

| Islet:                | A  | B | C | D | E | F | G | H | J | K | L   | Total |
|-----------------------|----|---|---|---|---|---|---|---|---|---|-----|-------|
| kingfisher/kotare     | x  |   |   |   |   |   | x |   |   |   | xx? | 3     |
| welcome swallow       | xx |   |   |   |   |   |   |   |   |   |     | 1     |
| silveryeye/tauhou     | x  | x |   |   |   |   |   |   |   |   | x   | 3     |
| grey warbler/riroriro | x  |   |   |   |   |   |   |   |   | x | x   | 3     |
| blackbird *           | x  |   |   |   |   |   |   |   |   |   | x   | 2     |
| tui                   | x  |   |   |   |   |   |   |   |   |   |     | 1     |
| bellbird/korimako     | x  | x |   |   |   |   |   |   |   |   |     | 2     |
| house sparrow *       | x  |   |   |   |   | x |   |   |   |   | x   | 3     |
| chaffinch *           |    |   |   |   |   |   |   |   |   |   | x   | 1     |
| goldfinch *           |    |   |   |   |   |   |   |   |   |   | x   | 1     |
| starling *            | x  | x |   |   |   |   |   |   |   |   |     | 2     |

## Lucy Cranwell's survey of the Rukuhia and Moanatuatua peat bogs, Waikato

Rhys Gardner

### Introduction

In 1935 Auckland Museum's dynamic young botanist Lucy May Cranwell (1907–2000) was in Sweden, learning the new science of palynology from leader in the field Lennart von Post. For six months (a Stockholm winter) they worked together on peat samples collected in Otago and Fiordland by Swedish geologist Carl Caldenius; the result, a classic article on post-Pleistocene vegetation history (Cranwell & von Post 1936). Our first peat and pollen expert, Lucy Cranwell specialized in Southern Hemisphere palynology for the rest of her long life.

That story is well-known (Moore 1986; Cameron 2000). A less familiar episode in her career is examined here, the survey she made in 1934 of two Waikato peat bogs. I am not the only person to suspect that her next year's move into palynology was partly brought about by what she had seen in those places (Moore 1986: 30). Also, at the article's end, some additions and corrections are made to what has been written about the first decade of Lucy Cranwell's botanical work (Notes 1–6).

### The Waikato survey

In the early 1930s the Soil Survey Branch of New Zealand's DSIR was looking at several places in the country whose productivity might be improved by a more scientific approach to soil quality. One of these, "a part of Waipa County", lay between the Waipa and Waikato Rivers south-west of Hamilton. Much of it had already been cleared for pasture but approximately a fifth was still covered by two restiad-dominated bogs, Rukuhia and Moanatuatua (generally called "swamps" at this time). Parts of

them had been cleared and drained, and in the numerous deep ditches and on the bog margins the vegetation of ancient times could be seen.

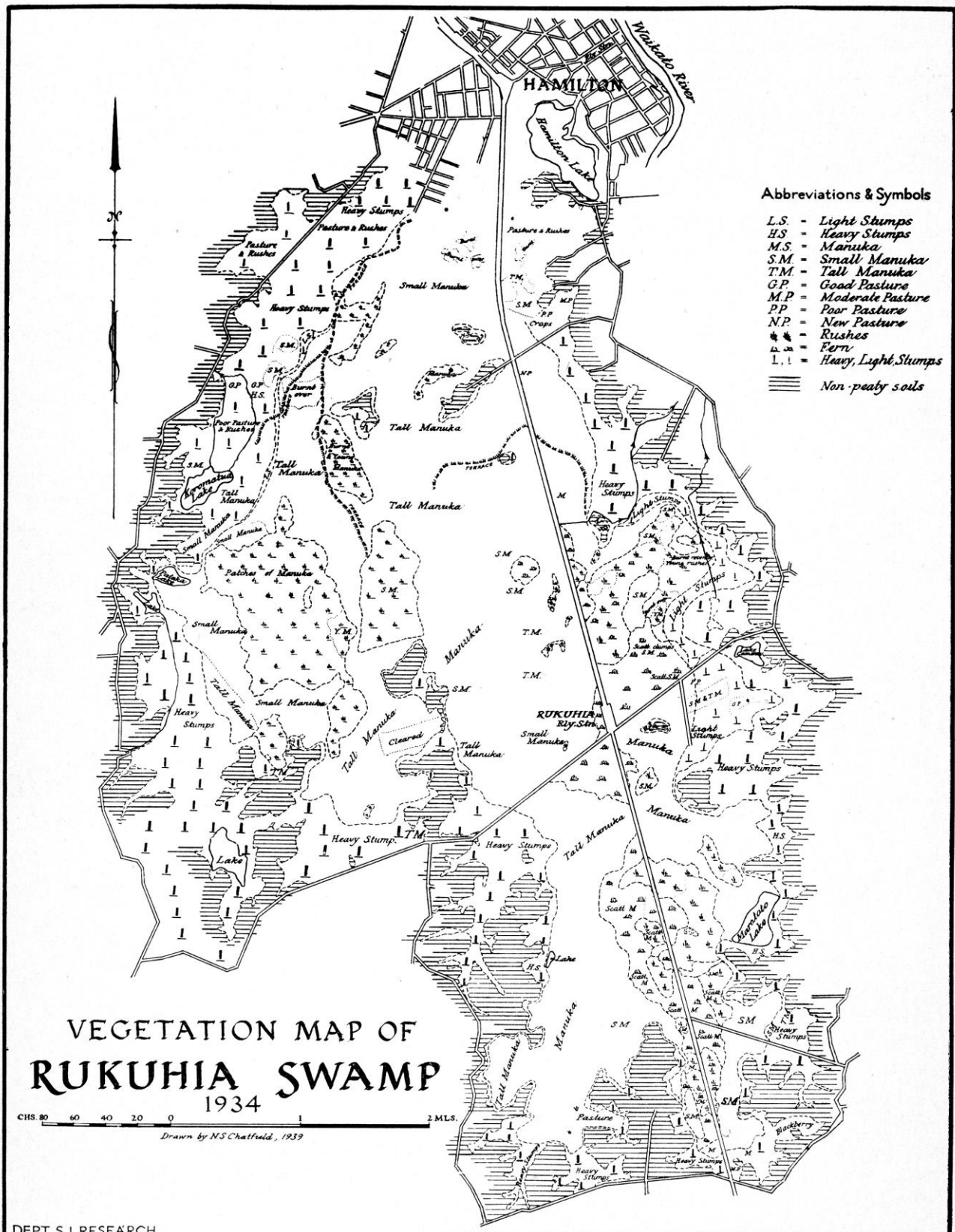
The fieldwork for this survey ran from 1933 to 1935, and the results were published four years later as a DSIR bulletin (Grange et al. 1939). A good, solid soils investigation from both the scientific and practical viewpoints, it also contained an agricultural account by the experienced P.W. Smallfield and an 8-page long botanical account of its two bogs by Lucy Cranwell (LMC hereafter).

The Introduction to that bulletin does not say why LMC had become involved—it was certainly not the case that conservation was being considered. But one of the pedologists, Norman Taylor, was an Auckland and could well have known her personally through his university studies. Perhaps the forthright LMC just made him the offer that she should be part of the team.

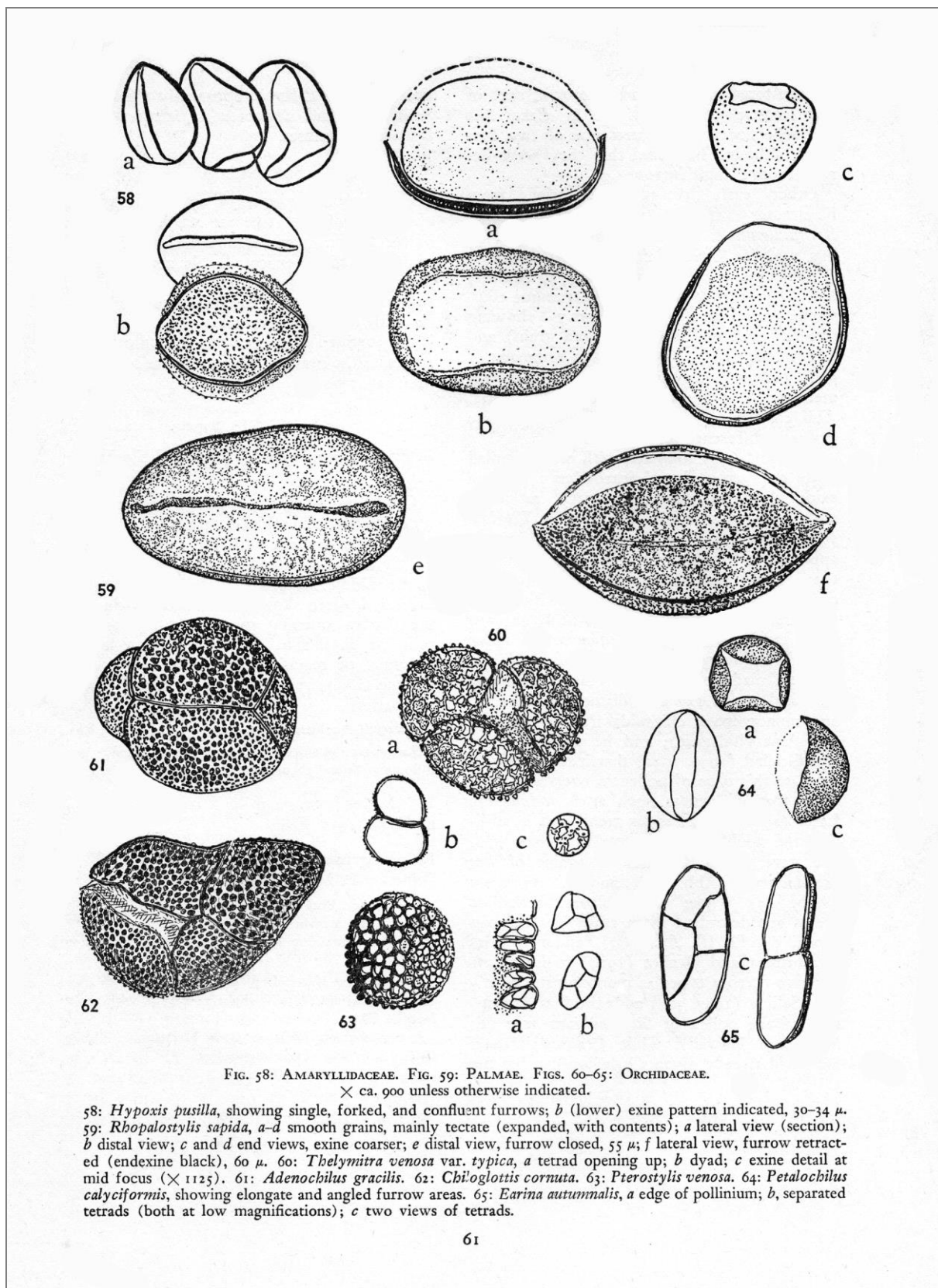
In the Auckland War Memorial Museum's Annual Report for 1934–5, page 17, LMC noted that the fieldwork for her survey occupied four days. The relevant collections in the Auckland Museum Herbarium (AK) and the Allan Herbarium (Landcare New Zealand, Lincoln) indicate that Rukuhia was investigated on 21–22 July and 3 Sept 1934, and Moanatuatua on 12 Jan 1935. They also indicate that LMC was accompanied on the July trip by her botanical friend Lucy B. Moore. Present with LMC at Moanatuatua for at least some of the time, to judge from the captions of two photographs (figs. 10 & 13 in LMC's report) was another friend of hers, the

young Auckland forestry graduate A. Lindsay Poole. Just four days to survey these two large areas is impressive, even for someone reputed to be the fastest trampler in the Auckland University College's Field Club; no doubt her helpers were invaluable.

A vegetation map of "Rukuhia Swamp" (LMC points out that 'bog' is the correct term) accompanied her text (Cranwell 1939: 29, fig. 15). It is reproduced here as Fig. 1. No such map was given for Moanatuatua.



**Fig. 1.** Vegetation map of Rukuhia Swamp, 1934; drawn by N.S. Chatfield, 1939 (Cranwell 1939: 29, fig. 15). With permission: reference S-L-1769-29, Alexander Turnbull Library, Wellington.



**Fig. 2.** Some monocot pollen grains (Cranwell 1953b, p.61, figs. 58–65).

LMC does not say how the boundaries of the Rukuhia map's twelve kinds of area were drawn. It could have been done by plane table, but perhaps only with help from a professional surveyor. It would not have been done using aerial photographs—these were hardly known at the time, although it would not be long before they were regarded as essential (as

DSIR Soil Survey Annual Reports began to note, e.g., Grange 1937: 60). I think LMC probably worked on a draft base map, perhaps one on which the non-botanical boundaries, e.g., "stumps", had already been drawn. This idea is supported by the DSIR bulletin's Topography and Geology section having in it three peat-contour maps for Rukuhia and

Moanatuatua, these being noted as “Taken from map prepared by Dept of Public Works” (Grange et al. 1939: figs. 5–7).

There is no soils map for Rukuhia Swamp in the Grange et al. (1939) bulletin, either in the text or as a separately published sheet. Interestingly though, the library of the Auckland Museum has a manuscript map (hand-drawn and hand-coloured) on tracing paper, which shows both Cranwell’s vegetation types and boundaries, and the kinds of soil recognized in that survey. It is cited in the References below under the name of its draughtsperson, H.V. Pearson. It is annotated “1934, Hamilton”. I do not think that any of the writing on it can definitely said to be that of LMC.

Now to return to the suggestion that this survey predisposed LMC to switch from ecology to palynology. We read in her report, “A better conception of the former forest can be obtained from the stumps and logs buried beneath the advancing margins of the swamps. Remains of large rimu, rata, matai, monoao (a *Dacrydium* [*Manoao colensoi*]) now extinct in this and surrounding districts, tawa, and rewarewa occur wherever the bogs overlap on to the rolling hills” (Cranwell 1939: 23). For any field botanist the sight of all this buried history would have been an unforgettable one (Note 7).

A relevant question is: how did LMC make those tree identifications? Possibly wood anatomy played a part—the Auckland Museum library does have a copy of a relevant work, the monograph of Garrat (1924), but its date of accession into the library is unknown. I think it more likely they were made just through LMC’s, and Lucy Moore’s, all-round competence: the two would have looked at associated leaf material and the gross character of the wood (as described by Kirk (1889) and especially, would have searched for any bark on the logs and stumps. We should remember that 100 years ago botanists had a wilder landscape to roam in than the present one and had many more opportunities to learn about trees in all stages of dissolution.

At any rate, LMC’s identifications of subfossil wood in Rukuhia and Moanatuatua, notably that of the silver pine (said to be common in the lower, i.e., older, layers of peat) agrees with data from pollen studies (McGlone et al. 1984). From 1936 onwards LMC might have been hoping one day to make those confirmations herself.

## Notes

**1.** The Wikipedia entry for LMC (accessed 1 Dec ’22) wrongly says that in the late ’20s and early ’30s LMC made several trips to take fossil pollen samples from South Island bogs. This is a confusion with the retrospective trip she and Lucy Moore did in 1940 “to see the six sites where Caldenius had collected his

peat samples” (Cranwell 1953: Plate 8 fig. 1; Moore 1986: 32; see also Lundqvist 1991).

**2.** Cranwell & von Post were not the first to publish on fossil pollen in New Zealand—von Post’s younger Swedish rival Gunnar Erdtman (1924) had already published on Otago and Chatham Island peats (Cranwell 1953: 187), but without, it seems, providing any data or samples that the other two could make use of. (This not to say that LMC had no contact with the latter—he is thanked in her article on NZ conifer pollen (Cranwell 1941: p. 3) for demonstrating to her in Sweden in 1935 his “new Erdtman method”, said to give uniformly good results with fresh, herbarium or fossil material).

**3.** Holzapfel (2002) mentions that LMC studied fossil pollen from the Whangamarino bog in the late 1930s. She did get pollen samples from there at some time and examined the stratification (as mentioned in Cranwell 1953:13) but she never published on this bog’s vegetation history.

**4.** The Waipa survey was referenced in LMC’s review of the country’s peat deposits (Cranwell 1953) but has been overlooked by Orwin (1974), Wardle (1981), Williams (1981), and Cameron (2000).

**5.** Another early publication of LMC has been missed by bibliographers, the brief account (Cranwell and Rhodes 1936), in a locally produced booklet of the plants of the Coromandel Peninsula.

**6.** The Waipa survey was not the only involvement LMC had with DSIR’s soil scientists. In 1937 she took part in a survey in Northland: “During December [LMC] spent a week in the field, tracing the relationship between the native vegetation and the soil types developed beneath them” (Taylor & Sutherland 1938: 57). No publication resulted from her efforts here, but perhaps there is a manuscript in LMC’s archives at the Auckland Museum.

**7.** As well as the realization that pollen would solve questions about places like the Waikato bogs, LMC, would, I think, have been predisposed towards palynology through her well-developed artistic sense; this must have been greatly stimulated when she first saw the beauty and detail of pollen grains specially prepared for the microscope. Soon she was making fine illustrations of her own, culminating in those of her study (Cranwell 1953b) of New Zealand’s monocotyledons (Fig. 2).

## Acknowledgments

I am grateful to Mark Beatty of the Alexander Turnbull Library for supplying a digital copy of LMC’s Rukuhia map, and to Zoe Richardson (Auckland Museum), Dhahara Ranatunga (AK) and Elizabeth Miller (NZFRI) for assistance in obtaining various pieces of literature.

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## Forty-six years of lichen quadrat monitoring at Kawerua, Northland, New Zealand

Bruce W. Hayward

### Introduction

Lichenometry (the use of lichens to date surfaces) has primarily been used in alpine and subalpine environments to date glacial moraines, landslides and other landform surfaces (e.g., Burrows & Orwin 1971, Gellatly 1982, Bull 2018). The slow growth rates of some crustose lichens also have the potential for dating other rock surfaces in geomorphology and archaeology. In the coastal zone these could include the dating of tsunami and storm gravel deposits, growth of boulder barriers and beaches, earthquake uplift events, coastal landslides and anthropogenic structures (e.g., Oliveira et al. 2020).

Lichenometry relies on information on the growth rates of lichen thalli, particularly crustose ones. This

is used to estimate the age of the largest thalli on the surface of interest. Photographic monitoring of the growth of lichen thalli provides the most accurate estimates of growth rates. The disadvantage of this method is that it takes years to get accurate growth rates for the slow-growing lichens. Another method for obtaining maximum growth has been to measure the size of the largest thalli on surfaces of known age, such as grave stones or landslides (e.g., Bull & Brandon 1998, Oliveira et al. 2020).

In this note I provide results of photographic monitoring of lichens in six quadrats on maritime rocks in Northland over a 46-year period. This is certainly by far the longest lichen monitoring project in New Zealand and one of the few and possibly longest on maritime rocks anywhere in the world.