). Comparison with modern satellite imagery reveals that the location is between Bobongara Point and the village of Hubegong, where uplift rates are ~3.5 mm/year.

Fig. 5. Tambuans (spirits). Photo and sketch by John Chappell.

at Mandok Island, in the Siassi Islands, after a suitable passage of induction amongst the Mandok. The boat was built, sailed to Huon Peninsula across the strait, and served for the next 6 months. At the end of the day, it was separated into two canoes, which were given, one each, to my two friends and workmates, Jorika Poma and Duwe. (Huon Peninsula field diary, p. 4).

The rather straightforward summary, above, glosses over the hardships that John had to overcome to make the boat a reality. He went to Mandok Island on sound information that boats would be available, but was rejected by the local men. Leaping on to the outrigger poles of a boat on its way to a party, he sailed to an outlying Siassi island (Malai) where Tumbuans (Spirits) had that day 'been born from the ocean'—hence the party. 'I took my turn in mask and cloak, knees bending and hips thrusting to the drumbeat. It was very hot work within the spirit's habiliments' (Huon Peninsula field diary, p. 19) (Fig. 5). On the return journey to Mandok they were nearly wrecked by a surfacing whale. But familiarity breeds friends, and the next day they sold him two canoes. A wooden deck was then constructed across

the two canoes, to make a catamaran and provide a stable working platform. A sail and an outboard motor were also installed, as well as an echo sounder to measure water depth and a winch (designed and built by John) to deploy a dredge and a gravity corer (Fig. 6). The Esvanu 1 was yet another example of John's extraordinary practical skills.

In 1968 Wally Broecker and his United States colleagues published a ground-breaking paper (Broecker and others 1968), based on U-series dating of uplifted coral terraces in Barbados, demonstrating the link between sea level and insolation as predicted by Yugoslavian mathematician, Milutin Milankovitch, many years before. This was quickly followed by John's first paper (Veeh and Chappell 1970) from his as-yet unfinished PhD, which supported the results of Broecker and others (1968). However, with uplift rates significantly higher than Barbados, more coral terraces, representing high sea level stands, were preserved on Huon Peninsula. This presented an opportunity to significantly extend the sea level record and provide an extended test of the astronomical theory of climate change, also known as the Milankovitch Theory.

The US team soon found their way to Huon Peninsula and published a paper with John in 1974 (Bloom and others 1974). Meanwhile, John's own publications flowed. Despite a full undergraduate teaching load, John published a series of seminal papers (Chappell 1973, 1974*a*, 1974*b*, 1975) in top-flight journals, quickly establishing himself as a leader in the field of Pleistocene sea-level and climate change.

John would return to Huon Peninsula many times during his career, noting in 1986 that 'It is regrettable that the morphostratigraphy of this important Upper Quaternary area has been surveyed and described by only one geologist (J.C.)' (Chappell and Shackleton 1986, p. 139). Multinational field teams, led by John, in 1988 and 1992 partly remedied that

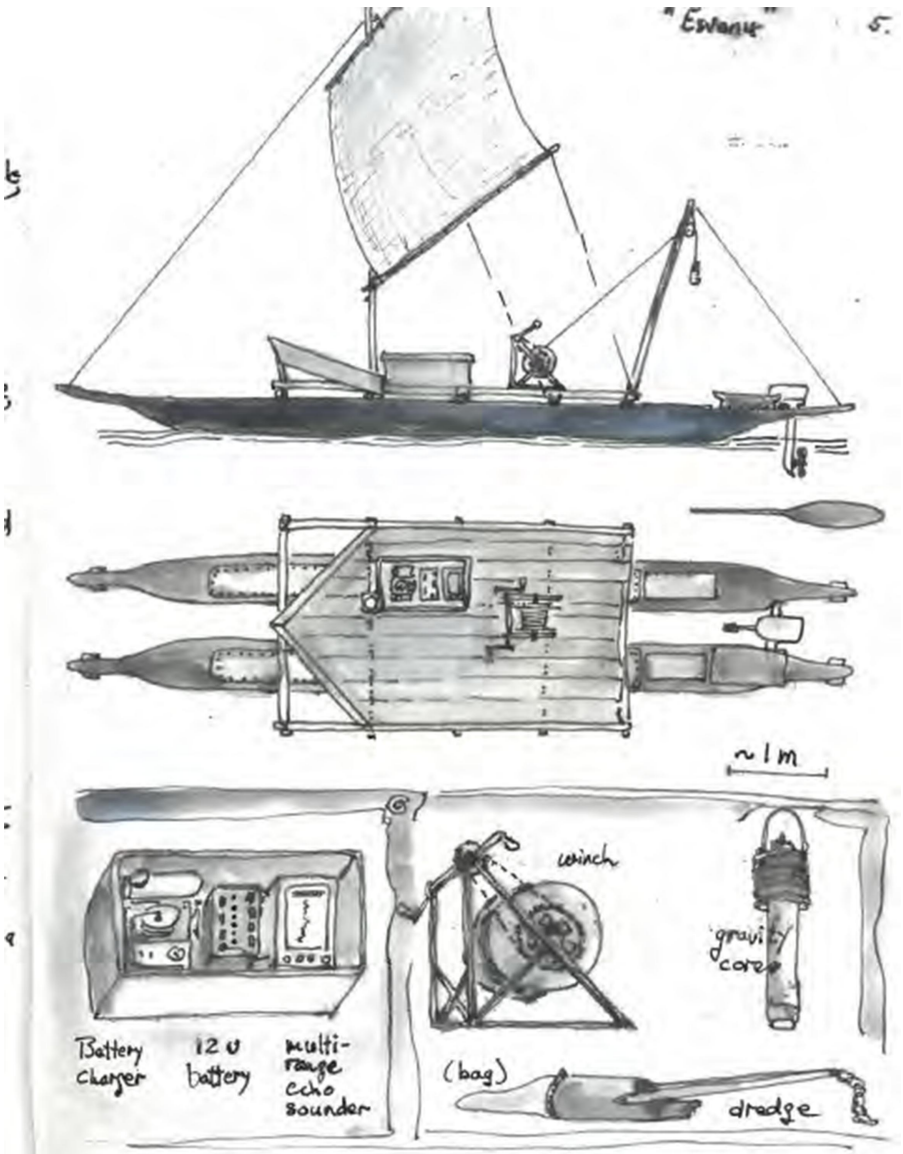

Fig. 6. Sketch plans for the research vessel Esvanu 1. Drawn by John Chappell.

situation, and as new field and laboratory data were acquired, the Huon Peninsula sea level record was duly revised (e.g. Chappell 1983; Chappell and Shackleton 1986; Chappell and others 1996*a*; Pillans and others 1998; Lambeck and Chappell 2001; Yokoyama and others 2001)—Fig. 7. A major reason that the Huon Peninsula terraces were not studied by more researchers was that the field area was difficult to reach, and prospective researchers considered it too inconveniently remote. Even with the benefit of John's considerable knowledge and local contacts, fieldwork in remote areas of Papua New Guinea was (and is) logistically challenging.

Regardless of whether he was leader or co-leader of field expeditions to Huon Peninsula, John was no stranger to the hard labour that invariably needed to be done (Fig. 8).

As the following recollections by daughter Gwenhyfar reveal, John's interest in Papua New Guinea (PNG) was not just scientific—he developed a deep connection to people and place:

> Perhaps one of my most abiding memories of Dad from an early age was his love and attachment to PNG. The frequent field trips there when I was small, even after the completion of the PhD in 1973, provided good fodder for stories and of course presents to return with. I still have a carved black wooden dog and a postcard from Dad in PNG from 1973.
>
> The stories frequently included a chap called Mr J [Jorika Poma, a village leader from the Huon Peninsula] and I

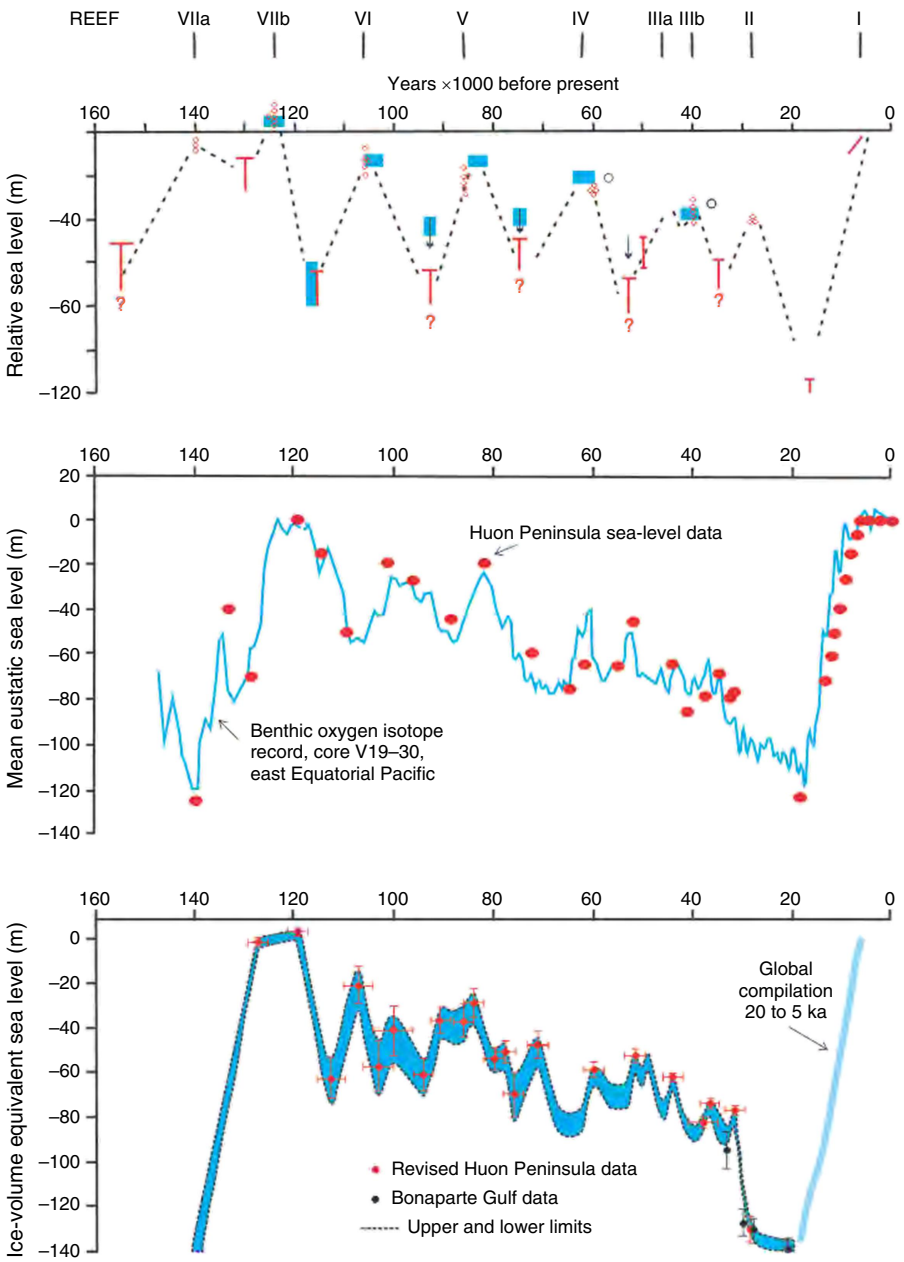

Fig. 7. Iterations of the Huon Peninsula sea level record, redrawn from original sources. (*a*) Bloom and others (1974). (*b*) Pillans and others (1998). (*c*) Lambeck and Chappell (2001).

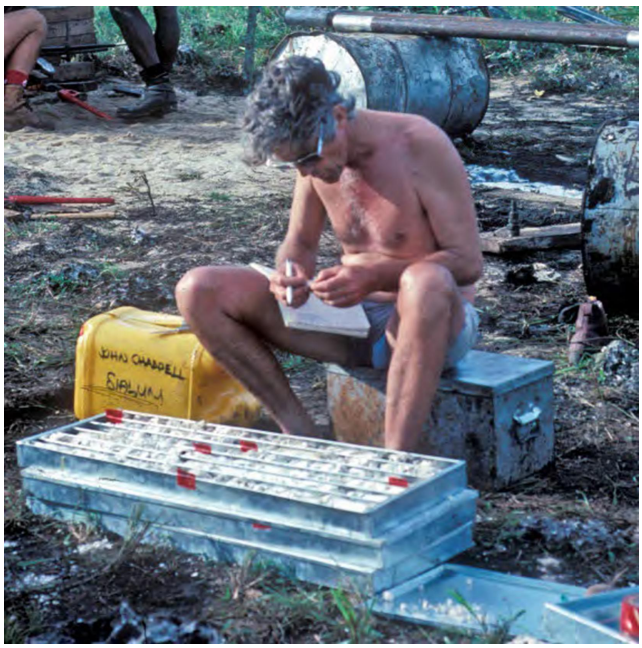

Fig. 8. John Chappell logging drill core, Huon Peninsula, 1988. Photo by Brad Pillans.

remember Dad referring to Mr J as his best friend, even years after Mr J died. Mr J came to visit us in Canberra (when I was in preschool) and I know Mr J died only a few years after that visit; from memory it was from TB. I had always thought Dad's PNG love and adventures started with the PhD. However, I later learned, that it had started years before during his first trips, researching stone axes, in his early 20's. I remember Dad telling me the story of how he first saw the Huon terraces in a WWII photo and immediately forgot about the aircraft in the foreground, while his geological curiosity was piqued to the point of salivation at the marvellous terraces that could only mean one thing—another reason to go to PNG.

In our childhood slide shows given by Dad, he had slides of head-hunters, cannibals, tropical jungle, rocks (of course), and I never had any sense his interest was due to any sort of colonial desire to be the brave white person in the wilds. Rather, from my childhood and early adulthood perspective, it was due to a genuine love of the place and of his adventures there.

When I was able to go to Huon Peninsula with him in 1992, he said it was his 25th trip to PNG, and it transpired not to be his last. Even by frequent traveller standards, such a relationship with a place as to warrant so many repeated visits, to me, smacks of the love of place and a sense of something to be enjoyed in the people, wildness, and possibility. When I remember the things I thought of as the building blocks of meaning in Dad's life, PNG loomed large and it was clear that the interest was not just scientific, but from my perspective, came from a sense of place, of relationship to place and of meaning made through the connections and times he had there.

Surf sand and sun: coastal geomorphology

In the 1970s, beginning with his first PhD student Ian Eliot, John became part of an inspiring team of coastal researchers that included Don Wright (Sydney University), Bruce Thom (then at ANU), Mark Bradshaw (ANU MSc student), and others.

For John, the attraction to studying beaches was the strong link between process and form—see Chappell (1978), for example. Observing the changes on an east coast Australian sandy beach was a kind of instant gratification, compared with the ultra-slow pace of terrestrial landform evolution in Australia, exemplified by bedrock erosion rates measured in mm/1000 years (though he would return to the challenge of measuring ultra-low erosion rates, using cosmogenic nuclides, later in his career).

In 1973 his undergraduate geomorphology class was conscripted to participate in a remarkable beach experiment. The hypothesis to be tested was that by artificially lowering the water table beneath the beach face, wave runup would infiltrate more readily and backwash (and therefore erosion) would be reduced. A large pump, with a capacity of 50,000 l/h, was duly hauled onto Durras South beach by class members, who also assisted with beach surveying and sediment sampling. I was part of the team. The results were published in 1979 (Chappell and others 1979), along with another highly influential paper on beach morphodynamics (Wright and others 1979). Further colourful details of the beach pumping experiment are provided in Bradshaw and Eliot (2020).

Later career at ANU

Following his appointment in 1979 as Professorial Fellow in the Department of Biogeography and Geomorphology in the (then) Research School of Pacific Studies (RSPacS), John extended his investigation of past changes of sea level, sedimentation, and coral growth to the Great Barrier Reef and Cape York Peninsula, thereby developing the basis for his subsequent larger program in the mangroves and tidal rivers of the Northern Territory (for example Woodroffe and others 1989). Supported by a generous grant from the (then) Tertiary Education Commission as well as other grants, and with a field team at the North Australia Research Unit of the ANU backed up by the RSPacS laboratories in Canberra, this program produced fundamental studies of long-term physical and ecological changes of floodplains and mangroves in Australia's tropical north. However, PNG was never far offstage, and in the 1990s he extended his palaeoenvironmental work to the great lowland basins of the Sepik and Fly rivers (Chappell 1993). The coral terraces of Huon Peninsula, PNG continued to be a cornerstone in his research into global problems of ice-age climatic cycles, which took a fresh turn

with a palaeoclimate modelling project in the 1990s, based in the CSIRO Division of Atmospheric Research and supported by Australian greenhouse funding (Syktus and others 1994, 1997). The same grant also enabled John, together with colleagues in the Research School of Earth Sciences (RSES), to initiate a project on high-resolution reconstruction of past climates from geochemical signals in long-lived corals (Gagan and others 1998). At the same time, his research continued at the Huon Peninsula terraces in PNG and, jointly with colleagues from Japan and elsewhere, he contributed significantly to various fields including the early human colonisation of PNG (Groube and others 1986), palaeo-earthquake research (Ota and others 1993; Chappell and others 1996*b*) and, probably most importantly, the understanding of past instabilities in the global climate system (for example Esat and others 1999; Chappell 2002).

During his time in RSPacS (later renamed the Research School of Pacific and Asian Studies—RSPAS), John was head of the Department of Biogeography and Geomorphology 1983-6, and was appointed Professor-Head of Department in 1989. Later, he became head of the newly-formed Division of Archaeology and Natural History, and in 1996 led a successful bid for ANU initiative funding to strengthen new ventures into luminescence dating in RSPAS, coral palaeoclimate research in the RSES, and the measurement of geomorphologic processes by accelerator mass spectrometry in the Research School of Physical Sciences and Engineering (RSPSE). From 1998, during restructuring in RSPAS, and at the instigation of the Director of RSES, John and several of his colleagues transferred to RSES, and thereby enhanced ANU research in environmental geochemistry, dating, and geomorphology. Taking advantage of the recently established capacity in RSPSE for accelerator mass spectrometry (AMS), John initiated a program in earth-surface processes and landscape history using cosmogenic nuclides, through which long-term erosion, soil formation and the impacts of long-past climatic changes were resolved at scales ranging from hillslopes to sub-continental catchments. Both this work, and the research into abrupt climatic shifts, were supported by substantial grants from the Australian Research Council.

Eroding Australia

From the 1980s onwards, the use of cosmogenic nuclides in geomorphic research gathered international momentum with rapid improvements in measurement techniques using accelerator mass spectrometry. John and his ANU colleague, Keith Fifeld, a nuclear physicist in RSPSE, were quick to recognise the potential applications, leading to a series of groundbreaking papers on long-term erosion rates and dating, utilising the radioactive isotopes ^{10}Be and ^{26}Al, in particular (Fujioka and others 2005, 2009; Wilkinson and others 2005; Fujioka and Chappell 2011). At the same time, John collaborated with Bill Dietrich (University of California, Berkeley) and one of Bill's PhD students, Arjun Heimsath, resulting in influential papers that quantified soil formation rates, slope, and catchment erosion rates in southeastern Australia (Heimsath and others 2000, 2001, 2010).

A wide collaborator

From his first years at ANU, John collaborated with scholars in disciplines beyond the natural sciences, particularly archaeology (Chappell 1966; Groube and others 1986), as well as human geography (for example Chappell and Webber 1970), strategic and defence studies (for example Chappell 1986), history, and the ANU School of Art. Participation in a new ARC-funded project with the Humanities Research Centre, on the impacts of Australian experience on 19th century science, was one such development. Contributions to collegial life ranged from a year as deputy warden of Bruce Hall, through courses given in the Centre for Continuing Education, to participation in the ANU 'Factor of Ten' environmental exposition in 2002, featuring a kinetic sculpture 'Water Stress', constructed by John from corrugated steel (Fig. 9).

A taste for teaching engendered by twelve years in the Faculties led him to give series of lectures and short courses both in Australia and abroad. Beyond the ANU, interaction from 1981 with scientists in China, though slow in gestation, enabled him to develop a project supported by Chinese-funding sources, which evaluated long-term erosion and sedimentary processes throughout the Yangtse River system (Chappell and others 2006), using techniques developed with colleagues at ANU.

It was almost inevitable that John would collaborate with renowned geochemist and paleoclimatologist, Sir Nicholas Shackleton at the University of Cambridge—two great minds striving to understand Quaternary sea level and climate change. Shackleton was using oxygen isotope ratios in foraminifera from deep sea sediments to measure past climate changes. If deep ocean temperatures had remained constant during glacial-interglacial cycles, then the oxygen isotope ratios would be an ice-volume/sea level signal. However, there were sufficient discrepancies between the isotopic record and the sea level record from Huon Peninsula to suggest that deep ocean temperatures had varied, and that the isotope record was not a pure ice volume record. John and Nick published their results in a paper (Chappell and Shackleton 1986) that is now a citation classic, with more than 2000 citations (Google Scholar, accessed November 2025). They remained close personal friends until Shackleton's death in 2006. Similarly, John developed a close collaboration with Kurt Lambeck, an eminent geophysicist who was also a colleague in RSES at ANU. Lambeck had been developing complex models of earth deformation in response to changing ice volumes during the Quaternary, a major consequence of which was that shorelines were deformed isostatically. Their landmark paper included an updated Huon Peninsula sea level curve and a reconstruction of shoreline changes in Bass Strait—the latter with implications for the arrival of Aboriginal

Fig. 9. Waterstress installation under construction by John Chappell.

people in Tasmania (Lambeck and Chappell 2001). A full, numbered list of John's publications is provided in the supplementary material.

Fellow of the Australian Academy of Science and other notable academic awards

Elected fellow of the Australian Academy of Science in 1992, John was a very active contributor to the Academy and generously gave his time to serve on numerous committees, including: Sectional Committees responsible for Earth and Planetary Sciences (1993–7 and 2004–8); National Committees for Geography and for Quaternary Research (1993–2007); international exchange programs to Asia and Europe (1993–2000); and the Academy's International-Biosphere Program during the early 1990s.

Other notable awards included:

(1) Honorary Life Fellow, International Union for Quaternary Research (2011); (2) Distinguished Geomorphologist Medal, Australian and New Zealand Geomorphology Group (2009); (3) Senior Fellow, International Association of Geomorphologists (2009); (4) Honorary Fellow, Geological Society of America (2008); (5) Life Member, Australasian Quaternary Association (2007); (6) D.A. Brown Medal for contributions to geology, The Australian National University (2003); (7) Centenary of Federation Medal for contributions made to Australian Society (2001).

Teaching: interfering with young minds

John referred to teaching as 'interfering with young minds'—not in any malevolent way, but rather, that he was shaping the way his students saw the world.

John was a charismatic teacher who lectured without lecture notes, often filling the board with ever expanding sketches that made taking notes rather challenging. But he was a very visual person—a gifted artist—whose field notebooks contained many sketches of field sites. In fact, he preferred to draw things rather than take photographs—drawings could emphasise subtle features not immediately obvious in photos. His lectures regularly incorporated results from his latest research as well as latest research of others. For many years geomorphology had been a largely descriptive discipline, but John emphasised quantitative measurements of geomorphic processes. Undergraduate student field trips were also an opportunity for John to develop a close rapport with students, typically cemented by informal discussions around campfires, with John frequently displaying his guitar-playing skills (Fig. 10).

His ability to inspire undergraduate students was clearly evident when he took a sabbatical leave at McGill University in Montreal in 1971. According to well-known British geomorphologist and hydrologist Thomas Dunne, who arrived at McGill soon after John had departed, the students were not only enthusiastic for the discipline, but were also full of praise for the amazing Australian professor (John) who had recently taught them.

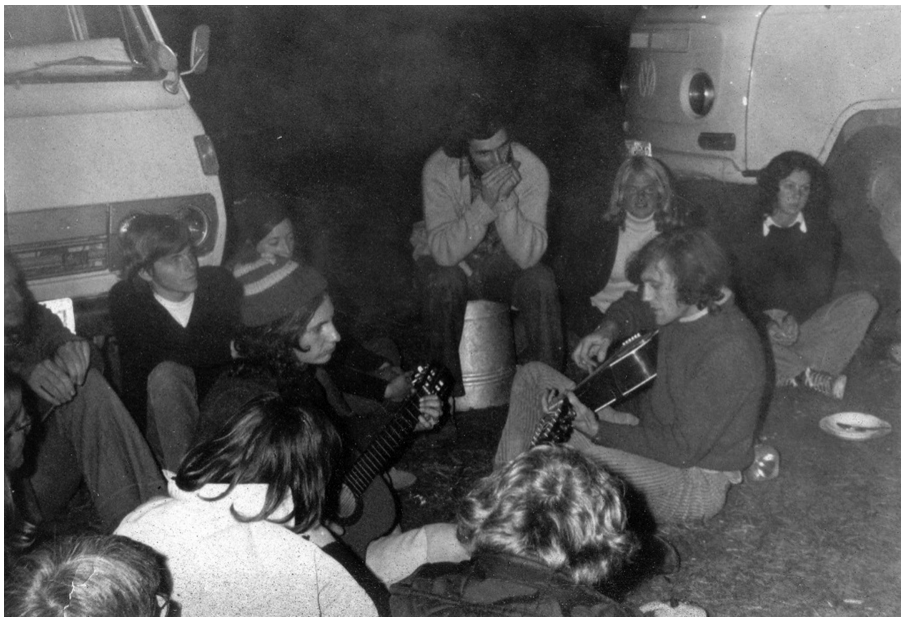

Fig. 10. Campfire group, second year ANU undergraduate field class in geomorphology, 1973, with John Chappell playing guitar. Unknown photographer: digitised from a black and white print, displayed on the Geography Department notice board.

Over the course of his academic career John supervised 29 PhD students, many of whom went on to distinguished careers in academia, government and private industry. A list of John's PhD students is available from the website of the Australian and New Zealand Geomorphology Group (Pillans 2010).

John's last PhD student was Toshiuki Fujioka, a Japanese student whose background was in physics, not geoscience. While John initially recommended some textbooks for Toshi to read, the cornerstone of his learning was to be one-on-one lectures in John's office. Here, Toshi takes up the story:

> We didn't have any fixed time for lectures, but rather I popped into his office anytime I had questions, or a topic that I wanted to discuss. Each time I came in, John would stop whatever he was doing and would mostly spend time with me right away—unless he had urgent matters to work on. Even in the latter case, he always promised to attend to my question as soon as possible, just a few hours later, or at maximum, the next day. After I experienced working with students over more than fifteen years of my career, after my PhD, I realised how difficult it was to make myself available for students' enquiries, regardless of what I was doing at that time. Now I look back, John was incredible in that regard, considering there were also other PhD students he was working with—he was always available and attentive to them, including myself, whenever we needed his help.
>
> Our lecture was always at the desk in his office or his house, on paper with his favourite pen from his chest pocket. Any concept, processes or calculations, he drew a diagram, table or wrote equations straight away from his memory, explaining carefully to ensure that I fully understood. Being a physics student, I was used to handling equations and calculations. Nevertheless, I was impressed that John was so familiar with mathematics and physics concepts. As I found later, that was not necessarily the case for every geologist or geomorphologist.
>
> Our 'lectures' also extended to the field, initially with day trips in the local Canberra region, followed by extended field sampling trips to Alice Springs, Coober Pedy, and the western edge of the Simpson Desert. On these trips, every spot we visited, we talked, discussed, and he again drew diagrams to explain how to understand the processes and landforms in plain language so that I could follow and understand. It was an amazing experience for me to find that the seemingly bare, non-active semi-arid landscapes in central Australia were the result of dynamic, complex processes, arising from the interaction of plate tectonics and climate changes after Australia separated from Gondwana over tens of millions of years.
>
> Many people asked me how difficult it was to move to Australia to start a PhD. I guess it was tough, but it didn't feel that way. In hindsight, I realise how much John looked after me, not only academically but also personally. He often invited me to his house for lunch or dinner. He introduced me to his family members, colleagues, friends and neighbours, and he treated me as his extended family. I didn't clearly notice this at that time, but being outside of my home country for more than 20 years now, having been treated very well like that was precious and invaluable.

John was a regular attendee at biennial meetings of the Australian and New Zealand Geomorphology Group. At

these, rather small (typically 50–100 attendees) meetings, student presentations were a focus. In such a setting, John was at his best—providing valuable feedback and encouragement to budding geomorphologists on a myriad of topics, not only in formal sessions, but afterwards over dinner and drinks.

Family life

In 1968 in Canberra, John married Koorine Else Mitchell, the daughter of Jim Else-Mitchell and Mavis Daisy Archbold. They had three daughters: Samantha (b.1969), Gwenhyfar (b.1970), and Anna (b.1972). In 1979 John married Helen Rosalind McLagan, whose parents were William James McLagan and Gweneth Rosalind Pow. They had two children, Louis Arthur (b.1979) and Bridget Mary (b.1987).

Reflection from wife Helen

> At home, to the children, John was just the dad like everyone else's, except that they got taken to deserts or remote beaches for extended intervals in school term time—or would occasionally receive letters from him in hieroglyphics or Morse code. But it was only in adulthood that they were prompted to exclaim, 'It seems like Dad's quite important!'
>
> John invited colleagues to our home not from a sense of duty, but because he liked them as people, so whether it was Oddie, the rollicking Indigenous technical assistant on his first visit south, or Sir Nicholas Shackleton, the eminent paleoclimatologist from Cambridge University, these people were merely seen as fun family friends who'd come to stay.
>
> Guests present or not, dinner times were a treat not only if it was John's turn to cook, but for the conversation: he was a wide reader with a seemingly photographic memory, who adroitly processed his thoughts and conveyed them in a compelling way. He 'held forth' but it was impossible not to listen, and in later years when it was just the two of us at home I eagerly looked forward to our nightly dinners and long talks about simply everything.
>
> It seemed that anything wrong could, with application, be cheerily put right by John; somehow, there would be a solution. Just as he routinely repaired equipment such as outboard motors, drills, and current metres that broke down in the field, he could fix things at home, and if the ideal tool wasn't there in the garage, he would often construct one, such as from the spoke of a disused bicycle wheel.
>
> People remember him as the polymath: scientist, artist, chef, musician, mechanic, gardener, historian, carpenter, poet and orator, and he was most of these things at home too. He sang cowboy songs and played his 12-string guitar to the children; they were implored to desist from the 'Peloponnesian War-like' occasional sibling rivalry; one of the girls expressed an idle desire for a four-poster bed, so he quietly constructed one, exquisitely turned, over months of evenings in the garage; when not in use, the substantial model train layout he made was hoisted up to the ceiling of the whimsical bay-windowed and lead-lighted garden pavilion that he'd also made, out of recycled wood. He mended the girls' dresses and made clothes for soft toys, having learnt to sew while in Antarctica. He acquired horses for each of the older girls and assiduously helped them in their equestrian pursuits (though Anna said later that the sight of John falling off a horse caused the shocking revelation that he wasn't invincible). Also, over many years, he daily sat with Louis as he practised his orchestral harp and later on, shared his aviation experience as they were both learning to fly.
>
> He worked long hours and was sometimes away from home, but the house seemed to light up whenever he

An interlude on parties by eldest daughter Samantha

> Dad had a propensity for parties. There were quite often guests for dinner, students or colleagues, and friends from out-of-town or overseas. Sometimes there were fancy dinner parties with the good linen and fine tableware. But occasionally there were all-out raucous, serious parties. The lounge room mat was rolled up and the pool table moved to the middle of the room. This was a serious undertaking, with the table being made of heavy slate and with one leg that always trailed behind the rest. Coloured light bulbs replaced all normal lighting, Dad bought stinkin' Gaulois cigarettes and Helen had coloured Sobranies with a long gold holder. The pinball machine on the veranda was so popular it was joined by a hired machine on at least one occasion. The hired one was quieter, with a digital score read-out but was considered inferior to ours after the novelty wore off. The wide Canberra nature strip and the long driveway to the golf course motel across the road meant plenty of parking for guests.
>
> Dad also enjoyed a bit of fancy dress: the most memorable for me being the Captain Goodvibes papier maché 'pig of steel' snout mask, teamed with cowboy hat and welding goggles. [Captain Goodvibes Pig of Steel was a popular comic strip character in surfing magazines in the 1970s and early 1980s.] The welding goggles became compulsory attire for anyone who did too well on the billiard table—a kind of handicap to keep the scores even.

came back. However, field work absences brought the compensation of his letters. John was a gifted prose writer and used down-times in the field to deftly commit to paper brilliant, funny or heart-rending gems of phrases about the site and surroundings.

Memories from son Louis

Dad was amazing at written and drawn explanations. Whether I was a kid asking for help with homework, or as an adult asking for general explanations about the wider world, if it could be explained with notes and diagrams, Dad would mark out great little informative sheets of paper to get his point across. Regardless of whether it was an A4 sheet of paper from the kitchen recycling stack, or a serviette in a cafe whilst having a meal, he would perfectly adapt the format of the explanation to fit it, seemingly by magic first go with no less than his ever-present fountain pen. After learning whatever I had to glean from these, on numerous occasions I would hesitate to toss out, or at least feel guilty discarding these fantastic constructions, given their perfection, no doubt a skill gained because of years of practice in taking field notes and lecturing to students.

Painting and sculptural skills—as long as I knew him, Dad would paint pictures and construct sculptures. The paintings I would consider to be post-impressionist or expressionist in style, and of a good enough standard that most of his works are still up on the walls of Mum's and us siblings' houses. He kept painting even in his later years when the tremors of Parkinson's affected his ability to manipulate the brush. The early sculptures of his consisted of old car parts welded together in an abstract fashion but later progressed to a cow of green corrugated iron, a fixture in the front yard that would occasionally cause comments from the more imaginative pedestrians walking past. Then, his ultimate creation was Waterstress (Fig. 9), a contraption illustrating the process of irrigation, set up for water to soothingly meander through and down, that would eventually earn a place in exhibitions at the ANU School of Art, and at both Orange and Cowra regional galleries.

Dad's decision to get his private pilot licence in his mid-fifties—as a teenager in New Zealand, Dad had a part-time job working around crop dusting aircraft in Rotorua, and I had the impression that since then he'd always had a passing interest in aviation. When I started learning to fly as a teenager, he did too, and I was very impressed, especially compared with other similarly middle-aged flying students I observed, just how good he was at soaking up all the information needed for such an activity. It was a stark example to me of his brain power, because even though Dad's broad knowledge was a given to me prior to then, this was the first time I'd had such a ringside view of Dad knuckling down and studying a new skill. Once he got his licence, he was able to combine it with geology by renting his flying school's Cessna 172 and mounting a bulky Hasselblad camera in the floor, set up to take stereoscopic aerial survey shots. I occasionally went along too for some flying exposure, and it was fascinating watching him pole the yoke with one hand whilst thumbing the remote shutter release in the other, simultaneously mouthing the required seconds between frames to achieve the perfect photographic overlay.

Ability to surprise with new knowledge—over the decades of knowing him, as with anybody, it was clear which subjects Dad was an expert on, but having said that I was still regularly amazed at some of his seemingly random areas of expertise. It could range from something as simple as an obscure word definition, to some hot topic in the news that, if it had piqued Dad's interest, I knew that I could count on him to have researched it completely and be able to explain the subject perfectly.

Building abilities—Dad's construction abilities led me to believe as a kid that he could make anything. A valve radio, a brick- and recycled-timber pavilion with stained glass windows for the backyard, (never admitted to us family, but I overheard him confessing to a colleague that he'd forgotten to wire it until after the walls were up), a four-poster bed for one of the girls, a solar farm complete with tracking array. At the time, I assumed that all dads must automatically know how to do such things.

Dislike of fast food, preferring to cook himself—I never knew Dad to ever resort to takeaway fast food if there was a kitchen within reach. Even after an afternoon of him driving us all back to Canberra from a weekend at the coast, he would still concoct something delectable, pizza complete with homemade dough being the most basic example.

The Valiant—in the mid 80's he bought a 1970 Chrysler Valiant Coupe for $600. As purchased, it began life in an unremarkable chipped and faded colour, but during one coastal interlude, he transformed it with just a brush and house paint into a funky scheme of green at the front, morphing over its length to blue at the back (mimicking a relativistic Doppler Effect), with a turquoise roof. Later, to complete the look, he bolted a foot-long bronze crocodile to the bonnet, although the ACT motor registry inspectors ensured this was only temporary. He seemed to enjoy its idiosyncrasies, such as coaxing it into life on frigid winter Canberra mornings, or getting it down the Clyde Mountain without overheating its four drum brakes, or loading its capacious boot to the gunnels with bricks for the next round of home improvements. For added

Fig. 11. Colourful sketches using simple computer graphics software (Microsoft Paint).

excitement, unwary passengers who had neglected to slam their door shut in a violent enough fashion, were sometimes treated to the surprise of having the door randomly open again mid-corner.

A true polymath

Geologist, geomorphologist, mathematician, physicist, chemist, gardener, carpenter, musician, painter, sculptor, mechanic, engineer, pilot, sailor, etc. By any measure, John was a true polymath, with a deep understanding of many disciplines. His talents also extended to sporting endeavours including rowing, cricket and hockey.

In his 1978 paper on process-landform models, John included a sketch of water movement below a waterfall by another great polymath, Leonardo da Vinci (Chappell 1978, Fig. 1). The drawings by Leonardo and John show the same eye for detail and the same insightful rendering of natural processes. John's artistic bent and fertile mind also led to rather more whimsical artworks, whether it be doodles using simple computer graphics software (Fig. 11) or major sculptural installations (Figs 9 and 12).

While I was reading a biography (McKie 1980) of the great French chemist, Antoine Lavoisier, John asked to borrow it. After lending it to him, I located another copy so I told John he could keep the book. John was clearly very interested in Lavoisier's life story, probably because Lavoisier was also a polymath—he started his career as a geologist, compiling some of the first geological maps of France, made his name as the father of modern chemistry, and went on to make major contributions to agricultural science, economics, and social reform.

Fig. 12. An untitled installation on the verandah of John's house in Canberra.

Sadly, Lavoisier was executed (by guillotine) during the French Revolution. As Lagrange, the equally famous French mathematician said at the time, 'Only a moment to cut off his head, and a hundred years may not give us another like it' (McKie 1980, p. 407), an assessment that could equally apply to John.

In the last months of his life, when he knew he was dying of pancreatic cancer, John spent a considerable amount of time reading. It was at that time that I gave John another biography—that of Sir Hubert Wilkins (Nasht 2005) an Australian photographer, explorer, reporter, naturalist, ornithologist, and pilot, who I felt that John would recognise as a kindred spirit—and indeed he did.

In those last months he also grappled with what I call John's Conjecture: What is the largest number you can make

with four twos, and is it more than the number of atoms in the Universe?

Here is what John had to say:

> What's the biggest number you can write with four twos? 2222? Meagre. 222^2 bigger. 22^{22} (22 to the power of 22)—much bigger. But what about 2^(2^22) (2, to the power of 2 to the power of 22)? Now there's a biggy, more than 2 to the power of 4 million, which looks to me bigger than ten to the power of one million; bigger than 10 followed by a million noughts—unthinkable, unreachable. There's a parameter!
>
> Not reachable-teachable? Am I sure? Is it more than the number of atoms in the universe? Let's see. Weight of the sun over mean atomic weight, times Avogadro's number, times number of suns in the galaxy, times relative mean size of all galaxies, x number of galaxies in the universe, over l minus the dark matter fraction? Now two a.m. Struggle with numbers in the dark. Succumb, switch on light, reach for calculator. Does it come to 10^{77} atoms? Check—maybe only 10^{76} atoms. Accept as working number.
>
> Night after night I wrangle with the universe, working out its measure. Schwarzschild radius, mean density, apparent expansion rate, sensitivity to parameter values, net curvature…

John's notes don't reveal his full calculations and conclusion—vaguely reminiscent of Fermat's famous last theorem—and he may not have reached one. Out of curiosity, I asked Brad Tucker, an astrophysicist at ANU, what he thought of John's Conjecture. Brad replied that the average calculation of atoms in the Universe is between 10^78 and 10^84 roughly. So, John wasn't far off. Brad said he usually quotes 10^80 because it is easy to remember, but scientifically 10^78 is the usual number.

John's Conjecture is also reminiscent of Sagan's Number—the number of stars in the observable universe, calculated by popular American planetary scientist Carl Sagan in 1980 to be 10^22. According to John's youngest daughter, Bridget, he met Carl Sagan at a conference, and they debated the possibility of life on Titan, the largest moon of Saturn and the only moon in the Solar System known to have a dense atmosphere. The discussion centred around carbon-based versus silicon-based life forms, a topic that Sagan had covered in his book, *Carl Sagan's Cosmic Connection: an Extraterrestrial Perspective* (Sagan 2000). Bridget says she does not remember who favoured carbon and who favoured silicon, but she was keen to know whether Carl was wearing his trademark turtleneck jumper and sports jacket: When asked, John leaned back, reflectively, in his chair and replied, 'You know, I think he was'.

Retirement in Dunedin

John retired in 2005, but remained an active member of staff at the RSES. On his doctor's advice, in 2008, John chose to fully retire to a quieter life in Dunedin in the far south of the South Island of New Zealand. 'Why do you want to move to north Antarctica?', I asked, rather cheekily, especially knowing that John had grown up in Auckland. John's unexpected reply was that he considered Dunedin to be the 'least spoiled' of the New Zealand cities.

Before John left Canberra, I organised a one-day symposium in his honour at the Academy of Science. The

Fig. 13. John aboard his yacht, *Kaikoura*. Photo from Helen McLagan.

symposium was titled 'Infinite Horizons', rather fitting considering the breadth of John's interests. John was invited to nominate the speakers. They ranged from historian Iain McCalman to botanist Marilyn Ball to anthropologist Colin Groves to geochemist Hugh O'Neill, to name a few. At the end of the day, I asked John's son Louis, if he had enjoyed the talks. 'Yes', he said, though I didn't understand all that was said'. Then, he added 'We [the family] never knew how famous dad was'.

In Dunedin, Helen and John moved into a beautiful late Victorian double bay-window timber house, with period furnishings and views to the part of Dunedin Harbour where his sailing boat, *Kaikoura*, was moored. Dunedin was home to Otago University, with an excellent Geology Department, but John rarely went to the campus. Rather he immersed himself in sailing (Fig. 13), gardening, cooking, and installing a backyard solar panel array of his own design.

In the months leading up to his death, John knew he was dying, and as a perceptive observer of nature, he was also a keen observer of his own demise. In September 2017, John was diagnosed with a small malignant tumour, blocking his common bile duct. Insertion of a stent provided a brief fix to allow bile to bypass the blockage, but John chose not to undergo more radical surgery that may have prolonged his life by a few more months. In June 2018 he duly informed his oncologist, Chris Jackson, in writing, of his decision. Jackson's reply was 'Possibly the most eloquent and delightful reply I have ever received'. Even facing certain death, John was still capable of beautiful writing. He died in Dunedin on 3 October 2018, aged 78, and according to his wishes, a natural burial was held.

A giant has fallen

In 1675, in a letter to Robert Hooke, Isaac Newton is said to have written; 'If I have seen further, it is by standing on the shoulders of giants'. John was of the same ilk.

I may not have stood on the shoulders of giants, but it was my privilege to walk beside one.

Supplementary material

Supplementary material can be accessed from the article page online.

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