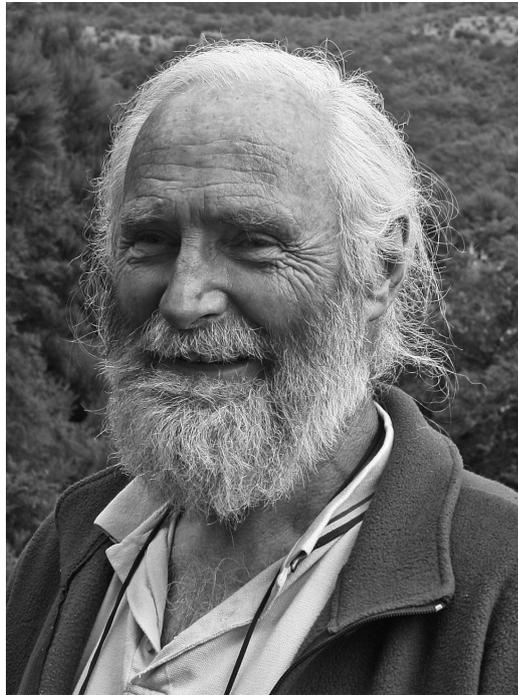


## Tony Whitaker MNZM, naturalist

### 5 September 1944 – 20 February 2014



Tony Whitaker at Catlins, Otago, after delivering the keynote address at the 2011 SRARNZ conference (Photo: Phil Melgren).

The sudden death of Tony Whitaker on 20 February 2014 while out mountain biking was a great shock to herpetologists and ecologists in New Zealand and elsewhere. Tony had dedicated his life to studying New Zealand and Pacific natural history. An expert on New Zealand and Pacific lizards, his research was widely published in academic journals and books. He devised new methods for locating and surveying lizards, found new species and discovered many remarkable new features of their biology and ecology. Tony was at the leading edge of ecologists who recognised the devastating impact of introduced rodents on New Zealand reptile populations and was involved in several conservation programmes for threatened species. His work also significantly improved New Zealand biosecurity through the development of rapid identification processes for reptiles and snakes intercepted at borders.

Anthony Hume (Tony) Whitaker was born near Chesterfield, Derbyshire, England, on 5 September 1944. With his parents and younger brother, Pat, he immigrated to New Zealand in 1951 on RMS *Orion*. The family settled into a small house in Pinehaven, near Upper Hutt, 30 km north of Wellington. Pinehaven was then still essentially a village surrounded by hills covered in native and exotic forests, which were enthusiastically explored by the local children. Also living in the village were Tony and Helen Druce, exceptional botanists and naturalists, who greatly encouraged Tony in natural history. But his youthful discoveries sprang from his own initiatives. From an early age he developed a serious interest in many branches of natural history and soon learned to record observations systematically. He also read widely in his fields of interest; establishment of a local library at Pinehaven encouraged this. This enabled him to view his observations on fauna and flora in a wider ecological and evolutionary context. Thus, even as a teenager, he was already well-regarded by the

small group of ecologists in New Zealand at that time.

An early interest in orchids resulted in him finding the almost subterranean tiny flower of *Corybas* [now *Molloybas*] *cryptanthus* in the summer of 1955/56. With another 11-year-old, his friend Piers Hunt, Tony located more than 40 *Corybas* flowers, and for the first time recorded the monthly occurrence of flowering in this tiny saprophytic plant at Pinehaven and in Queen Charlotte Sound. These observations were published by Tony (1957) in the *Wellington Botanical Society Bulletin*. Before this there had been only three records of flowering in this species (Irwin 1954) and, even today, there are only 12 collections of this cryptic plant in the Allan Herbarium at Landcare Research, including two by Whitaker and Hunt. This early paper is notable for the detail given of the exact habitat, aspect and information on surrounding vegetation. In a paper (1963) on the occurrence of two specimens of the very rare endemic forest ringlet butterfly *Dodonidia helmsi*, he provides even more detailed remarks on habitat, including remarks on forest succession following logging. Tony was fascinated by the challenge of finding small, cryptic plants and animals. But his primary interest was lizards, widely occurring, but often missed on the New Zealand mainland. He kept the live animals in glass aquaria, building up a collection of skinks and geckos, including the beautiful, but now rare, tree-dwelling green gecko (*Naultinus elegans*). Although Tony and his brother sometimes referred to their collections as a 'museum', it was the idea of studying the life and habits of lizards in the wild that most appealed to him, rather than collecting and classifying them.

Simply locating them in the wild for study was challenging, as the introduction of mammalian predators, along with forest clearance, had led to great reductions in lizard distribution and abundance nearly everywhere on the New Zealand mainland. Developing field survey techniques for lizards was a priority, and Tony soon established himself as a master in this, publishing two papers on field techniques in the American journal *Herpetologica* in 1967. One dealt with locating nocturnal geckos at night by spotlighting using binoculars, a technique in which he became expert. All New Zealand geckos (except for *Naultinus* spp.) are largely nocturnal, along with many of the skinks once known as '*Cyclodina*' (Gill & Whitaker 1996). Elsewhere, only about 20% of lizard species are nocturnal (Roots 2006). So the location of sparse forest-dwelling lizards by night was almost uniquely a New Zealand problem.

Tony really was incredibly good at finding and catching things – especially small lizards and frogs at night. That was one reason why his talents were always in such great demand. His papers on spotlighting geckos (1967b) and catching skinks in pitfall traps (1967a) were instant classics, not to speak of his revolutionary method (published 1972) of rigging mist-nets one above the other nearly to the canopy so as to study the vertical distribution of birds in New Zealand forest (Fitzgerald et al. 1989b).

From 1963, Tony (then a university student on summer break) joined a series of multi-disciplinary expeditions, initiated by Peter Harper and myself, to the Hauraki Gulf islands. These largely predator-free islands were a microcosm of New Zealand's lost biota. In 1963 and 1964 the team spent 52 days on the Poor Knights Islands studying the vegetation, reptiles and birds. Only two lizard species had been recorded previously, but Tony found that the Poor Knights supported more species (7) than had been known before from any New Zealand island group. He also helped identify the wealth of plant, land-snail and insect species unique to these enchanting islands. Tony surveyed lizards on all but one of 13 islands

and stacks that made up the Poor Knights group (Whitaker 1968b). He caught and marked over 300 lizards, recording their colour and morphometrics, habitat, diet, behaviour, diel rhythm, breeding state, predators and parasites. Using simple capture–recapture algorithms, he calculated a density of up to 2582 individuals/ha for *Oligosoma oliveri* (a biomass of approximately 45 kg/ha) in their preferred habitat. As so many lizard species occurred at high densities on Aorangi (68 ha), Tony thought that niche separation must be very distinct. He defined niche in terms of diel periodicity, habitat type, and diet (Whitaker 1968b). Three vegetation–habitat quadrats of 71 m<sup>2</sup> each were surveyed for lizards, petrel burrows, *Placostylus* density, and soil profiles. Vegetation types were defined using the point-intercept method of Atkinson (1962), and mapped. The straightforward methodology, style and careful scholarship of Whitaker (1968b) made this a model for future research.

Niche separation in relation to speciation was a topic often revisited in the more than 60 papers that Tony subsequently wrote on lizards. It was considered by him to be of particular importance in New Caledonia, where he encountered exceptionally high species diversity paralleling the complexity of habitats available. He always precisely described the habitat of new lizard taxa (e.g. Bauer et al. 2006b), and came to believe that speciation in lizards occurred most often in large, dense populations, especially where diverse habitats were available (Whitaker pers. comm. 2007).

All New Zealand lizard species are viviparous except for one skink, *Oligosoma suteri*, found mostly on islands north of the Coromandel Peninsula (Gill & Whitaker 1996). Although Tony did not locate any nests on the Poor Knights Islands, he later discovered several of their nests under beach stones on nearby Hen Island (Whitaker 1968a). In his first foray into eco-zoogeography, he speculated that this occurrence of ovipary suggested there might have been three invasions of Australian skinks into New Zealand. He also pointed out that ovipary only occurs north of 37°S signifying that, due to cooler conditions, vivipary is more efficient over most of New Zealand.

These two papers, 1968a, b, were the first Tony wrote as a scientist at Ecology Division, DSIR (Department of Scientific and Industrial Research). He had begun working as a vacation assistant in Ecology Division in his university holidays. Following graduation from university in 1966, he was appointed as a scientist, initially under the supervision of Rowley Taylor, and was able to continue with his island studies and to build up a fully-documented and well-curated national lizard collection. During these years he developed strong links to the New Zealand Wildlife Service and was able to participate in many island surveys. This culminated in a paper on lizard populations on islands with and without Polynesian rats (*Rattus exulans*; Whitaker 1973), perhaps the most influential of all his works. This really was a major wake-up call. The impact of rats on native New Zealand animals had been chronicled since the days of Walter Buller and before, but Tony showed that rats had exterminated nocturnal, ground-dwelling lizards everywhere and reduced both the abundance and ranges of other lizards, especially on the mainland. Tony's 1973 paper contributed to the idea that removal of rodents from offshore – and now mainland – islands was not merely desirable, but a necessity for New Zealand conservation. This was quite a radical idea at the time, and was not widely accepted for another 10–20 years, according to Thomas and Taylor (1993). Rat eradication techniques were pioneered by Don Merton and others on the Noises Islands and later by Rowley Taylor and Bruce Thomas elsewhere. The results are history. This

is a story that New Zealand can be very proud of, both as a national effort and as a valuable 'export commodity'.

Between other projects at Ecology Division, in 1970 Tony commenced a mark–recapture study of diet, survival and density of common geckos (*Woodworthia maculata*) in the raised boulder-beaches of Cape Turakirae, South Wellington. Interim results were published in 1982, and the work was continued (Anastasiadis & Whitaker 1987b) to show that some of these small geckos live longer than 20 years. Lettink and Whitaker (2006a) later found that *W. maculata* may sometimes live to over 42 years.



Tony Whitaker measuring skinks on Motunau Island, 1975. This work was undertaken while he was at Ecology Division, DSIR (Photo: Sandy Bartle).

Tony went on to compile an essential bibliography of everything ever written on New Zealand lizards (Whitaker & Thomas 1989a). This is constantly updated online by the Society for Research on Amphibians and Reptiles in New Zealand (SRARNZ), and now contains over 3000 references. Another vital research and conservation tool that he also helped initiate was an atlas of distribution (Pickard & Towns 1988), also constantly updated online. Regional identification guides were provided for the Department of Conservation, culminating in the publication of a popular field guide (Gill & Whitaker 1996).

But to ordinary New Zealanders, Tony's beloved lizards were largely invisible, and their ecological importance ignored. In 1977 he left Ecology Division to farm at Orinoco (near Motueka, Nelson District) with his lifelong partner Viv Whitaker (née Warren). But, in 1990, Tony got the chance to curate the National Museum's first – and only – exhibition on reptiles and amphibians, working with the gifted James Mack. This was called *The Forgotten Fauna*. Thousands of the four magnificent posters – printed to publicize the exhibition – were widely distributed and remain today as collectors' items. For the many visitors to this memorable exhibition, the New Zealand herpetofauna could no longer remain 'forgotten'.

The National Museum borrowed the mysterious stuffed giant gecko *Hoplodactylus delcourtii* for the exhibition. This unique specimen had largely escaped notice since 1869 (or even earlier) in the Musée d'Histoire Naturelle de Marseille in France. However, Tony's intensive research failed to establish whether it was from New Zealand and if it could be the legendary New Zealand *kawekawau* (Whitaker 1991). Tony always paid great attention to detail, and would go to great lengths to get his facts correct. Whether it was establishing

a broad ecological or evolutionary pattern, or the minutest morphological or taxonomic trait, Tony was a very dedicated scientist.

Nevertheless, studying lizards in their natural habitat was always Tony's passion, rather than museum-based taxonomic research. Not that he thought that research on museum collections was useless – on the contrary, his collection of 1674 New Zealand lizards and frogs is by far the largest single herpetological collection in what is now the Museum of New Zealand Te Papa Tongarewa, far exceeding others in number of specimens and in accuracy of collection data. This collection includes seven holotypes. Only one of these – the black-eyed gecko (*Mokopirirakau kahutarae*) – was named by him (Whitaker 1984). Tony recognised and strongly supported work on lizard taxonomy and embraced the newer techniques of molecular taxonomy as they were developed. The ideas of the American gecko systematist Aaron Bauer strongly influenced him from this time on, and Tony co-authored many papers with Bauer on gecko relationships, both in New Zealand and in New Caledonia.

Taxonomic revolutions can have anarchic impacts on ecological and zoogeographic studies. In no other vertebrate group has New Zealand seen such extensive taxonomic change. Near the beginning of his career, Tony recognised only 28 endemic species of lizard in New Zealand (Bull & Whitaker 1975). Although he then recognised that 'considerable rearrangements [would] be necessary', no one then anticipated that in just 20 years Daugherty et al. (1994) would recognise 59 species, making New Zealand proportionately richer in lizards than Australia, yet all the product of post-Oligocene radiations. Today the number recognised is 103 species, including 40 as yet undescribed (New Zealand Lizard Database, 2014). By comparison, there are only 58 species of endemic terrestrial birds extant since 1840, almost all of which were described before 1900 (Ornithological Society of New Zealand 2010).

After building a homestead at Orinoco, from materials the family retrieved from the old Richmond Post Office, Tony's gaze was drawn southward towards the endangered skinks of Otago. From 1984 to 2005 surveys in Otago for mining companies (20 reports written) and elsewhere for various extractive industries (a further 20 reports produced) helped pay the bills. Fieldwork in Otago also gave Tony a chance to research the conservation biology of locally endemic Otago lizards in 15 reports to the Wildlife Service and, later, the Department of Conservation. From 1998 Tony was able to secure research contracts with the Department for most parts of New Zealand, and 35 more reports were produced. Many of these were substantial, both in scope and in size but, after 2008, fewer funds for conservation research reduced such opportunities.

But Tony never really quite forgot his botanical roots. Following his early observation on the Poor Knights of over 50 geckos feeding on the nectar produced by a small pohutukawa (*Metrosideros excelsa*), he went on to examine the role of lizards in cross-pollination and seed dispersal in a range of plants (1987a, c). He believed that the reduction or extermination of geckos on the New Zealand mainland was likely to be affecting plant reproduction. In another botanical paper (Dawson et al. 2000) co-authors Tony and Viv described two new species of *Metrosideros* from New Caledonia, with Viv as the primary author of a popular account of those discoveries (Whitaker & Whitaker 1999).

Viv's role in the work was as a specialist field assistant. This was essential in the early days of spotlighting lizards at night, when Tony could see eyes gleaming at him in the

forest from a distance of up to 30 m – but what were they? Apart from lizards and tuatara (*Sphenodon* spp.), possibilities included birds and even small spiders. So a second person was mostly needed to identify and, if necessary, catch the animal whose eyes reflected Tony's headlamp. Then there was the challenge of quadrat surveys, which are more easily done with two people. From 1993 Viv became an essential partner in most of the fieldwork in Vanuatu and in New Caledonia. From that date she was a joint author of many field reports (17 in all). Tony was always scrupulous in acknowledging the role of others, and Viv's role is acknowledged in all of his New Caledonia papers. Sometimes Tony would concentrate on photography (he was an outstanding photographer of lizards and their habitats), leaving Viv to search for lizards. So she was the first to find several new species, which Tony specifically acknowledges (e.g. Bauer et al. 2006b).

Gradually Tony and Viv became increasingly interested in the diverse, bizarre and poorly known lizards of Vanuatu and New Caledonia. It was early believed (Whitaker 1975), and later shown (e.g. Chapple et al. 2009; Nielson et al. 2011) that skinks and geckos had colonised New Zealand, perhaps in a single event, from New Caledonia in the early Miocene. Whitaker and Bauer (1997) noted these close relationships – at least for geckos – and the very high diversity of the lizard fauna in New Caledonia (15 times higher than New Zealand by land area), with many undescribed species and even new genera. This made a very convincing case for accelerating research into the lizards there. They also pointed to the high level of extinction risk in New Caledonia, with the fauna facing all the habitat and predator pressures seen in New Zealand plus fire ants (*Wasmannia* spp.) and an illegal pet trade. From 1993 until 2010, first conservation organisations, and then New Zealand and New Caledonian governments – along with mining companies – funded 25 field surveys by Tony and Viv Whitaker of key sites in Vanuatu and, later, New Caledonia. Many conservation initiatives developed from these surveys and subsequent reports. The scientific results from New Caledonia were outstanding, with 11 papers jointly authored with American and Australian specialists appearing from 1998 onwards. Three new genera and 23 new species of skinks and geckos were described on the basis of morphological and genetic characters. Tony and Viv explored the isolated ultramafic mountains of west and central New Caledonia, finding these new lizards at altitudes of up to 1100 m. Many were restricted to individual massifs and were thus very vulnerable, especially as few of their habitats were protected. The habitats were described in detail, and often illustrated in their papers from this period, perhaps most notably in Bauer et al. (2006b), which is a major work, integrating taxonomy, genetics and ecology across eight species, seven of them new.

As a measure of Tony's scientific passion and commitment, it is notable that his publication output since he moved to farm at Orinoco averaged 2.3 papers per year, far exceeding his output when he had the resources of DSIR behind him (average 1.4 papers per year). Tony was appointed a Member of the New Zealand Order of Merit (MNZM) in 2010 for services to herpetology. He was a founding member of SRARNZ.

Despite his breadth of vision and depth of ecological and evolutionary knowledge, Tony is most remembered for his personal qualities: his energy, warmth, humour and kindness. He was generous in discussing natural history topics and sharing jokes with hundreds of correspondents all over the world. He was a great networker; providing vital information for many projects, and connecting researchers to others with similar interests. His passing leaves a great gap in New Zealand and

Pacific ecology and herpetology, and in the lives of those who were fortunate to know him.

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