3. European Intruders and the 1878 Rabaul Eruption: 1870–1883

In the evening the sight became more than grand — it was awful; every few moments there would come a huge convulsion, and then the very bowels of the earth seemed to be vomited from the crater into the air; enormous stones, red hot, the size of an ordinary house would be thrown up almost out of sight, when they would burst like a rocket, and fall hissing into the sea.

Wilfred Powell (1883)

Blanche Bay and the Tolai

The landscape surrounding the vast bay at Rabaul had long been occupied by Melanesian people when the British naval surveyors Captain C.H. Simpson and Lieutenant W.F.A. Greet entered the bay on 17 July 1872, naming it after their vessel, HMS Blanche. The Melanesians of the Rabaul area are known today as the Tolai, a populous group made up of different matrilineal descent lines or vunatarai.1 They had migrated there at different but undated times from New Ireland, some through the Duke of York Islands, had settled successfully by taking agricultural advantage of the rich soils of Rabaul’s volcanoes, and are thought to have displaced the Baining people, who moved into the mountains to the west. The Tolai language is Tinata Tuna, although it is most commonly referred to as Kuanua, a word from the Duke of York Islands meaning ‘over there’.

Numerous features of Blanche Bay — volcanic peaks and ridges, gullies and rocks, prominences and islands, reefs and inlets — have been named individually by the Tolai. Even small, seemingly insignificant locations are named after particular plants, trees, or other natural features. These special places are of overall importance because of their intimate association with past events or ancestors, and a spirit world that is a part of the Tolai natural environment and belief system. Naming places and incorporating them in genealogies are important aspects of Tolai descent-line claims of land ownership. Land still holds special meaning for the Tolai, as it does for many other Melanesian groups, reflecting a fluid system of collective land tenure. Early European intruders in search of ‘purchasable’ land, and who attempted to individuate, codify and regulate land tenure, were generally slow to understand the complexities — religious, historical, social and political — lying behind this indigenous view of land ownership.

Volcanic activity was acknowledged by the Tolai both as an agent of landscape creation and change, and as a manifestation of the workings of the spirit world. The Kuanua word *kaia* refers to the different spirits that appear, most commonly, as giant snakes called *valvalir* or *kaliku*, and the most prominent *kaia* live inside the craters of volcanoes and cause volcanic eruptions. *Rakaia* — ‘the Spirit’ — was the name given by the Tolai to the volcano that emerged from Blanche Bay in 1878, even though more than one *kaia* were thought to live there.² Some *kaia* can be befriended and some may be of assistance. One story is of two Tolai sorcerers instructing two *kaia*, who were disguised as snakes, and sending them to Tavurvur to start the 1878 eruption. The sorcerers also made two magic sticks, which were thrown into a fire and any crackling was to be the signal for the *kaia* to use their powers again and stop the eruption. Many earthquakes of volcanic origin are felt in the Rabaul area and the Kuanua word for earthquake, *guria*, is now part of the vocabulary of Tok Pisin, one of the national languages of modern Papua New Guinea.

Beings in the physical guises of *tubuan* and *dukduk* are created by the Tolai in the form of painted, conical, volcano-like heads and bodies of leaves that cover all of the enclosed person’s body, except for feet and calves. Tubuan heads rise from the leafed bodies as if they are volcanic peaks rising from a forested landscape, and the bodies rustle and vibrate during tremor-like shaking movements, as allegories of volcanoes in eruption and for ground-shaking by earthquakes. Tubuan are ‘raised’ in commitment to the rituals of male secret societies which are also called *tubuan*. The Tolai have complex rites at initiation, mortuary, funeral, and other ceremonies, which were — and to a diminishing extent still are — part of the intricate tapestry of traditional cultural activity in the Rabaul area.

Simpson and Greet produced the first map of Blanche Bay, naming waters in the north of the bay after themselves — Simpson Harbour and Greet Harbour. Their map is sketchy and distorted, but it does give a first impression of the imposing scale of Blanche Bay and the prominence of the peaks of North Daughter, Mother, and South Daughter, the Tolai names for which are Tovanumbatir, Kombiu or Kabiu, and Turagunan. The beauty of the bay impressed them, but Simpson wrote, more pragmatically, that ‘… one cannot look at it a moment without being struck at the natural strength of the position in a military point of view … [there is] water in it for the navies of the world to anchor in, perfectly sheltered from all winds’.³ The fleet of the Japanese South Seas Force was one such navy that, in 1942, would take military advantage of Blanche Bay and its harbours, even under volcanic threat, during an advance southwards towards Australia during the Second World War.

² Neumann (1992), quoting the German missionaries Josef Meier and August Kleinitzchen. The story of the two sorcerers is from Meier (1908), an English translation of which is given by Neumann (1996).

³ All quotations in this and the following paragraph are from pp. 4 & 5 of Simpson’s report (1873).
Simpson and Greet were aware of the volcanic origins of the three main peaks at Rabaul and they identified two further volcanoes — one just west of the Mother, the other west of South Daughter. The Tolai call the former Palangiagia and the latter is Tavurvur which, wrote Simpson, ‘… has been much more lately active … [and] with the smell of sulphur’. Simpson and Greet were impressed also by two precipitous rocks rising from Simpson Harbour west of Matupit Island. They named them the Beehives, although today they are known also as Davapia Rocks. Simpson and Greet were surprised to find on the larger Beehive, ‘a village containing perhaps 200 inhabitants … many of their houses are built in the water on piles, they had numerous canoes moored around them’. Perhaps their most significant observation, however, bearing in mind the volcanic eruption that would follow in 1878, was the presence of ‘a reef of rocks ending in three or four detached islands’ extending from the south-western shore of the
bay. This reef was not obviously a volcano, but its submarine foundation had likely been formed by volcanic activity. A new island would form there within six years.

The 1872 survey by Simpson and Greet is not the only example of volcanologically significant coastal mapping by the British Navy in Near Oceania in the mid-to late nineteenth century. The towns and cities of eastern Australia were growing and trade needed to be conducted with Asia, safe passages through the Melanesian islands needed charting, and there was now interest in potential places for European settlement. A survey by Captain John Moresby in the British HMS Basilisk is another example of shoreline-mapping and harbour-seeking. Moresby traversed the south-eastern coast of New Guinea in 1874, finding the harbour on whose shores a settlement would root, take his family name, and later become a capital city — Port Moresby. He also sailed the passage between the D’Entrecasteaux Islands and the New Guinea mainland, recognising the volcanic nature of Fergusson Island, including its hot springs. Moresby named Dawson Strait between Fergusson and Normanby Islands, where there are young volcanic cones — Lamonai, Oiau and Dobu — that were, however, not recognised by him as eruptive centres. These volcanoes, together with felt earthquakes in the early 1950s, would so concern volcanologists that a permanent volcanological observatory would be built at Esa’ala on the Normanby shoreline at Dawson Strait.

Moresby also mapped further west ‘… a lofty promontory … [where a] double peaked mountain rises 4000 feet high … the features were so striking that I resolved to honour them with great names. The Cape is therefore Cape Nelson, the two summits of the mountain are Mounts Victory and Trafalgar, and the great bay thus formed, is now Collingwood Bay’.4 Moresby did not recognise that Victory and Trafalgar were two separate volcanoes. He did, however, succeed in scattering names from the enduring British victory over the Franco–Spanish fleet at the Battle of Trafalgar in 1805, in a remote part of New Guinea overlooking the island group named previously by the Frenchman D’Entrecasteaux. The battle indeed had introduced a century of Pax Britannica, a period of relative peace and international stability and trade that was underpinned by the prowling British Royal Navy, providing benefits to far-flung colonies such as Australia, and including more numerous and safer passages through Melanesian waters. Russian warships, however, had been testing their own approach to imperialism in the Pacific.

4 Moresby (1876), p. 269.
Miklouho-Maclay

The armed Russian corvette *Vityaz* came into New Guinea waters in September 1871 carrying a Russian naturalist, Nikolai Miklouho-Maclay.\(^5\) The young scientist asked Captain Nazimov to leave him near Melanesian villages on the north coast of New Guinea, south-east of present-day Madang, where he stayed for 15 months during this first of three visits to New Guinea. Miklouho-Maclay was a charismatic figure who became mythologised by the Russians as a humanitarian hero dedicated to the welfare of humankind. His main scientific interests were in zoology, anthropology, ethnology, and comparative anatomy — including the differences in brain physiology between human races — but he was also a talented artist and maintained a broad interest in all aspects of the natural world. He made some observations of earthquake effects and volcanic eruptions.

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Miklouho-Maclay, on his second visit to the north coast of New Guinea in June 1876, was told by villagers of several earthquakes that had taken place since his first sojourn there. Falling trees had caused deaths to villagers and damage to huts. Miklouho-Maclay saw for himself how landslides had denuded trees on hill summits and how coastal stretches of forest had been destroyed by tsunamis. Even the depth of the sea, which had previously been sounded by the Vityaz, had changed, as well as the direction of small streams which had been diverted by sedimentation caused by the tsunamis. Miklouho-Maclay left the
New Guinea coast by commercial schooner in 1877 after his second visit and, on the evening of 11 November, he observed from the vessel eruptive activity from Manam volcano:

I saw a red fire in the north-west … The fire occurred in intervals of several minutes and lasted each time for only about half to two minutes. At a considerable distance of more than 60 sea miles it was similar to the periodical light of a lighthouse. During the whole night one could watch the flickering of the red light … [On the following night as] … it grew darker I saw for several times mighty fork lightnings flash through the darkening clouds … [and] white smoke masses, periodically thrown out changed into columns of fire which flared up in the same way as they had done the day before. It was an impressive view.6

There was no time to investigate the eruption because the schooner’s skipper had to adhere to a schedule, but Miklouho-Maclay was able to produce a watercolour rendition of it at dawn the next morning. Furthermore, his description is sufficiently detailed that it can be regarded as the first known report from Near Oceania of the *strombolian* type of volcanic eruption. Strombolian eruptions characterise much of Manam’s known eruptive activity, as well as that of other volcanoes to the east along the length of the Bismarck Volcanic Arc. Strombolian eruptions involve periodic explosions of lava high in the conduits beneath volcanoes. They are caused when volcanic gases froth out of solution, and break up the lava, ejecting it as incandescent pieces which, individually, can be many metres in diameter but commonly much less. The pieces are thrown out on smooth parabolic trajectories that, in night-time, time lapse photographs, look like the stalks of a brilliant bunch of orange-red flowers. Some pieces spin through the air and create spindle-life forms by the time they cool and land on the volcano’s flanks. Others ‘splat’ onto the ground forming cow-pat bombs, or break up on impact spraying glowing fragments around as secondary explosions. And still others reach the ground at such a great rate and in such large amounts without appreciable cooling, that they reconstitute and form lava flows that move off down the flanks of the volcano.

Miklouho-Maclay in his reports on Manam in 1877 also briefly mentioned eruptions from Bam volcano to the west of Manam. Furthermore, during his third visit to the region, he observed, from an anchorage on the north coast of Manus Island in the Admiralty Islands, a volcanic eruption on 28 March 1883. This may have been from the general submarine area of Tuluman Volcano, although Miklouho-Maclay himself thought it

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6 Miklouho-Maclay (1878), pp. 409, 410.
might, very likely, have been the volcano on the small island called by
the natives Loo [Lou], and from which they obtain the obsidian for their
weapons and implements … I could see a large halo as from an immense
fire, and two or three times heavy thunderlike rolling noises were heard,
followed by distinct flashes like columns of fire on the horizon.\(^7\)

Figure 16. Miklouho-Maclay sketched Manam Island in his field notebook
from the west at daybreak on 12 November 1877, and showed clearly
both the main and southern craters in eruptive activity. The night-time
incandescence, so characteristic of strombolian activity, would not have
been clear in the daylight, but there is a suggestion of strombolian jetting
from the southern crater on the right.

Source: Miklukho-Maklai (1952; figure between pp. 286 & 287). Image provided by E. Govor.

**Traders, Missionaries and a Gentleman Explorer**

Natural resources in Near Oceania had been obtained by foreign traders and
whalers well before the first significant European settlement of the Duke of York
Islands and Rabaul area in the 1870s. Traders bartered with Melanesian villagers
during passage through the region, offering mainly metal goods in exchange,
and both sides learnt skills in obtaining mutually acceptable deals. The German

\(^7\) Miklouho-Maclay (1885), p. 965.
company J.C. Godeffroy & Sohn, however, pioneered direct European trading in the south-west Pacific, opening for business in Samoa in 1857. The company expanded northwards and by 1873 two Godeffroy traders plus four non-European companions had established trading posts at Nonga on the north coast north of Tovanumbatir, and on Matupit Island in Blanche Bay.8 The Nonga group was driven out by the Tolai and retreated to Matupit from where, coming again under attack, they fled to the Duke of York Islands. Godeffroy’s agent in Samoa informed the authorities in Berlin of the incident and a German naval vessel, the SMS Gazelle, on a surveying expedition and under the captaincy of G.E.G. von Schleinitz, visited Blanche Bay on 12–17 August 1875. Schleinitz published a chart of Blanche Bay as a result of his 1875 visit that, like the one prepared by Simpson and Greet, has the prominent reef extending out into the bay from the south-western shore, from where eruptive activity would take place in 1878.9 A Godeffroy trader, William Hicks, would later witness the 1878 eruption.

1875 was also the year that Methodist missionary the Reverend George Brown and the German merchant Eduard Hernsheim first came, separately, to the Rabaul area. Both would witness the effects of the 1878 eruption. Brown and a team of Fijian and Samoan teacher–missionaries arrived on the John Wesley at Port Hunter in the Duke of York Islands in August 1875, while Schleinitz was exploring Blanche Bay.10 This event — the arrival of the lotu, or church — is significant in Tolai history as it marks the introduction and eventual acceptance of Christianity in the New Britain region and, from a more secular viewpoint, establishment of the first quasi-permanent European settlement there. Brown himself was an energetic if not dogged leader, a diarist, and a keen observer of the natural world — indeed, a polymath whose interests extended well beyond proselytism alone.

Eduard Hernsheim came into the area in 1875 from Micronesia to the north in order to seek and exploit new commercial opportunities in Melanesia, but found there instead — as he had in Micronesia — the competing presence of Godeffroy & Sohn. Hernsheim was, nevertheless, to become one of the most important merchants in the region and to play a role in political events that led to German acquisition of colonies in the New Guinea region in 1884. Hernsheim also would eventually establish a substantial commercial base on Matupit Island, including a copra-processing factory. He left in 1892, however, broken in health and having experienced the year before ‘nerve-wracking, continual earth tremors and mysterious subterraneous rumblings’ that not only resulted in many of his staff leaving but causing in himself ‘an inexplicable fear … in the daily expectation of a volcanic eruption [from Tavuruvur] and the disappearance of my island’.11

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8 See, for example, Neumann (1992).
9 See, for example, Schleinitz (1889).
10 Brown (1908).
Figure 17. The area of reef and islets running out from the western shore of Blanche Bay is the site of the Vulcan eruption in 1878.

Source: Schleinitz (1889, tafel 40, opposite p. 240).
One other European observer who was on hand to witness directly the 1878 eruption at Rabaul was an adventurous Englishman, Wilfred Powell, one of the ‘landed gentry’ in Britain, and who is perhaps best described as a ‘gentleman-explorer’. He was a cousin to Lord Baden Powell, founder of the Boy Scout movement. Powell spent a good deal of 1877–1880 exploring New Britain in the ketch *Star of the East*.

Figure 18. Wilfred Powell (1853–1942).

Source: Royal Commonwealth Society, London.

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1878 Eruption at Rabaul

Three Europeans — Brown, Powell and Hernsheim — reported on the 1878 Rabaul eruption, or at least on its immediate effects, and information from the Matupit-based trader Hicks, was collected not long afterwards. These form the basis for a summary of the events at Rabaul in 1878.13 There is, however, an additional and fascinating, but rarely told story of the 1878 eruption by a Tolai eyewitness. This account was reported in English in 1951 after first being translated from an oral version told in Tok Pisin to an Australian more than 30 years previously — that is, about 40 years after the 1878 eruption itself. There are some differences between all these accounts, but the main features of the eruption are clear.

The Tolai eyewitness was To Maran, or Tomaran, of Matupit Island. To Maran recalled that the weeks and months prior to the eruption were ‘a time of famine and hunger’ for the Matupits because the ground on their island had been ‘getting steadily hotter — it was this that had killed our gardens and started the famine’.14 Severe tremors then began to be felt ‘so that at times our people were thrown down and none could remain standing’. The wealth of the Matupits lay in shell money and one day a large group of them decided to cross the bay to Keravia to buy much needed food, but on the way ‘with a noise like a great cannon, there burst forth out of the sea [at Vulcan] not far from us a great explosion which threw the sea-water into the air’. They returned to Matupit, one canoe being caught up in tsunamis from the submarine disturbances. Then, next morning while at Matupit watching the Vulcan eruption across the bay:

suddenly a new opening appeared along the beach near the sea, throwing fire high up the mountain side [at Tavurvur]. Stones were shot high into the air, also dense smoke [from which] fell much ash, so that some of the people of Talawat, nearby, were killed.

The Matupits decided to evacuate to Malaguna, ‘the big place’ to the north-west where, however, fighting broke out between them and the villagers at Malaguna because of the extreme hunger of the Matupits: ‘Yes, our men stole from their gardens so that trouble arose and they cried out that they would kill and eat us.’ Eventually the eruptions ceased and the Matupits returned to their island. However, the ‘ownership of the land gave us some trouble to define, for the old boundaries could not be seen. Trees were broken, rocks covered up, and the beach was not the same shape it had been. Many owners had died …’ Village discussions were held and ‘the land was re-allotted [sic] and the ownership then decided has held good till this day.’

13 Johnson et al. (1981).
14 All quotations in this and the following paragraph are from p. 67 of Tomaran (1951).
This dramatic account can be set against a summary of the European records of the time. Brown recorded that frequent and locally strong earthquakes preceded the 1878 volcanic outbreak, particularly overnight on Sunday 3 February. Two tsunamis eroded the shorelines of Blanche Bay on the next morning and, soon afterwards, ‘clouds of steam were observed rising from the Bay in a direct line’ between Tavurvur and the south-west shore of the bay. This phenomenon was described even as a ‘line of fire’ by Hicks. A submarine volcano then developed about 1.5 kilometres from the shoreline at the south-western end of the line, Tavurvur across the bay ‘burst out with terrific power’ a few hours later, and inhabitants of the bay shores and Matupit Island fled to higher ground, reported Brown. Hicks put these events a day later, on the 5 February, and also said that there had been six tsunamis, initially four metres high. Brown stated clearly that the Vulcan eruption preceded the outburst from Tavurvur by a few hours — as did Tomaran — although Brown did not witness the two eruptions himself. Brown, however, had earlier noted in his diary on 30 January that he had received a report that the ‘Volcano at Matupit’ — presumably meaning Tavurvur — was in eruption. The significance and accuracy of the reporting on this early date of 30 January remains obscure, but in any case, eruptions at both volcanoes were well established by 5 February.

Brown noted that by 13 February ‘The whole channel in front of our house [in the Duke of York Islands] and seemingly for miles to the southward is full of immense fields of pumice stone from the volcano.’ Hernsheim, too, who had arrived at the Duke of York Islands on 9 February, noted that ‘… thick layers of pumice covered the ocean as far as the eye could see’, and that the passage between the islands and New Britain mainland was closed by a blanket of pumice up to 1.8 metres thick. Powell recorded that ‘huge blocks’ of floating pumice surrounded his ketch anchored at Makada in the Duke of Yorks and that ‘it really appeared as though one could walk to New Britain on it.’ These large volumes of pumice would eventually drift eastwards, washing up on the shores of the Solomon Islands and even as far east as the Ellice Islands in the Pacific. Fishing was disrupted, and the hull of at least one ship was scraped clean of paint by the abrasive pumice.

Powell was imprecise about the times of these events at Rabaul in 1878, but he produced a dramatic description of Tavurvur’s activity, which he saw from the summit of the Mother. He saw its incandescent explosions and the ejection of huge rocks, and recorded that

At the same time angry flames would dart up, almost to the altitude on which we stood, and of the most dazzling brightness. Then all would die.

15 The primary references and quotation sources used in this and the following paragraphs are given by Johnson et al. (1981).
down to a low sulphureous breathing, spreading a blue flame all over
the mouth of the crater, whilst over us and all the country near hung
a panoply of thick black smoke, broken only by the falling of red-hot
stones in showers, which destroyed all the vegetation to leeward to a
distance of about two miles.¹⁶

Volcanic activity at Vulcan is thought to have lasted about three or four days,
whereas Tavurvur continued in eruption for almost a month. A new island,
Vulcan, a few kilometres in diameter, was formed where the south-western reef
had been, but parts of which still survived. The island was visited at different
times by Brown, Powell and Hicks. It had been built up by the accumulation
of pumice, yet Brown seems to have been more struck by the island having
been created by upheaval and being ‘thrown up’. This was in contrast to the
Beehives that he ‘… saw were gradually sinking as the Houses which were some
feet above the high water mark on my previous visit are now quite flooded at
high water’. New Vulcan Island had a crater containing boiling water and the
ground was so hot that visitors had to keep moving to avoid their feet being
burnt, wrote Powell. Brown, however, noted that this had not prevented the
opportunistic trader Hicks from taking ‘possession of it by planting Cocoa Nuts
even before it was quite cool … [and that] at the head of Simpsons Harbour Mr
Hicks assured us that the water was all at scalding heat for several days. The fish
were all killed and the Turtles were so much cooked that when the Natives got
them the Shell (Tortoise Shell) had dropped off’.

Several conclusions can be drawn from these accounts of the 1878 Rabaul
eruption. First, the eruption is the earliest in Near Oceania to be described in any
sort of detail in eyewitness accounts. Most descriptions of previous eruptions
are by individual eyewitnesses of short-duration eruptive periods, in contrast
to the several observations made over a month at Rabaul. Secondly, and more
significantly, the described ‘eruption’ is in reality a double eruption — that is,
more or less synchronous eruptive activity from two separate volcanoes. This
is an unusual phenomenon, even globally, yet is one that would be repeated
at Rabaul in both 1937 and 1994, on both occasions with damaging results.
These repeated ‘double’ eruptions are separated by periods of 59 and 57 years
respectively. The double eruption, naturally, has led to speculation about
whether the two volcanoes are linked underground by some sort of geological
fault, a notion fuelled perhaps by the claim of a ‘line of fire’ running between
them in 1878. Geophysical data that would help to define the nature of Rabaul’s
underground ‘plumbing’ system would not be obtained for more than another
century.

¹⁶ Powell (1883), p. 113.
Figure 19. Tolai people had re-established themselves on the larger of the Beehives by the time this photograph was taken in 1883, but in lesser numbers than those before the 1878 eruption. The Beehives consist mainly of layers of pumice, such as that produced by Vulcan.

Source: Methodist Church of Australia, Department of Overseas Mission Papers, held by the State Library of New South Wales. Published courtesy of the Secretary for the World Mission.

Both of the 1937 and 1994 eruptions at Rabaul took place at a time of year when the south-east trade winds were blowing, but the north-west monsoon had set in by the time of the February 1878 eruption, meaning that the floating pumice was immediately blown out of Blanche Bay into St Georges Channel to the south-east, rather than piling up in Simpson Harbour to the north. Deaths resulting from the 1878 eruption are thought to have been very few, unlike in 1937. But one can imagine that the tsunamis at least must have been threatening to lives in 1878 — for example, those of the villagers living on the Beehives to the north of Vulcan, where bush-material huts were destroyed. Neither are there post-1878 records of so many people ever again living on these vulnerable rocks after the 1878 eruption, and what little remains of the Beehives today does not support any sort of settlement.
The chemical compositions of the rocks produced by Vulcan and Tavurvur are known to be similar, yet the styles of eruption at each volcano are remarkably different. *Pumice* is commonly produced by Vulcan, but not normally by Tavurvur. Pumice represents frothed volcanic rock that contains so many now empty gas cavities that its density is less than that of water, and so is the only common type of rock that will float. The gas has come out of solution in the magma as bubbles so rapidly — like the froth discharging from an opened bottle of beer — that the magma breaks into inflated pieces which are scattered by water, air, or in pyroclastic flows. Pumice is the product of many large and catastrophic eruptions that accompany the formation of large calderas. It is an important product of many other significant eruptions in Near Oceania.

Tavurvur eruptions produce volcanic ash and large lava blocks — some up to the ‘size of an ordinary house’, as noted by Powell. These are flung out in repeated explosions that may last from minutes to hours, in a general eruption style known as *vulcanian*. The explosions generate ash clouds that may rise several kilometres, but the ash is not distributed as widely as in some other styles of explosive eruption. Vulcanian explosions are thought to take place from the deeper parts of the volcano’s conduit, compared with Strombolian eruptions, and in some cases may represent the disruption of a frozen cap of lava, deep in the vent, caused by the build-up of underlying pressure. A distinctive feature of some vulcanian eruptions are ‘bombs’ of fresh lava, the interior of which has frothed somewhat, causing cracking of the chilled outer skin and the formation of a ‘breadcrust’ structure. Crater glow is commonly seen at night. Some vulcanian eruptions appear to produce no fresh magma, but only rocks from the walls of the conduit, as if the volcano is ‘clearing is throat’.

The distinction between vulcanian and strombolian eruptions is not always clear and, indeed, there may be in practice a continuum between the two during the course of an eruptive period at a single volcano. The description of 1878 Tavurvur activity provided by Powell may refer to such a transitional example, but one which is more towards the vulcanian end of the ‘spectrum’.

**Powell’s Voyage and a Possible Eruption ‘Pulse’**

Powell’s and Hernsheim’s volcanological stories do not finish here. Powell in particular — later in 1878 and possibly into 1879 — made important volcano observations along the north coast of New Britain. He documented especially a fundamental geological feature — one that would be explained a century later by the theory of plate tectonics — that the active volcanoes of New Britain all seemed to be located on the northern side of the island and that there were none on the southern side. He was the first European, also, to identify the
considerable extent of the volcanic terrain between Open Bay and Du Faur volcano immediately west of the present-day town of Kimbe, including the ‘islands’ to the north of Du Faur. And then, further west, he made the keen observation that there was a volcanic ‘gap’ between Du Faur and the western end of New Britain. All of these observations represent the first documented recognition of a major part of the 1,000-kilometre-long, discontinuous chain of volcanoes stretching from Rabaul in the east to the Schouten Islands in the west and known today as the Bismarck Volcanic Arc.

Figure 20. Powell sketched Lolobau Island from the east in 1878. A volcanic plume rises from the crater of the volcano on the left. The high peak on the right is an extinct volcanic peak.

Source: Powell (1883, plate following p. 220).

Powell noted the volcanic nature of Lolobau Island, which had been named Du Portail by D’Entrecasteaux in 1793. He also described and illustrated the towering stratovolcanoes of Ulawun and Bamus, which had not been identified as such by earlier voyagers, together with the lower volcano of Likuruanga to Ulawun’s north-west. Powell named these three the Father, South Son and North Son — not, evidently, as his own complement to Carteret’s naming of the Mother and Daughters triplet at Rabaul, but probably because he heard versions of myths told by the Nakanai people of the area. Following is a composite of extracts from versions of these myths that were reported some years later by a Catholic missionary:

A stranger called Ulawun came down from the mountain one day smoking tobacco and met Simolo, a Nakanai woman, who was so pleased with the effects of the tobacco, that she married Ulawun. The two of them went back up the mountain ‘and sat there forever smoking and stomping about causing the ground to tremble and the mountain to breathe fire’. They later gave seeds to the villagers for planting, which is how tobacco came to be grown in Nakanai gardens. Ulawun was a snake but Simolo was a true woman, and she bore a son who, when he grew up, was told by his parents to find another place to live. He settled on a nearby mountain which he named after himself, Bamus. ‘He
stayed up there constantly smoking and breathing fire and throwing up stones to such an extent that the villagers in the valley were devastated and people were killed.’ Bamus and Ulawun one day invited all the volcanoes to a singsing and gave out gifts of betel nut and shell money to their guests, except for the unpopular Vuna Kiku who then became angry. Vuna Kiku, who alone of the volcanoes had a tail, drove it into Likuruanga, or North Son, and kept on driving it in until the earth trembled and shook for a long time. The mountain finally collapsed into the sea and stopped smoking. This was Likuruanga’s last eruption.17

![Volcanoes](image)

**Figure 21.** The volcanoes Ulawun, on the left, and Bamus, on the right, were sketched by Powell from Lolobau Island in 1878. Both are shown emitting vapour plumes, which, in the case of Ulawun at least, appears to contain some volcanic ash. The summit areas of both volcanoes were reported to be free of vegetation, an indication of recent eruptive activity, whereas Bamus today is covered by vegetation. The prominent peak on the extreme left is Likuruanga volcano.

Source: Powell (1883, figure on p. 219).

Powell unfortunately misidentified Du Faur as an island, and repeated the likely error made by D’Entrecasteaux that Willaumez, Raoul and Gicquel were also islands, probably because he was too distant; although, Powell did add specifically to his map that ‘All the passages between these islands appear to be dangerous’. The islands are part of Willaumez Peninsula and Du Faur is an extinct volcano near the southern end of it and is part of New Britain. Powell also made the clearly exaggerated statement that at the western end of New Britain there were:

> innumerable volcanoes, small and large, all in violent eruption … there must have been some hundred or more all belching fire and smoke, indeed the land seemed all on fire … When night came on the sight was wonderful. Flames seemed to cover the mountainous point of land, and it would have been easy to read a book by the light; the air was full of fine ashes covering and making everything a light grey colour; indeed it

was difficult to breathe comfortably. Tupinier [sic; Ritter] Island was in eruption also, and the noise made by them all was like low continuous thunders.\textsuperscript{18}

Figure 22. The peaks in Wilfred Powell’s map are the volcanoes of Willaumez Peninsula and the Cape Hoskins area of the central-north coast of New Britain. Powell was mistaken in believing that most were islands separate from the mainland. He has used the French names of islands that were first recognised, probably falsely, by D’Entrecasteaux in 1793.


There is, however, only one active volcano at the western end of New Britain — Langila. Powell may have mistaken an active field of lava flows from Langila,
which as they flowed broke open in many places to reveal, at night, incandescent interiors. The lava flows also may locally have set fire to nearby vegetation, as commonly happens in such circumstances, even in the tropics. Powell also probably mistook Tupinier, or Sakar, which is an inactive volcano, for Ritter, the only active island volcano in the area.

The combined observations of Powell and Miklouho-Maclay in the second half of the 1870s provide some evidence for a possible ‘pulse’ or ‘time cluster’ of volcanic eruptions in Near Oceania at this time — that is, a period of volcanic activity when more volcanoes were in eruption than ‘normal’. Six volcanoes were definitely active between 1875 and 1878, and possibly three others, if the vapour plumes witnessed by Powell at Lolobau and Bamus are taken as evidence of recent eruptive activity, and if sluggish lava flows were still being emitted at Bagana when viewed in 1875.

**Table 1. Volcanoes in Eruption in Near Oceania from 1875 to 1878**

<table>
<thead>
<tr>
<th>Volcano</th>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bam</td>
<td>1877</td>
<td>Reported by Miklouho-Maclay to be in ‘full eruption’ and synchronous with activity at nearby Manam.</td>
</tr>
<tr>
<td>Manam</td>
<td>1877</td>
<td>The eruptive activity was described by Miklouho-Maclay.</td>
</tr>
<tr>
<td>Ritter</td>
<td>1878</td>
<td>Powell noted noisy eruptions but misidentified the volcano as Sakar.</td>
</tr>
<tr>
<td>Langila</td>
<td>1878</td>
<td>Powell gave a vivid but inaccurate description of eruptive activity.</td>
</tr>
<tr>
<td>Ulawun</td>
<td>1878</td>
<td>Powell observed an eruption and illustrated a dense, presumably ash-laden plume in a sketch.</td>
</tr>
<tr>
<td>Rabaul</td>
<td>1878</td>
<td>Near simultaneous eruptions at Tavurvur and Vulcan volcanoes.</td>
</tr>
<tr>
<td>Bagana</td>
<td>1875</td>
<td>The volcano was identified as ‘active’ by Schleinitz. Observed emissions were apparently of vapour only, although lava flows may well have been active, despite being emitted sluggishly.</td>
</tr>
<tr>
<td>Bamus</td>
<td>1878</td>
<td>Powell showed a plume rising from Bamus in the same sketch as the one showing Ulawun in eruption, but the plume does not appear to have been significantly ash-laden, if at all.</td>
</tr>
<tr>
<td>Lolobau</td>
<td>1878</td>
<td>Powell provided a sketch of Lolobau Island and a vapour plume rising from one of its volcanic centres.</td>
</tr>
</tbody>
</table>

The evidence for a late-1870s volcanic pulse, however, is not conclusive, bearing in mind the brevity and inaccuracy of some of the observations. Nevertheless, it is intriguing because two, much more obvious, volcanic pulses would be documented in the twentieth century, and possibly one in the 1890s. Furthermore, a more explicit connection between tectonic earthquakes in the early 1870s and eruptions later in the same decade would be proposed in the
1950s by volcanologist G.A.M. ‘Tony’ Taylor in attempting to generate an integrated theory for the origin of eruptions in the region, as well as support for his explanation for a volcanic ‘pulse’ in 1951–1957.

Volcanological Events Elsewhere

Hernsheim was well settled at Matupit Island by 1883. He enjoyed the evening view within Blanche Bay ‘when the green gradually changed to red and then to deep violet and every single tree stood out against the background in the clear air, [turning] this spot into a scene of greatest beauty, which I can never forget. These colour effects were particularly magnificent in the year 1883’.

Hernsheim was not alone in appreciating the unusual sunsets at this time, as they were being witnessed in many parts of the world. A major and catastrophic explosive eruption had taken place in August of that year at Krakatau Island in the Dutch East Indies, which had lofted ash and gas into the stratosphere, perhaps to heights of 40–50 kilometres. The main cause of the vivid sunsets was the presence of aerosols of sulphuric acid formed by the hydration of sulphur-dioxide gas from the volcano.

The eruption at Krakatau in 1883 is probably the most significant event in the history of volcanology in terms of the extent of the scientific reporting in the decades afterwards, and of its impact on understanding volcanic processes in general. More than 36,000 people were killed by the great tsunamis — some at least 30 metres high — that resulted from the eruption, and most of the original island disappeared, forming a caldera. The explosions were heard on the other side of the Indian Ocean and in central Australia, and worldwide barographs recorded the passage of the airwaves, some several times as the waves bounced back and forth around the world. News of the eruption spread throughout the world at an unprecedented speed by means of the growing telegraph system.

The 183 years between William Dampier’s 1700 voyage in the *Roebuck* and the 1883 Krakatau eruption mark extraordinary changes in European thought and society, including an understanding of volcanoes. The foundations of modern science had been laid down, the powers of Church and State were being challenged by thinkers of the Enlightenment in a new Age of Reason, and new technologies were beginning to transform lives of drudgery as a result of the Industrial Revolution. Beliefs that the Earth’s rocks had formed in an imagined world of mysterious catastrophes, supernatural cataclysms and biblical floods were disappearing.

20 See, especially, Verbeek (1885) and Simkin & Fiske (1983).
The foundations of the new science of geology were created largely in the late eighteenth century, led by the great Scottish scientist James Hutton, although many others — such as Hutton’s contemporary, the French geologist Nicholas Desmarest and the pioneering Danish anatomist Nicholas Steno — contributed fundamental geological insights.21 Charles Lyell in 1830 then produced his seminal *Principles of Geology*, which in turn set the stage for Charles Darwin’s revolutionary *On the Origin of Species*. Hutton was a principal proponent of the Plutonist school, which successfully undermined the beliefs of the Neptunists that rocks precipitated from oceans. The Plutonists, in contrast, concluded that the processes forming the rocks of previous times were the same as those seen operating today. Volcanic rocks were previously magmas formed when materials deep in the Earth were melted, and then erupted and cooled, and not by precipitation from ancient oceans or the combustion of flammable materials. Furthermore, the Earth had to be a great deal older than the age of 4,004 BC that had been calculated by Bishop James Ussher on the basis of scripture.

Europeans in the nineteenth century had also become more aware of the disastrous effects of the eruption at Vesuvius, which in 79 AD had destroyed the Roman towns of Pompeii and Herculaneum on the Bay of Naples, Italy. This increased awareness was largely because of the treasure-seeking that could be undertaken there by visitors, as well as the volcanological writings of Sir William Hamilton — who arrived in Naples in 1764 in time to observe eruptions at Vesuvius the following year — and the archaeological excavations and discoveries that were later undertaken at the buried towns. The 79 AD eruption was already well known to historians through letters written to the Roman historian Cornelius Tacitus by the Younger Pliny whose uncle, the Roman naval commander, the Elder Pliny, had perished in the eruption. One of the letters contained a description of the Vesuvius eruption cloud that volcanologists now recognise as *plinian*.

The Younger Pliny wrote that the cloud was ‘… like an umbrella pine, for it rose to a great height on a sort of trunk and then split off into branches …’.22 The high-rising ‘trunk’ is a narrow column of hot ash, pumice and gas that is propelled upwards from deep within the volcano by forceful jetting, as if from a powerful, vertically directed hosepipe. The column then ascends much further through ingestion of air and by thermal convective expansion, until winds — at different heights and with different velocities — capture it and form horizontal layers from which the solid material falls forming plinian deposits on the ground. Large plinian eruptions can reach many tens of kilometres into the stratosphere, such as at Krakatau in 1883. Plinian eruptions would also take place at Rabaul in 1937 and 1994.

21 See, for example, Geike (1905).
References


Powell, W., 1883. *Wanderings in a Wild Country; or, Three Years amongst the Cannibals of New Britain*. Sampson Low, Marston, Searle, & Rivington, London.


