



TRILEPIDEA

Newsletter of the New Zealand Plant Conservation Network

No. 190

September 2019

Deadline for next issue:
Friday 18 October 2019

SUBMIT AN ARTICLE TO THE NEWSLETTER

Contributions are welcome to the newsletter at any time. The closing date for articles for each issue is approximately the 15th of each month.

Articles may be edited and used in the newsletter and/or on the website news page.

The Network will publish almost any article about plants and plant conservation with a particular focus on the plant life of New Zealand and Oceania.

Please send news items or event information to events@nzpcn.org.nz

Postal address:
c/- 160 Wilton Road
Wilton
Wellington 6012
NEW ZEALAND

Taxonomy for Plant Conservation – Ruia mai i Rangiātea

A joint conference of the Australasian Systematic Botany Society
and the New Zealand Plant Conservation Network

24–28 November 2019, Wellington, New Zealand



Conference updates

Are you getting excited about this year's ASBS-NZPCN Joint Conference in Wellington later this year? It's certainly going to be a big one, with conference numbers now up to 180 (and counting!) representing both the New Zealand Plant Conservation Network (NZPCN) and the Australasian Systematic Botany Society (ASBS). Here are some updates from the past month of conference planning:

- **We have received about 80 abstracts** to present talks or posters at the conference. The scientific committee is now assessing all the abstracts and hopes to get back to everyone who submitted abstracts very soon about their acceptance. Useful hints and tips for preparing your talk or poster can be found on our website: [Guidelines for Presenters](#).
- Conference extras including [workshops](#), [field trips](#) and [dinner](#) are all going ahead as they have reached their minimum numbers. **You can still register for conference extras.**
- **There are quite a few other events happening** just before, during and after the conference, some science/botany related, some not (check them out!). Make sure you consider these events when planning your travel dates.
- This includes now **four public events associated with the conference** that we have helped co-plan for that week. See the links for details and to register/purchase tickets.
 1. Sunday 24 November, 9 am – 5 pm: [Wikipedia workshop](#) on threatened plants. *Free, but you need to register.*
 2. Monday 25 November, 6:30 pm: Friends of Te Papa [Public lecture](#): "Solander, Sparrman, and the Anthropocene - Saving "the Environment" on a Planet made Unstable by Humans. Speaker: Prof Sverker Sörlin. *Registration and payment required; conference attendees get discounted tickets.*
 3. Thursday 28 November, 6:30 pm: Panel discussion on the [The politics of collecting plants, from Banks and Solander to today](#). *Registration and payment required; conference attendees get discounted tickets.*
 4. Saturday–Sunday 30 November–1 December: Botany for Botanical Illustrators [workshop](#). *Registration and payment required; spaces are limited.*
- Our [silent auction](#) will be run during the first two days of the conference. It will certainly be interesting, potentially a lot of fun, and will hopefully generate a good amount of \$\$ for our research funds. We still need donations too! Contact Matt Ward if you'd like to donate something. mattward@gmail.com
- And don't forget our three fantastic [keynote speakers](#):

- ◆ Hon Eugenie Sage, Minister for Conservation, Minister for Land Information New Zealand and Associate Minister for the Environment
- ◆ Melanie Mark-Shadbolt, Kaihautū Chief Māori Advisor to the Ministry for the Environment, the Director Māori of NZ's Biological Heritage National Science Challenge and CEO of Te Tira Whakamātaki
- ◆ Kevin Thiele, founding Director of Taxonomy Australia, an organisation established to advocate and implement in Australia the recommendations of [Discovering biodiversity: A decadal plan for taxonomy and biosystematics in Australia and New Zealand 2018–2027](#).
- ◆ Feeling a fear of missing out? Haven't registered yet? Don't worry, it's not too late to [register](#). Standard registration fees now apply:
 - Society members* (NZPCN or ASBS): \$420
 - Non-members: \$525
 - Students, unwaged or retired: \$260
 - Single day: \$260

*New Zealand Department of Conservation (DOC) staff can register using the member's rate, as DOC is a corporate member of NZPCN

Book your travel and accommodation now

Wellington is a very popular destination for tourists and conferences alike, particularly at the time of year the conference will be held. Hotels are notorious for filling up fast, particularly in the CBD around Te Papa! If you are coming to the conference, we suggest you book your travel and accommodation now, if you haven't already done so. We have some suggestions on our [website](#) that may be useful to you.

Student support is available

ASBS and NZPCN are able to offer some financial support to their student-members to attend the conference.

- ASBS student-members who are presenting at this year's meeting can [get details from the ASBS website](#) [<http://www.asbs.org.au/asbs/student.html>], [download the application form](#) [<http://www.asbs.org.au/asbs/forms-files/student-assistance-web-form.doc>] and submit it to the Secretary at secretary.asbs@gmail.com at least four weeks prior to the conference.
- Applications for student support for NZPCN student-members who are presenting a talk or poster at the conference have now closed.

How to contact us

If you have any questions or think we can be of assistance, please don't hesitate to contact us on plants2019nz@gmail.com

Rewi Elliot and Heidi Meudt
on behalf of the 2019 Conference Organising Committee <https://systematics.ourplants.org/organising-committee/>

Sponsorship

A massive thank you to our sponsors:



Sponsorship opportunities are still available. Please see our [Sponsorship](https://systematics.ourplants.org/supporters/) [<https://systematics.ourplants.org/supporters/>] page or contact the organisers for more details.

The ongoing slide to extinction of the enigmatic Chatham Island linen flax (*Linum monogynum* var. *chathamicum*)

Peter J. de Lange (pdelange@unitec.ac.nz), School of Environmental & Animal Sciences, Unitec Institute of Technology, Auckland

Linum (Linaceae) is a genus of about 200 species found mostly in the northern hemisphere though it extends into the subtropics and has representatives on most of the major landmasses of the world. Universally known by the vernacular ‘flax’ some species, notably ‘linen flax’ *Linum usitatissimum* produce fibres that are used for the production of cordage and linen fabric; while the seeds are the source of linseed oil (Mabberly 2017). New Zealand has five species, of which only *Linum monogynum*, known to Maori as ‘rauhuia’ is indigenous and endemic. There are two varieties of rauhuia, *L. monogynum* var. *monogynum* (Fig. 1) which is widespread in the North, South and Stewart Islands (Webb et al. 1988), and var. *chathamicum* (Fig. 2, 3), which is endemic to the Chatham Islands (Cockayne 1902; de Lange et al. 2011).



Figure 1 (left). Rauhuia (*Linum monogynum* var. *monogynum*) as seen on the Otago coast. This is the white-flowered race found throughout the North, South and Stewart Islands. Photo: John Barkla, January 2015.

Figure 2 (centre). Chatham Island linen flax (*Linum monogynum* var. *chathamicum*), Te Whanga shoreline, Rekohu (Chatham Island) showing growth habit (December 2008).

Figure 3 (right). Chatham Island linen flax (*Linum monogynum* var. *chathamicum*), Te Whanga shoreline, Rekohu (Chatham Island) close up of flowers—which are ‘just’ faintly blue-tinged (December 2008).

Chatham Island linen flax (*Linum monogynum* var. *chathamicum*) is a small, sparingly branched shrubby plant, rarely exceeding 80 cm tall. The upper one-third to two-thirds of the whip-like, erect or floppy stems are covered in grey, spreading, entire, lanceolate leaves. At the apices of these stems, in spring through summer are borne clusters of 10–15 mm long tubular flowers, which when fully expanded are white with a bluish cast (Fig. 2, 3), though the buds just prior to flowering are distinctly coloured sky-blue. It was on account of the blue-tinged, or as Leonard Cockayne (Fig. 4) put it ‘broadly-striped or flaked with pale blue’ flowers that Cockayne (1902) described the Chatham Islands plant as a distinct endemic variety. The New Zealand plant, var. *monogynum* Cockayne noted has white flowers.

When preparing a checklist of the Chatham Island plants (de Lange et al. 2011) it was discovered that *Linum monogynum* var. *chathamicum* didn’t seem to have a common name. In the absence of one the name ‘Chatham Island linen flax’ was conjured up, and as an afterthought the Maori name ‘rauhuia’

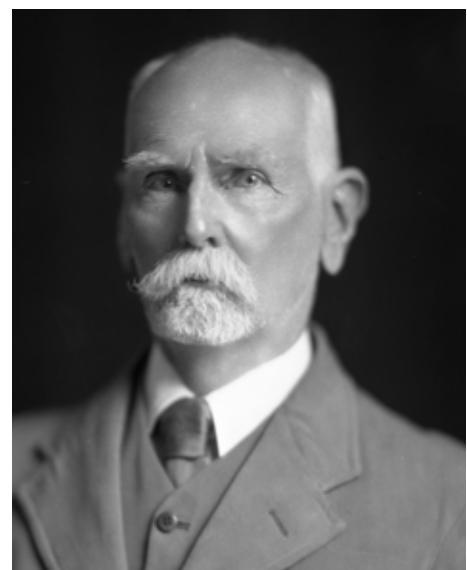


Fig. 4. Leonard Cockayne (1855–1934) the first scientist to describe the vegetation associations of the Chatham Islands, and the author of the Chatham Islands linen flax (*Linum monogynum* var. *chathamicum*).

added as an alternative, though I have never heard that name used on the Chatham Islands only in New Zealand, and even then, infrequently. The addition of ‘linen’ to ‘flax’ seemed necessary though as by itself ‘flax’ is potentially confusing especially as *Linum* have no semblance to, nor are they remotely related to the widespread flax (*Phormium tenax*) found throughout New Zealand, the Chathams and Norfolk Island. That plant, a member of the monocotyledonous Asphodelaceae, and known to Maori as harakeke and Moriori as harapepe, was in turn bestowed the name ‘flax’ by early European voyagers because when they saw the way Maori used its fibres for cordage, clothing and other items, they were reminded of the way the northern hemisphere linen flax (*Linum usitatissimum*) was used for the same purpose. So ‘Chatham Island linen flax’ seemed a ‘quick fix’ way out of this confusion, though I have since found in my discussion with islanders that this is not the case, confusion remains. So, from a Chatham Islands perspective, short of people learning the scientific name for the plant, I feel that someone on the islands needs to get creative and think up a more sensible common name for the plant.

Possibly though the lack of a vernacular name for *Linum monogynum* var. *chathamicum* reflects the fact that it may never have been a common plant on the Chatham Islands anyway—so ‘out of sight then, out of mind’ I suggest. On this issue of past abundance Cockayne (1902) though recording it as an associate of the vegetation of exposed limestone cliffs and rock outcrops throughout the islands gave no indication of its abundance at the time. Certainly, by the time I became familiar with this variety it was already regarded as seriously threatened. I well recollect a very long day spent with Amanda Baird, Ian Atkinson, Gillian Crowcroft and Richard Suggate during February 1996 traipsing over to Ocean Bay and then scouring up and down Te Moko Creek searching for a population reported ten years previously by the late David Given; only after much searching did we eventually find a single plant. That was all that was left then. We soon learned that as a rule, this seems to be the pattern, Chatham Island linen flax seems to be a very uncommon, biologically sparse member of the Chatham Islands flora. In fact the only places I have ever seen more than a handful of plants are on limestone bluffs along the coast of Te Whanga south of Airport Road, Rekohu / Wharekauri (Chatham Island), and on coastal cliffs just north of Waipaua Stream mouth, Rangahaute / Rangiora (Pitt Island).

A further impediment to our understanding of *Linum monogynum* var. *chathamicum* has been Cockayne’s original description of it. Cockayne never particularly cared for traditional taxonomy (Cockayne 1926; Thomson 2019; A.D. Thomson *in litt.*), and with respect to his descriptions of new plants from Chatham Islands (Cockayne 1902) he distinguished his new *Linum* variety using the bare minimum then acceptable, stating thus “petals broadly striped or flaked with pale blue. The type has white flowers”. This brief description has without any doubt been the cause of much taxonomic debate ever since. Here I provide a brief summary starting with Auckland Museum botanist Thomas Cheeseman (Fig. 5), who unusually for him, as he typically disregarded Cockayne’s taxonomic discoveries (much to Cockayne’s chagrin (Thomson 1990; A.D. Thomson *in litt.*)), accepted the variety. In doing so though he noted that it also occurred on the ‘mainland [sic] as well as on the Chatham Islands’ (Cheeseman 1925). Despite this uncharacteristic vote of support from Cockayne’s main taxonomic critic, the *Linum* was then not accepted by Harry Allan (Fig. 6), which is even more surprising as Allan was very much Cockayne’s protégé. Yet in his treatment of the indigenous *Linum* for his *Flora of New Zealand* (Allan 1961; p. 240) Allan considered var. *chathamicum* as a synonym of *L. monogynum*, further noting that he had ‘observed plants

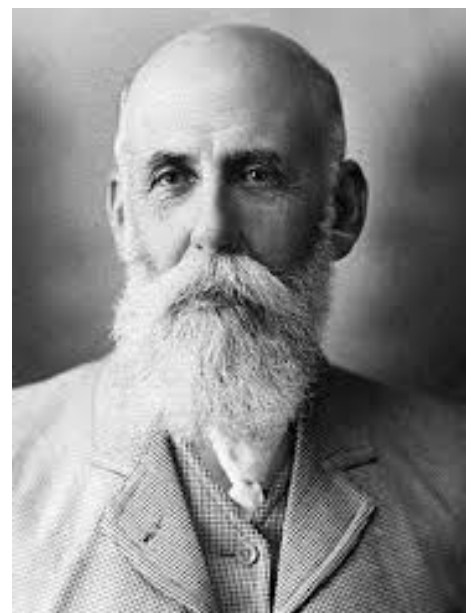


Figure 5. Thomas Cheeseman (1846–1923) the first director of the Auckland Museum and author of two treatments of the New Zealand Flora. A traditional and usually ‘cautious’ taxonomist Cheeseman did not accept many of Leonard Cockayne’s taxonomic contributions, a stance which in part contributed to Cockayne’s dislike of traditional taxonomy.

with variously blue-tinged flowers near Fielding and on the Wellington coast, but always with the introduced *L. marginale* [a name then widely used in New Zealand for the plant now referred to *L. bienne*] nearby'. This statement has the inference that hybridisation between *Linum monogynum* and bluish-flowered *L. bienne* might be the explanation for the bluish tinge described by Cockayne (1902) for the flowers of the Chatham plant. If so, it was rather speculative as hybridisation, between *Linum bienne*, with $2n = 30$ chromosomes, and *L. monogynum*, with $2n = 84$ chromosomes would be rather unlikely. If it did happen, then the resulting progeny would be sterile, because the hybrid would have $2n = 57$ chromosomes. Inferred hybridism or not I strongly suspect that the comment by Allan (1961) stemmed more from his understanding of the range of variation in *Linum monogynum* in New Zealand (it is a very variable species) and his lack of familiarity with the Chatham Island plants. Allan was also correct in that blue-tinged flowers are present in New Zealand populations of *Linum monogynum*. for example, I have seen them on Aorangi Island, in the Poor Knights group (de Lange & Cameron 1999). So, blue-tinged flowers are not a reliable way to separate out the two varieties.

Blue tinged flowers or not, the stance as to whether *Linum monogynum* var. *chathamicum* was a valid taxon has vacillated over the last three decades. For example, Given (1996) uncritically accepted the variety in his summary of the endemic plants of the Chatham Islands. Others regarding the extent of variation in *Linum monogynum* as a whole, felt the species needed a modern taxonomic revision. Until that was done, they preferred to treat var. *chathamicum* as a named unit within a morphologically variable *L. monogynum* (see de Lange et al. 1999; de Lange et al. 2004; de Lange et al 2009). Whatever its status though, on one thing all were agreed, the Chatham Islands plant was (and still is) seriously at risk of extinction.

This remained the situation until in 2010 a molecular study of the origins and divergence of the Chatham Island endemic plant flora (Heenan et al. 2010) discovered, on the basis of DNA sequence data obtained from the Internal Transcribed Spacer (ITS) region *Linum monogynum* var. *chathamicum* diverged by 0.7% from two New Zealand samples of *L. monogynum* var. *monogynum*. On this basis, at least for now, *L. monogynum* var. *chathamicum* has been cautiously reinstated (see de Lange & Rolfe 2010; de Lange et al. 2013; de Lange et al. 2017). There the matter still stands, as there has been no further advance on the taxonomic situation.

Meanwhile the conservation plight of *Linum monogynum* var. *chathamicum* seems to be going from bad to really bad. As far as I can tell there has not been a population census undertaken for the plant since 2008. So, what little is known about the conservation status of Chatham Island linen flax is now 11 years old. The most recent records I am aware of from the islands is of plants reported by botanists visiting Mang're / Mangere (2013) and Hokorereoro / Rangatira / South East Island (2015). At both locations there are only a 'handful' of plants. In September and November 2018, I searched for *Linum* at Blind Jim's, a well-known location for this plant where upwards of 50 plants grew on the limestone cliff tops at least since 1990.



Figure 6. Harry Allan (1882–1957) the first Director of the DSIR Botany Division and author of the first volume of 'The Flora of New Zealand' published posthumously in 1961. Allan was very much a student of Leonard Cockayne, usually following his taxonomic advice even after Cockayne's death.



Figure 7. *Linum* rust (*Melampsora lini*) infecting a cultivated plant of rauhuia (*Linum monogynum* var. *monogynum*) from Christchurch. Photo: Jerry A. Cooper, December 2005.

Worryingly my searches found none, and even more concerning is that I don't know why this is. The habitat is still there, nothing obvious has changed.

What may have tipped the balance though is the spread of an introduced rust, linum rust (*Melampsora lini*) (Fig. 7). This rust was first detected in New Zealand on *Linum monogynum* plants growing around Wellington in 1920 and 1921 (Cunningham 1924). The rust is believed to have naturally dispersed from Australia where it was first detected in 1889 as an accidental introduction associated with linen flax seed imported from Europe (McAlpine 1906). Intriguingly Cunningham (1924) recorded linum rust from both varieties of *Linum monogynum*, var. *chathamicum* and var. *monogynum*. The initial rust samples were collected from York Bay, by E.H. Atkinson, a keen gardener who lived there. So, I suspect but cannot prove that these *Linum* plants were cultivated (var. *chathamicum*, least ways in the strict sense. They had to be, as we have already shown it is a Chatham Island endemic so it is unlikely to have been naturally occurring around Wellington). Possibly Atkinson's *Linum monogynum* var. *chathamicum* had been given to him by Cockayne who by then resided in Wellington (Thomson 2019) and who as a keen gardener probably grew it.

Melampsora lini seriously impacts on *Linum monogynum* and is especially severe on var. *chathamicum*, plants of which soon succumb and die when infected by it. In New Zealand all attempts to cultivate Chatham Island linen flax have failed, plants always get the rust and once infected within a matter of months the afflicted plants die. Unfortunately, the same happens on the Chatham Islands where the Department of Conservation has tried to grow plants as part of an *ex-situ* conservation plan. Work which had to be abandoned about 2005 because of the constant outbreaks of rust killing all the plants. At that time the rust had not yet been reported from wild plants but by 2008 plants at Blind Jim's had it. That was also the last time I saw *Linum* there. Interestingly the sole Mang're / Mangere Island observation of *Linum monogynum* var. *chathamicum* posted on iNaturalist NZ by Department of Conservation Botanist Dr Catherine Beard (see <https://inaturalist.nz/observations/3634320>) depicts a plant also infected by *Melampsora lini* (Fig. 8).



Figure 8. *Linum* rust (*Melampsora lini*) infecting Chatham Island linen flax (*Linum monogynum* var. *chathamicum*), Mang're / Mangere Island. Photo: Catherine Beard, March 2013.

We are of course fully aware that the major upheavals of the Chatham Islands landscape over the last 150 or so years of farming and other ecosystem-changing land use activities has had a profound impact on the natural biota of the islands.

However, from a plant perspective, with the exception of the Chatham Island scurvy grasses (*Lepidium* spp.) and button daisy (*Leptinella featherstonii*), plants that are tied to the ornithocrophilous ecosystem (now only seen intact on the outer predator free islands and islets of the Chatham group) most Chatham Island endemic plants respond well to basic predator control and fencing. Only a few, such as Barkers tree koromiko (*Hebe* (*Veronica*) *barkeri*), rautini (*Brachyglottis huntii*) and Chatham Island toetoe (*Austroderia turbaria*) require hands on management. In the case of Chatham Island linen flax, it had hitherto been assumed it was simply a very uncommon plant of secure cliff habitats. If linum rust is truly the cause of the loss of plants at Blind Jim's and elsewhere then this needs urgent investigation, especially as there is no *ex-situ* reservoir for this plant.

Further research into the decline of this plant is needed. In the meantime, reporting occurrences, and ideally the number of plants seen of *Linum monogynum* var. *chathamicum* to the Department of Conservation at their Te One Office will help researchers to gain a better appreciation of what is currently happening in the wild.

Acknowledgements

I would like to thank the late Dr Andy (Andrew) Thomson for his insightful and voluminous correspondence about Leonard Cockayne and in particular, his honesty in answering my questions about Cockayne's taxonomic contributions and relationships with leading New Zealand taxonomists of that time. I also thank Amanda Baird for introducing me to *Linum monogynum* var. *chathamicum*, Bridget Gibb for arguing about the need to do more to prevent its extinction, and to Gillian Crowcroft, Richard Suggate and the late Ian Atkinson for company in the field during my first visit to the islands in 1996. Finally, a big thank you to Dr(s) Jerry Cooper and Eric McKenzie for answering my questions about linum rust (*Melampsora lini*); Jerry also for use of his image of *Melampsora lini*, John Barkla for permission to use his *Linum monogynum* var. *monogynum* image, and Dr Catherine Beard for allowing me to use her image of rust-infected *Linum monogynum* var. *chathamicum* for this article.

References

- Allan, H.H. 1961: *Flora of New Zealand. Vol. I.* Government Printer, Wellington.
- Cheeseman, T.F. 1925. *Manual of the New Zealand flora.* 2nd ed. Wellington, Government Printer.
- Cockayne, L. 1926: Donald Petrie 1846–1925. *Transactions and Proceedings of the Royal Society of New Zealand Institute* 56: 8–10.
- Cunningham, G.H. 1924: The Uredinales, or Rust-fungi, of New Zealand: Supplement to Part 1; and Part 2. *Transactions and Proceedings of the Royal Society of New Zealand* 55: 1–58.
- de Lange, P.J.; Rolfe, J.R. 2010: *New Zealand Indigenous Vascular Plant Checklist.* Wellington, New Zealand Plant Conservation Network.
- de Lange, P.J.; Heenan, P.B.; Rolfe, J.R. 2011: *Checklist of vascular plants recorded from the Chatham Island Islands.* Department of Conservation, Wellington. 57pp.
- de Lange, P. J.; Heenan, P. B.; Given, D. R.; Norton, D.A.; Ogle, C. C.; Johnson, P. N.; Cameron, E. K. 1999: Threatened and uncommon plants of New Zealand. *New Zealand Journal of Botany* 37: 603–628.
- de Lange, P.J.; Norton, D.A.; Heenan, P.B.; Courtney, S.P.; Molloy, B.P.J.; Ogle, C.C.; Rance, B.D.; Johnson, P.N.; Hitchmough, R. 2004: Threatened and uncommon plants of New Zealand. *New Zealand Journal of Botany* 42: 45–76.
- de Lange, P.J.; Norton, D.A.; Courtney, S.P.; Heenan, P.B.; Barkla, J.W.; Cameron, E.K.; Hitchmough, R.; Townsend, A.J. 2009: Threatened and uncommon plants of New Zealand (2008 revision). *New Zealand Journal of Botany* 47: 61–96.
- de Lange, P.J.; Rolfe, J.R.; Champion, P.D.; Courtney, S.P.; Heenan, P.B.; Barkla, J.W.; Cameron, E.K.; Norton, D.A.; Hitchmough, R.A. 2013: Conservation status of New Zealand indigenous vascular plants, 2012. *New Zealand Threat Classification Series* 3: 1–70.
- de Lange, P.J.; Rolfe, J.R.; Barkla, J.W.; Courtney, S.P.; Champion, P.D.; Perrie, L.R.; Beadel, S.M.; Ford, K.A.; Breitwieser, I.; Schönberger, I.; Hindmarsh-Walls, R.; Heenan, P.B.; Ladley, K. 2018: Conservation status of New Zealand indigenous vascular plants. 2017. *New Zealand Threat Classification Series* 22: 1–82.
- Given, D. R. 1996: Flora. In: Anon. ed. *The Chatham Islands, heritage and conservation.* Christchurch, Canterbury University Press. Pp. 80–92.
- Heenan, P.B.; Mitchell, A.D.; de Lange, P.J.; Keeling, J.; Paterson, A.M. 2010: Late Cenozoic origin and diversification of Chatham Islands endemic plant species revealed by analyses of DNA sequence data. *New Zealand Journal of Botany* 48: 83–136.
- Mabberly, D.J. 2017: *Mabberly's Plant Book.* Cambridge University Press, Cambridge.
- McAlpine, D. 1906: *The Rusts of Australia: Their Structure, Nature, and Classification.* Agriculture Department, Victoria. 1–349.
- Thomson, A.D. 1990: A comparison of the approach to taxonomic botany by T.F. Cheeseman and L. Cockayne. in P. Short (ed.) *History of systematic botany in Australasia – Proceedings of a symposium held at the University of Melbourne, 25–27 May 1988.* Australian Systematic Botany Society Inc. Pp. 235–238.
- Thomson, A.D. 2019: 'Cockayne, Leonard', *Dictionary of New Zealand Biography*, first published in 1996. Te Ara – the Encyclopedia of New Zealand, <https://teara.govt.nz/en/biographies/3c25/cockayne-leonard> (accessed 8 September 2019)

The unexpected near demise of *Caloplaca maculata* (Teloschistaceae; lichenized mycobiota) from the Chatham Islands

Peter J. de Lange (pdelange@unitec.ac.nz), School of Environmental & Animal Sciences, Unitec Institute of Technology, Auckland

The Chatham Islands group are the eastern-most expression of the New Zealand archipelago. Opinions vary as to the age of the current islands; geological evidence suggests that the current surface expression is anywhere from 2–3 million years old (Holt 2008) but the DNA evidence, based on molecular clock inferences indicates that some of the island groups biota is much older than this (Heenan et al. 2010). Some biologists, favour an island hopping theory, namely that there has always been land in the approximate location of the current islands for at least six million years, meaning that past islands as they eroded away have been augmented or replaced by new land resulting from fresh uplift and / or ongoing volcanic activity. On this issue though the jury is still out.

What is clear is that the isolation of the Chathams group has resulted in the usual features of remote island biota, low species diversity coupled with high endemism. For example, of the 460 or so plants regarded as indigenous to the islands, over 40 are endemic, including, at least for now, one monotypic genus, *Myosotidium*, known to the world as the ‘Chatham Island forget-me-not’ (de Lange et al. 2011). That species, along with the endemic black robin (*Petroica traversi*) are widely regarded as the quintessential international icons of Chatham Island biodiversity.

While our knowledge of the macro-fauna (birds, fish and reptiles especially) and flora (clubmosses, ferns, flowering plants, and bryophytes (hornworts, liverworts and mosses) is fairly good, little is known about the islands fungi (mycobiota) diversity. Literally a handful of fungi (five taxa) have been described as endemic to the island (de Lange 2012), and one lichenized mycobiont, *Lecanora kohu* described in 2017 ‘maybe’ endemic (Printzen et al. 2017).

While a comprehensive account of the mycobiota of the Chathams is lacking, since 2007, I have been collating a checklist of the lichens of the island group. In this endeavour I was encouraged by the late Dr David Galloway (1942–2014), who was in effect the ‘Father of New Zealand Lichenology’ and his friend, Dr Peter Johnson, who collected Chatham lichens for David during his time on the Chatham Island Conservation Board, and then as a tour group leader. One of Peter’s early Chatham lichen discoveries, *Caloplaca maculata* (Fig. 1.) was made from the main island, Rekohu (Chatham) ‘just W[est] of Waitangi wharf, Ellice



Figure 1. *Caloplaca maculata* as seen at the type locality near Ellice Point in December 2008. Here the bright orange apothecia and white, cracked thallus diagnostic of the species can easily be seen.



Figure 2. The type locality of *Caloplaca maculata* as seen in December 2008. Note the associated cover of Chatham Island ice-plant (*Disphyma papillatum*).

Point, on coastal rock, on [a] ledge of tuff on headland' (Galloway 2004). At the time it was described David cautiously suggested *C. maculata* might be endemic to the islands.

Keen to see this lichen and to ascertain its conservation status, I, accompanied by Department of Conservation officer Ben Horne, visited the type locality near Ellice Point on 2 December 2008 (Fig. 2). The lichen was easy to find as it is a distinctive species with a cracked white thallus and orange apothecia (dish-shaped fruiting bodies) located in a remarkably well defined, singular habitat. Namely, a shelf of palagonitic tuffaceous rock known as the 'Red Bluff tuff', which is about 3 m above



Figure 3. Palagonitic tuff from the 'Red Bluff Tuff' formation supporting colonies of *Caloplaca maculata* (December 2008).

sea level and which juts out from a shore platform beneath a large sea cliff. There, within an estimated area of 6m² of more or less exposed palagonitic tuff that forms a narrow shelf we found that *Caloplaca maculata* was abundant (Fig. 3). Sparse associates included a range of buelloid lichens (*Amandinea*, *Buellia* spp.), other *Caloplaca* species and *Dufourea ligulata*. Above the exposed tuff is a colluvial apron derived from erosion of the cliff face which is comprised of friable, loose tephra sequences, that continually erode and slide down to partially envelope the tuff shelf. In 2008 that apron was densely covered in a thick turf of Chatham Island ice plant (*Disphyma papillatum*), *Dichondra brevifolia*, with patches of Chatham Island sow thistle (*Sonchus (Embergeria) grandifolius*), Chatham Island geranium (*Geranium traversii*) and tussocks of *Festuca coxii*. As noted, the habitat is 'remarkably singular' by which I mean I could not find comparable habitat along the coastline for about one kilometre either way but being pressed for time I didn't do then, and still haven't done since, a more comprehensive survey. From a conservation view point, based on the then known extent of the lichen population, well below one hectare, the species easily qualified as 'Threatened / Nationally Critical' (Townsend et al. 2008) and it was initially rated as such when the New Zealand Lichen Threat Listing Panel met in November 2009 to undertake New Zealand's first ever lichen threat assessment (de Lange et al. 2012). However, in an interesting twist in early 2012 *Caloplaca* expert Dr Ulrik Søchting from Copenhagen, Denmark, accompanied by Dunedin-based lichenologist Dr Allison Knight discovered *C. maculata* on a coastal rock outcrop at the mouth of Akatore River, south of Dunedin, South Island (de Lange 2012). This late discovery, bolstered by the assumption that the Chatham and Akatore locations of *Caloplaca maculata* were 'secure' prompted the lichen panel to change the threat assessment for this species to 'At Risk / Naturally Uncommon' qualified DP [Data Poor], RR [Range Restricted], Sp [Sparse] (de Lange et al. 2012). That is where the story stopped until 15 November 2018, nearly 10 years after I had last seen *Caloplaca maculata* at Ellice Point, Rekohu (Chatham Island). On that day, having just flown in to the island for a Conservation Board meeting the next day, I decided I would visit the *Caloplaca* site to see how it was faring. What I saw shocked me.

The type locality (Fig. 4) was still recognisable on the basis of the distinctive geology, and that the colluvial apron was still covered in the thick turf and coastal herb field of Chatham Island endemics that I had noted in 2008. However, the lichen had declined by an estimated 98%. Why I am still not clear but I speculate that the decline may have been caused by storm damage / wave wash, as the location is only 3 metres above a very active and exposed coastline. When this decline happened and whether it is still ongoing are critical issues for which I don't have answers. Irrespective, the situation, at least based on what is known of this species on the Chatham Islands, is now serious. As such, I made another visit to the site on 5 May 2019. The situation was even worse. The previous dense coastal turf



Figure 4. Two views of the *Caloplaca maculata* type locality as seen in November 2018. The vegetation seen in 2008 is still intact but the rock exposures previously coated in *Caloplaca* are now virtually devoid of any lichen growth.

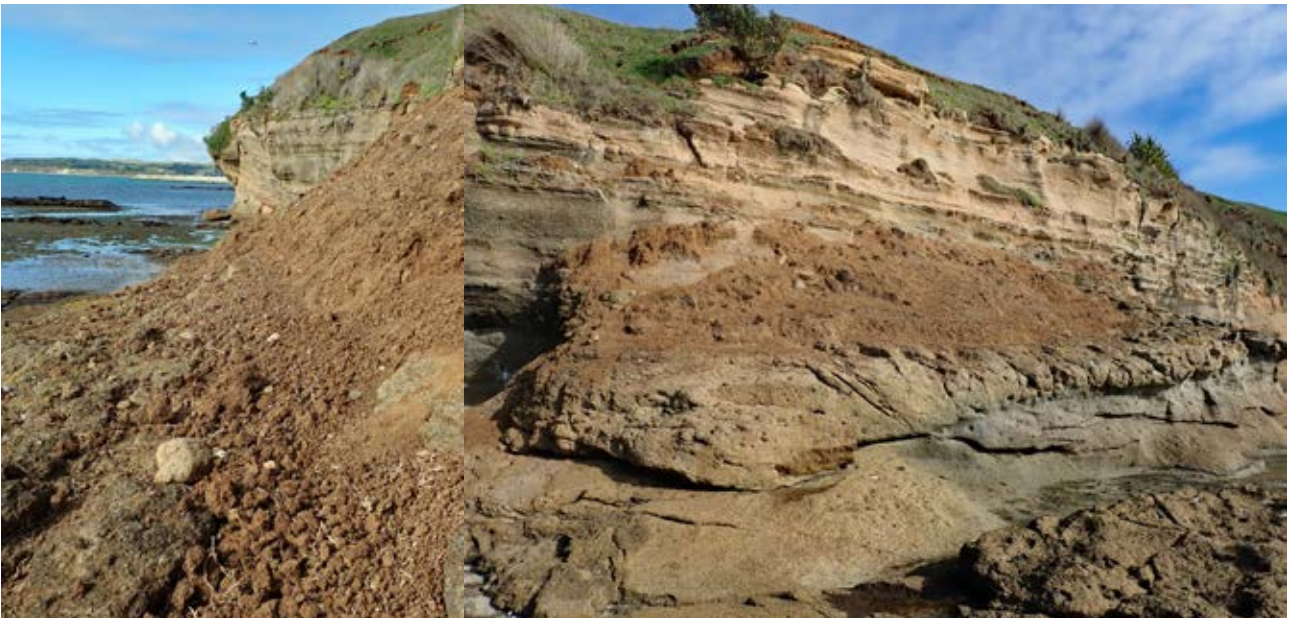


Fig. 5. Two views of the *Caloplaca maculata* type locality as seen in May 2019. The vegetation covering the loose colluvium accumulated on the rock ledge supporting the lichen has been completely destroyed

and herb field that kept the colluvium above the lichen habitat in check had completely vanished (Fig. 5). The reason I assume, was that one or more sheep (*Ovis aries*) had fallen off the unfenced cliff tops above the site, and being trapped on the ledge forced to eat every scrap of vegetation—whether the animal (animals) were rescued or eventually died I don't know, what I do know is that during this enforced entrapment the entire ledge was drowned in an avalanche of sheep droppings. Patient searching found two patches of *Caloplaca maculata*, the largest of which was 15 mm diameter (Fig. 6). Based on what we know of this lichen it is now nearly extinct on the Chatham Islands.

As a post-script to that, during a week-long August 2019 field trip to Rekohu (Chatham Island) with the University of Waikato and Unitec Institute of Technology, School of Environment & Animal Sciences, I made another visit to the *Caloplaca* type locality (Fig. 7). Mercifully the situation had not changed since May 2019, patient searching found the same two lichen patches. Regeneration of the coastal turf and herb field had not as yet commenced.

These discoveries highlight a range of issues. Obviously, the near extinction of *Caloplaca maculata* on Rekohu (Chatham Island) remained unknown, until a series of unplanned for events came into play. Namely I, who knew the lichen, was appointed to the Chatham Island Conservation Board in July 2018, and in November of that year I had the time to visit the type locality. Prior to November last year it would seem that nobody who knew the lichen existed had done so, or if they had, reported on its status. That this happened should not surprise people. Very few people in New Zealand proper, let-alone the Chatham Islands, know how to identify lichens. Further, the discovery came too late for the current threat assessment of New Zealand lichens which was completed in August 2018, and where the previous threat assessment of *Caloplaca maculata* ('At Risk / Naturally' DP, RR, Sp) was confirmed in the absence of any more recent information than the 2008 assessment (de Lange et al. 2018). This highlights the importance of obtaining trend and population data; data that one could argue should have been obtained by monitoring. Again, it is easy to blame those responsible for managing New Zealand indigenous biodiversity but who honestly has ever conducted a species-specific long-term lichen monitoring programme in this country and published on it?



Fig. 6. One of two colonies of *Caloplaca maculata* left at the type locality. Note the deeply cracked and weathered thallus and malformed apothecia as seen in May 2019 (cf. Fig. 1 which shows a thriving colony seen in December 2008).



Fig. 7. *Caloplaca maculata* type locality as seen in August 2019. No change for the worse but no change for the better either.

This story also highlights the ongoing problem of providing accurate threat assessments for cryptic taxa. Just focusing on lichens, beyond the obvious question of how do you define an individual, the lack of population and trend data is a serious impediment to accurate threat assessments. This in part explains why just 16 (0.7%) New Zealand lichens out of a possible 2026 have been assessed as 'Threatened' and why 1108 (54%) of our lichen mycobiota remains assessed as 'Data Deficient'. Critically if one looks at the 16 'Threatened' lichens, only one *Ramalina pollinaria* is not qualified 'Dp' [Data Poor] which means that the

panel has some population trend data on which to base its claim of 'Threatened'. In this case *Ramalina pollinaria* does seem to be a very uncommon lichen, known (to the best of New Zealand lichenologists abilities) from just two sites, one in serious, though still only opportunistically monitored, decline.

On the positive, two threat assessments for New Zealand lichens have now been completed (de Lange et al. 2012; de Lange et al. 2018). These lists provide a reference point for conservation effort and research, as well as the best statement to the world of the extent of our nations lichen diversity. That we can do better is obvious but it is pleasing to see more people taking note of lichens and actively trying to put names on what they see. This is a critical step toward initiating targeted research into

lichen ecology, their use as bioindicators, economic and cultural values and designing realistic conservation programmes.

However, for *Caloplaca maculata*, least ways on the Chatham Islands, all we can do is hope that further populations will be found, and that the one at Ellice Point recovers. In favour of further discoveries is that the substrate the lichen occupies is widespread, though much of it is inaccessible without a boat, a kind tide or without abseiling. So, we really don't know if the Ellice Point site is the only Chatham Island occurrence. I doubt it. Because, with few exceptions, Chatham Island endemic plants if the habitat is present, will be there; they have also proved to be remarkable resilient. If sites are fenced and adequate possum and weed control is undertaken, they tend to thrive. While lichens are not plants the same situation seems to apply if our experience of *Lecanora kohu*, the other tentative lichen endemic, is anything to go by. That species was initially known from two specimens collected in 2015 from Hokoreero / Rangatira / South East Island (Printzen et al. 2017) but since 2018 it has been found in a further seven locations on Rekohu (Chatham Island) at all of which it is locally common. Hopefully, someone will find the same good news for *Caloplaca maculata* on the islands and perhaps also in New Zealand.

References

- de Lange, P.J. 2012: [Sole Chatham Islands endemic lichen discovered on south Otago Coastline](#) – Natural Heritage. Chatham Islands, New Zealand. <https://chathams.co.nz/> (website accessed: 4 September 2019)
- de Lange, P.J.; Heenan, P.B.; Rolfe, J.R. 2011: Checklist of vascular plants recorded from the Chatham Island Islands. Department of Conservation, Wellington. 57pp.
- de Lange, P.J.; Galloway, D.J.; Blanchon, D.J.; Knight, A.; Rolfe, J.R.; Crowcroft, G.M.; Hitchmough, R. 2012: Conservation status of New Zealand lichens. *New Zealand Journal of Botany* 50: 303–363.
- de Lange, P.J.; Blanchon, D.J.; Knight, A.; Elix, J.; Lücking, R.; Frogley, K.M.; Harris, A.; Cooper, J.A.; Rolfe, J.R. 2018: Conservation status of New Zealand lichens and lichenicolous fungi, 2018. *New Zealand Threat Classification Series* 27: 1–64.
- Galloway, D.J. 2004: New lichen taxa and names in the New Zealand mycobiota. *New Zealand Journal of Botany* 42: 105–120.
- Heenan, P.B.; Mitchell, A.D.; de Lange, P.J.; Keeling, J.; Paterson, A.M. 2010: Late Cenozoic origin and diversification of Chatham Islands endemic plant species revealed by analyses of DNA sequence data. *New Zealand Journal of Botany* 48: 83–136.
- Holt, K.A. 2008: The Quaternary History of Chatham Island, New Zealand. Unpublished PhD. Massey University, New Zealand. 243p.
- Printzen, C.; Blanchon, D.J.; Fryday, A.M.; de Lange, P.J.; Houston, D.M.; Rolfe, J.R. 2017: *Lecanora kohu*, a new species of Lecanora (Lichenized Ascomycota: Lecanoraceae) from the Chatham Islands, New Zealand. Submitted: *New Zealand Journal of Botany* 55: 439–451.
- Townsend, A.J.; de Lange, P.J.; Norton, D.A.; Molloy, J.; Miskelly, C.; Duffy, C. 2008: The New Zealand Threat Classification System manual. Wellington, Department of Conservation.

UPCOMING EVENTS

If you have events or news that you would like publicised via this newsletter please email the Network (events@nzpcn.org.nz).

Botanic Gardens Australia New Zealand (BGANZ)

9th Congress: Te Papa (Wellington). 20–23 October 2019

Plants from the past – Plants for the future.

<https://www.confer.nz/bganz2019/>

This conference will explore the role of Botanic Gardens in science communication & story-telling, plant conservation, managing collections and displaying plants. Join us—or submit an abstract to contribute your ideas. Botanic Gardens Australia and New Zealand (BGANZ) is the peak body representing all botanic gardens in Australia and New Zealand. BGANZ promotes the interests and activities of all Australian and New Zealand botanic gardens through its 140 member gardens, enhancing the state of botanic gardens internationally. The 9th BGANZ Congress will be attended by over 20 Directors, General Managers and Presidents of botanic gardens from Australia and New Zealand. More than 50 botanic gardens are expected to attend.

More information: <https://www.confer.nz/bganz2019/>

Auckland Botanical Society

Meeting: Wednesday 2 October, 7.30pm. **Speaker:** Ewen Cameron. **Topic:** Flora and fauna of Costa Rica based on a four week visit.

Field Trip: Saturday 19 October to QE II covenanted Page property, Hoteo catchment. **Meet:** 10.00am at 213 Wayby Station Road.

Leader: Janeen Collings, ph. 022 410 5471.

Waikato Botanical Society

Field Trip: Saturday 12 October (combined with Auckland Botanical Society) to Hapuakohe. **Meet:** 9.00am at Hoe-O-Tainui Hall, corner of Mangawara and Tahuna Roads. **Bring:** Clean sturdy boots and enough food and water for an all day trip.

Leader: Kerry Jones, email km8j1s@gmail.com, ph. 07 855 9700 or 027 747 0733.

Meeting: Wednesday 21 October at 6.00pm. **Speakers:** Dr Kiri Joy Wallace and Sarah Busbridge. **Topic:** A Forest on our Doorstep: Restoring Aotearoa.

Rotorua Botanical Society

Field Trip: Saturday/Sunday 5-6 October to Whangapoua, Coromandel QE II Covenant.

Leaders: Graeme Jane and Gael Donaghy, email: gtjane@kinect.co.nz and Meg Graeme. Contact the leaders for further details.

Field Trip: Saturday 12 October to Okareka Mistletoe Restoration Project (Weed control/plant releasing work day). **Meet:** 8.45am at the corner of Summit and Loop Roads, Okareka. **Grade:** Medium/Hard, although activities for all ages and abilities will be provided.

Leader: Paul Cashmore, email pcashmore@doc.govt.nz, ph. 07 349 7432 (wk) or 027 650 7264.

Field Trip: Sunday 3 November to Toatoa Scenic Reserve, Motu Road. **Meet:** 9.00am at the Opotiki I-site/DOC Office. **Grade:** Medium.

Leader: Mike Butcher, email mikebutchernz@xtra.co.nz, ph. 07 315 7160 or 027 455 5610.

Wellington Botanical Society

Field Trip: Saturday 5 October to Waterfall Road, Raumati South.
Meet: Catch the 8.44am Kapiti line train from Wellington to Paekakariki Station. Car pool at the Paekakariki Station at 9.30am to drive to the site.

Leader: Alison Lane,
ph. 022 309 4558.

Meeting: Monday 21 October – Research and Student Presentations. **1.** Katherine de Silva – Temporal Development and Regeneration Dynamics of Restored Urban Forests. **2.** Fabio Mologni – Hidden invasion dynamics of exotic plants on islands. **3.** Ganges Zi Yang, Lim – Signal Honesty in Bird-Plant Interactions – The Role of Plant Signals in Avian Foraging.

Venue: Lecture Theatre M101, ground floor Murphy Building, west side of Kelburn Parade.

Field Trip: Saturday 2 November to Waipango Stream, Mangaroa, Whitemans Valley. **Meet:** Catch the 8.35am Hutt line train from Wellington to Wallaceville Station. Meet at the Wallaceville Station at 9.30am to carpool to the site. **Bring:** Sturdy footwear, warm clothes and a raincoat.

Leader: Owen Spearpoint,
ph. 027 285 8083 or 04 562 8780.

Nelson Botanical Society

Field Trip: Sunday 20 October to Inches Bush, Wairoa Valley.
Meet: 8.00am at Cathedral steps or 8.25am at Brightwater Motor Inn.

Leader: Shannel Courtney,
email: scourtney@doc.govt.nz,
ph. 027 284 7337. Please contact Shannel in advance if you intend to participate.

Meeting: Monday 21 October at 7.30pm. **Speaker:** Dr Allison Knight. **Topic:** Sexy lichens from urban to alpine.

Venue: Jaycees Room, Founders Park.

Canterbury Botanical Society

Meeting: Monday 7 October at 7.30pm. **Speaker:** Samarth. **Topic:** Research into the molecular drivers for masting.

Venue: Upper Riccarton Library community meeting room, 71 Main South Road, Riccarton.

Field Trip: Saturday 12 October to Long Bay Scenic Reserve, Banks Peninsula. **Meet:** 8.30am at the Halswell Bowling Green carpark, 301 Halswell Road for car pooling. **Grade:** Medium/Difficult. **Bring:** Lunch, drink, warm clothes, hat, raincoat and sturdy footwear. Cost: \$20.00 for fuel reimbursement.

Contact: Alice Shanks,
email alice@caverock.net.nz,
ph. 027 366 1246.
Please contact Alice in advance if you intend to participate.

Meeting: Monday 4 November at 7.30pm. **Speaker:** Paul Maurice. **Topic:** The flora of the Silk Road, in the Tien Shan mountains of Central Asia.

Venue: Upper Riccarton Library community meeting room, 71 Main South Road, Riccarton.

Botanical Society of Otago

Meeting: Wednesday 9 October at 5.20pm – Speaker Wayne Everson. **Topic:** Botanical art.

Venue: Room 215, 2nd Floor, Zoology Benham Building, 346 Great King Street.

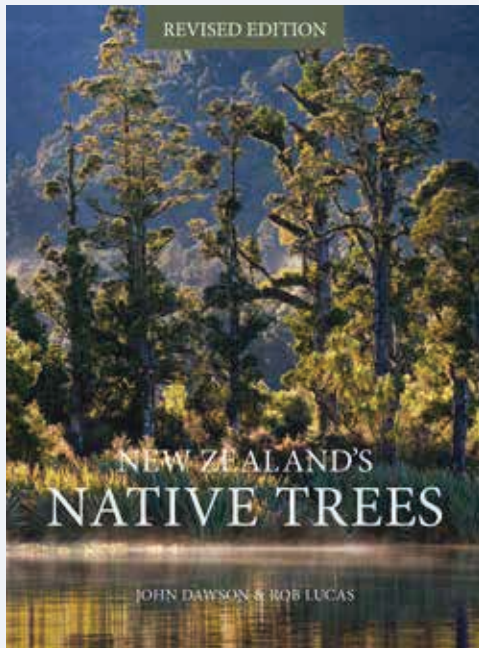
Weekend Field Trip: Saturday/Sunday 19-20 October to the northern Catlins.

Contact: John Barkla, email: jbarkla@doc.govt.nz, ph. 03 476 3686 by Monday 14 October if you intend to participate.

Field Trip: Saturday 2 November to Andersons Lagoon. **Meet:** 8.30am at the Botany Department carpark.

Contact: John Steel, email john.steel@otago.ac.nz.

Special Offer 20% Discount For NZPCN Members



New Zealand's Native Trees

John Dawson & Rob Lucas

A complete revision of the best-selling, award-winning landmark book on New Zealand's native trees.

Special price \$104.00

Normally \$130.00

John Dawson & Rob Lucas

310 x 229 mm, 688 pp

Hardback with dustjacket, colour throughout

Published: October 2019



Fight for the Forests

Paul Bensemann

The remarkable and inspiring story of how New Zealand's native forests were saved between 1960 and 2000.

Special price \$55.99

Retail \$69.99

Paul Bensemann

265 x 215 mm, 300 pp

Hardback with dustjacket, colour throughout

Published: November 2018

To receive 20% discount and free delivery in NZ, order online at pottonandburton.co.nz and use the coupon code **NZPCN19** at the shopping cart. Offer ends 20 December 2019.

