Succession of Fronds of Mamaku *(Cyathea medullaris)*

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An account of the leaf fall of nikau (*Wellington Botanical Society Bull.* 36) led me to wonder how mamaku (*Cyathea medullaris*) produces its fronds. A young tree fern in our garden in Mt Albert, Auckland afforded me an opportunity to note the time of appearance of new fronds, their position on the trunk, or caudex, and their life span. The plant was about 6 years old and had developed a bare trunk about 30cm long at the beginning of my observations in 1971. It was in an open situation with some morning shade.

New fronds were produced throughout the year but not in a very regular pattern.

Time	Average no. of days between appearance of new fronds
August-October	10
October-February	31
February-March	35
March-August	35

Over one year 16 fronds were produced. The spectacle of a number of fronds uncurling simultaneously seems to be a feature of older plants. Mrs F. C. Duguid says, "I always think they look like a round table conference with people standing up hurriedly to interject". (Fig. 1).

The life span of each frond was a little more than a year on average; some lasting to 400 days, a few becoming yellow at 280 days, and some failing to expand at all. A curious feature of this fern was the earlier yellowing on the right hand side of the frond. I also noticed that the pinnae on this side were raised slightly higher than those on the left.

A feature of mamaku is the prominence of the diamond-shaped marks on the trunk. These are the places where the fronds were attached. Their pattern can be visualised as a steep spiral rising to the left or to the right and in a number of other ways. The problem was to decide which scars represented successive fronds. To do this I recorded the direction which each frond pointed when it emerged, then established the angle between successive fronds. Each new frond emerged a little more than a third of the way around the trunk from its predecessor—actually 138.4 degrees on the average—in an anticlockwise direction. When a string was run from each scar to the next in succession, this formed not one of the spirals that are immediately obvious on the trunk, but a much gentler one. The string passed five times around the trunk before it reached a scar

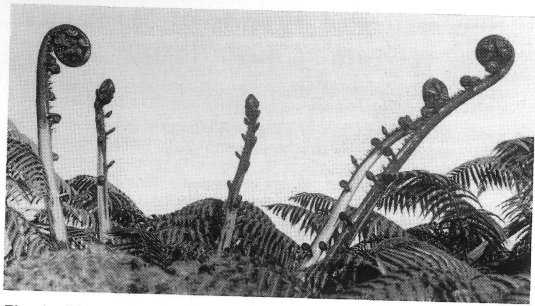

Fig. 1.—"A round table conference with people standing up hurriedly to interject."

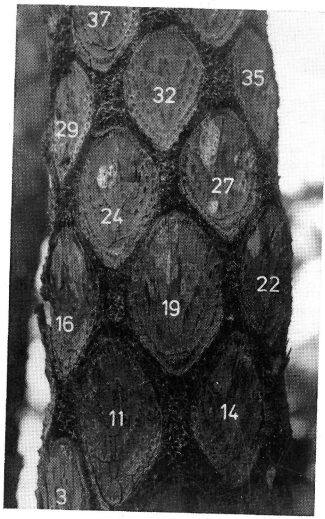

Fig. 2.—Position of frond bases on a typical mamaku trunk.

Photos by W. R. Esler

immediately above the first, and it passed 13 scars on the way, for instance from scar 11 to 24 in Fig. 2.

This was the basic pattern on this plant but complications arose. Sometimes a frond failed to develop, and occasionally an extra frond appeared in an unscheduled position. Looking at the trunk of a mature mamaku one notices that the pattern of scars becomes very regular and more compact with age. With older plants, new fronds tend to come in batches of three or more, rather than singly, and this obviously complicates some aspects of observation. On this plant the vertical distance between scar 14 and scar 29, representing the growth of one year, was 30cm.

In conclusion, I emphasise that these observations apply to one plant, at one stage of growth, in one district only, and may not be of general application.

Asplenium Bulbils

F. C. Duguid, Levin

Having an unending supply of bulbils on my aspleniums, I took the opportunity to follow their growth, right from the first tiny green knobs, smaller than pins' heads, lying on the upper surface of the fronds, up against veins. The green knobs were naked, but soon they became covered with some small brown scales, triangular-cordate in shape and netted like lace.

Later, one or two simplified fronds erupted from the top of each enlarging knob, their number and complexity increasing with the growth of this storage bulb from which they sprang. The tip of the parent pinnule producing a bulbil then became bent out of its original position so that it formed a keel-like appendange pointing downwards, in contrast to the ring of little fronds pointing upwards in positions resembling the arrangement of fronds on a mature fern growing in the ground. As the load of bulbils grew heavier, the parent frond dropped more and more till its tip, in many cases, was pointing downwards; the fronds of the bulbils were seen to adjust to this parental droop, still holding themselves aloft in a suitably erect position with the "keel" acting as balancer. The top-heavy collection of young fronds may be borne on a nearly pea-sized storage bulb, which acts as a fulcrum. It is not only the weight of the bulbils which draws the parent frond downwards, but also the heavy drain on its moisture content. A heavily-bearing frond will eventually sag to the ground, wither and die, but its papery remains form a mulch, conserving moisture at ground-level, where the bulbils send roots into the moist soil and form a colony of young plants beside their source.