

Foreword

The famous British geologist, Arthur Holmes, was greatly admired by my geology teacher at Gateshead Grammar School on Tyneside in the north-east of England. This was not just because Holmes was author of the definitive textbook *Principles of Physical Geology* (1944) that we used in class in the late 1950s, but also because Holmes was a local lad, a Tynesider, and therefore a Geordie. Holmes' geological researches — including determining the age of the Earth using the principles of radioactivity — propelled him to international fame, if not geological immortality.

Holmes as a boy lived at 19 Primrose Hill, Low Fell — the same part of Gateshead where I was born and raised. I don't recall being particularly impressed by Holmes' achievements at school as my clear ambition was to become a veterinary surgeon rather than a geologist. I became more familiar with the importance of Holmes' contribution to the evolution of geological ideas, however, after the revolutionary theory of plate tectonics emerged in 1967 and after I arrived in Papua New Guinea as a volcanic geologist in 1969. Holmes said that heat is generated deep within the Earth by radioactivity, which in turn generates large-scale convection currents that bring hot rocks towards the Earth's surface. These rocks melt to form magma as a result of their upward, convective transport into a lower pressure environment closer to the Earth's surface. Some of the magmas so formed may be erupted from volcanoes. This simple idea of 'decompression melting' and magma eruption can be traced back to the mid-nineteenth century.

The 1960s were a formative decade in other ways too. 1960 was when I started, rather unenthusiastically, an undergraduate course in geology at the magisterially named Imperial College of Science and Technology, part of the University of London. And in 1960, too, British Prime Minister Harold MacMillan gave his 'Winds of Change' speech in Africa, acknowledging the end of imperialism — at least of the British sort. A further step in my commitment to volcanic geology followed a field season of undergraduate mapping in eastern Iceland in 1962, supervised by a motivational lecturer in mineralogy at Imperial, G.P.L. Walker — a brilliant observer in the field, startlingly insightful in his geological interpretations, and infectious in articulation of his geological knowledge. There was no escape from such geological mentoring. I therefore started fieldwork for a PhD in Africa in 1963 on the geology and petrology of a young volcano in the Eastern Rift Valley of the British colony of Kenya, where I was hosted by local Masai people and supported by generous-minded geologists of the Kenya Geological Survey. Kenya obtained its independence from Britain that year and I saw the Union Jack lowered and the new Kenyan flag raised in a ceremony in Nairobi, while encompassed by the shrill warbling of enthusiastic Kikuyu people. Similar decolonisation ceremonies would take place in the 1970s in Melanesian countries in the south-west Pacific, including Papua New Guinea.

My career in 1966 seemed set, albeit vaguely, on becoming a teacher at a university somewhere, probably in North America and, indeed, I next undertook a period of postdoctoral work at the University of California at Berkeley. A strong school in volcanology existed at Berkeley in the 1960s, its traditions having been formed by the research of, amongst others, Welshman Howell Williams and the intellectually impressive Belgium-born volcanologist John Verhoogen, who had worked on volcanoes in the Belgian Congo of central Africa. Williams had contributed significantly to an understanding of the formation of calderas, or large volcanic craters, based on his fieldwork in the Cascades volcanic chain of the western United States and elsewhere, and had published in 1941 a well-known and benchmark paper 'Calderas and their Origin'. Nevertheless, and despite the presence of these high achievers, an academic career in volcanic geology lost its appeal for me irretrievably while at Berkeley and I decided to join a government geological survey like the one I had so identified with while in Kenya.

An interview in London in 1968 for a position with the national geological survey in Australia turned out to be more fruitful than I had expected. I was summoned to Australia House on the Strand to be assessed by Dr N.H. Fisher, then chief geologist of the Australian Government's Bureau of Mineral Resources, Geology and Geophysics, known ubiquitously as 'the BMR', and based in Canberra. 'Doc' Fisher was a tall, dark-suited, somewhat gruff and aloof public servant carrying a superficially imperious demeanor, not unlike that of Verhoogen. Fisher's underlying interest in volcanoes — was it a passion? — soon became apparent and there followed a lively, back-and-forth conversation between the two of us about volcanoes and Australian Government volcanologists — Tony Taylor, Colin Branch, and the Imperial-trained David Blake. Fisher himself, as a young man, had published a well-known report, amongst others, on the 1937 volcanic eruption at Rabaul on New Britain Island in the Territory of Papua and New Guinea to the north of Australia in north-western Melanesia.

The interview ended well for me, even though the only other member of the selection panel — a career-diplomat type — had been somewhat sidelined from the specialised volcanological conversation. I would be joining a BMR field party in mapping the mainly volcanic geology of New Britain, which included some spectacular but unmapped volcanoes and caldera structures, including at Rabaul. Our first field base-camp in January 1969 was at Pomio on the south coast of New Britain, hemmed in by the magnificent but brooding Nakanai Mountains, and facing Jacquinot Bay and, beyond, Palmalmal Plantation across the blue water. Fireflies would blink in unison at night in bushes alongside the earthen footpaths at Pomio, and I saw for the first time how the wakes of boats could sparkle with tropical phosphorescence. The coral reefs and their banded sea snakes were breathtaking.

The first geological traverse I made in New Britain in 1969 was led by geologist Peter Macnab through the Nakanais — its aim, to map some of the older volcanic rocks of the island. We took off from Pomio by helicopter, landing less than half an hour later on a boulder bed in the lower reaches of the Ip River to the east. I quickly realised on the flight over that I, as a rock-seeking volcanic geologist, was in serious trouble. Tropical rain forest covered every piece of country in sight, including the fiercely rugged Nakanai Mountains. There were no rocky crags to be seen anywhere and I was later to discover that even though rocks were exposed in steep creek beds in these moss-forest covered mountains, most of them were inaccessible in the higher reaches of the streams anyway. Furthermore, the rain and mist were incessant. Neither were there any tracks, maps, indigenous people, and certainly no GPS gadgetry, to assist in traversing this deserted and dreadful piece of forested country. Navigating was in fact a nightmare, unless — like Macnab — you could use instinct, together with black-and-white aerial photographs from the Second World War to see where you were going by adjusting your eyes and viewing the water-saturated photographs in stereoscopic vision in the incessant mist, cold, and pouring rain. My pocket stereoscope simply steamed up.

A three-day traverse had been planned, but we took five days to reach the pre-arranged helicopter pick-up point. We and our Melanesian team of rucksack carriers — no vehicular roads in this devil country — returned to Pomio exhausted, bitten by voracious insects, evil beetles and so forth, and scratched and poisoned by the most vicious of vines, nettles, and roots imaginable. I was informed with true Australian drollery by colleagues back at the Pomio base camp that the five days represented just a ‘shakedown’ traverse. Pomio is synonymous with high rainfall, mosquitoes, and malaria. I fell ill and, after a few days of high fever, began hallucinating, possibly through overdosing on anti-malarial tablets. I was air-lifted to Rabaul and admitted to Nonga Hospital.

This was not the best beginning to volcanological studies for the Australian Government in what is now Papua New Guinea, but the work and my state of mind did improve. I remained with BMR, now Geoscience Australia, for 36 years and grew to appreciate the volcanoes, volcanic rocks, and people of Papua New Guinea — a truly extraordinary and inspiring part of the world — enough, that is, to want to write this book.

The book is dedicated to Jill who, curiously, has never shared my volcanological obsessions during our more than 40 years of marriage, but she came along anyway.

R.W. Johnson

Canberra