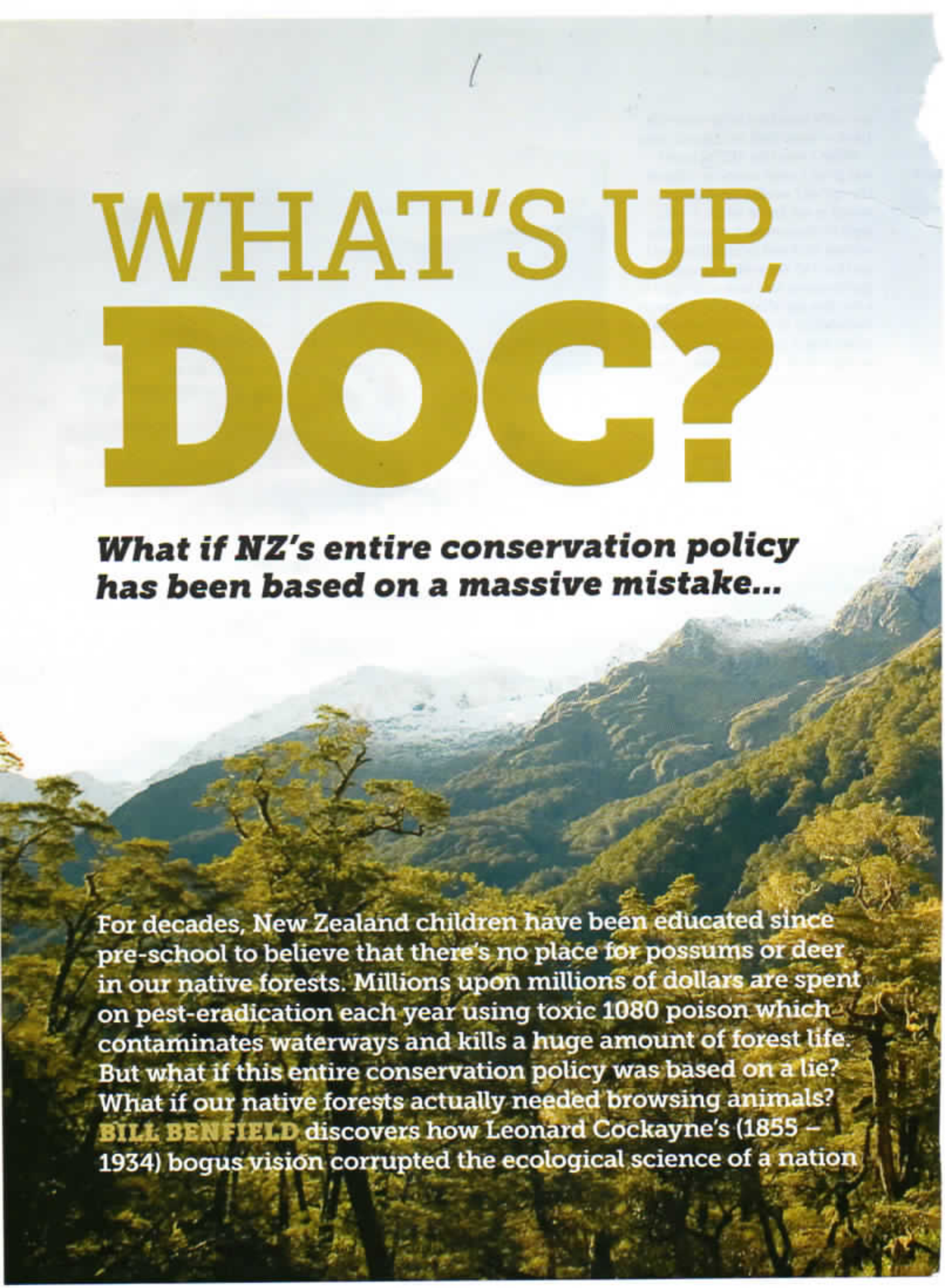
WHAT'S UP, DOC?

What if NZ's entire conservation policy has been based on a massive mistake...



For decades, New Zealand children have been educated since pre-school to believe that there's no place for possums or deer in our native forests. Millions upon millions of dollars are spent on pest-eradication each year using toxic 1080 poison which contaminates waterways and kills a huge amount of forest life. But what if this entire conservation policy was based on a lie? What if our native forests actually needed browsing animals? **BILL BENFIELD** discovers how Leonard Cockayne's (1855 – 1934) bogus vision corrupted the ecological science of a nation

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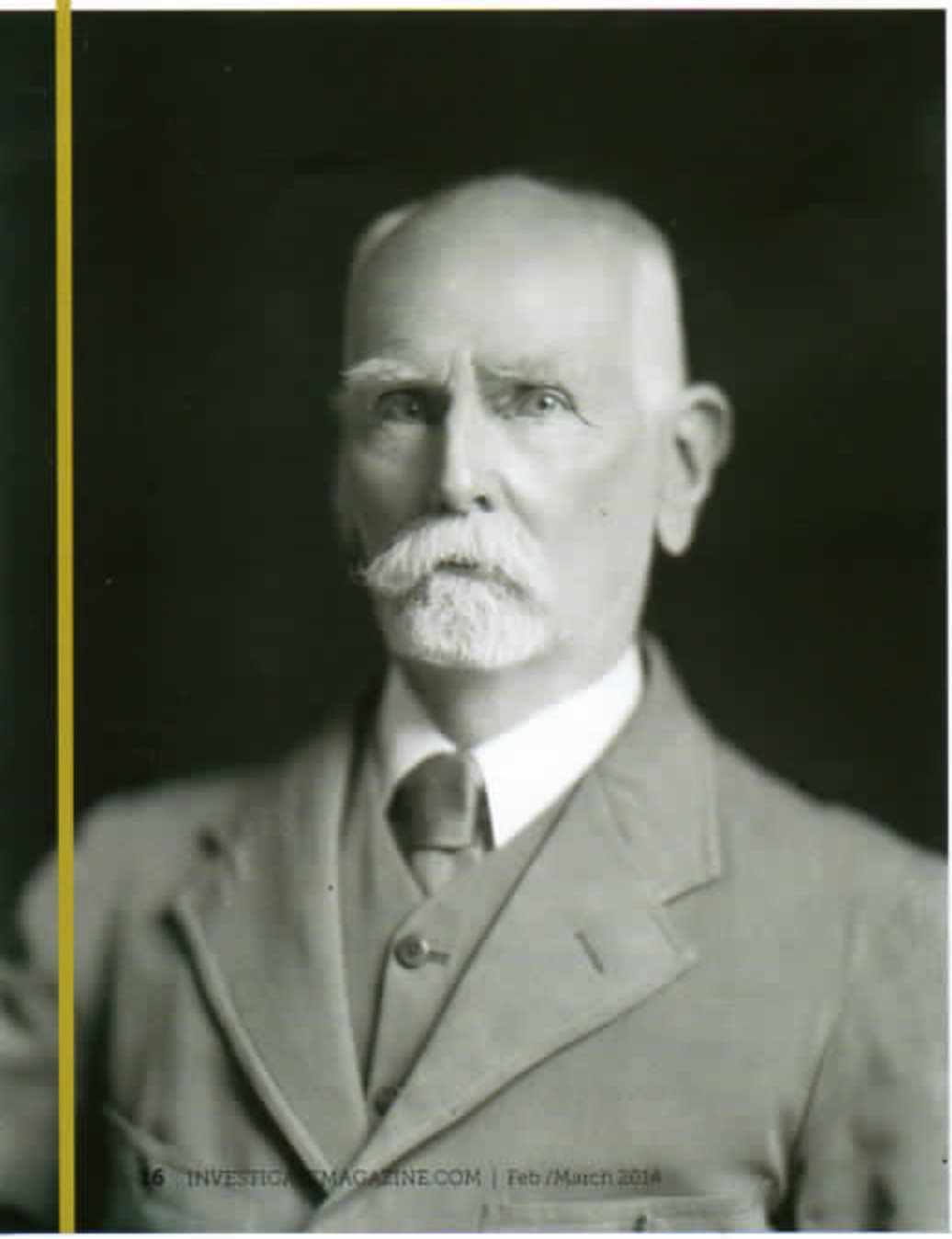
New Zealand has always claimed that its conservation is special; that it is special because its forest ecosystems evolved without browse or browsers. This claim has made New Zealand's conservation management unusual, having since the early 1930's sought to eradicate (exotic) browsers from the wilds of its forests and mountains. The programme has broadened over time to include all exotic wildlife except small birds. What started as government cullers with service rifles killing deer has over time morphed into aerial broadcast of attractant baits dosed with the metabolic poison, 1080 (sodium monofluoroacetate). Any insect, bird or animal that requires oxygen as part of its metabolic process is affected, 1080 could be considered a whole ecosystem toxin and the programme draconian, with implications to both rare and endemic wildlife.

In seeking to understand the reasons for such extraordinary conservation management, we have to understand the historical origins and Leonard Cockayne's pivotal role in it. Over time, this "vision" has become deeply embedded in New Zealand law through the Resource Management Act and regional council regulations; it has even been embraced by the science establishment. It is a vision that is still growing, with the recent emergence of programmes such as "Pest Free New Zealand" and "Project Janszoon" at Abel Tasman National Park. It is now even being exported as island eradication programmes abroad. Any attempt at the re-introduction of browsers as part of a programme to restore the forests original ecological balance would fly in the face of the Cockayne vision and New Zealand's conservation.

Cockayne actively sought honors to gain influence

English born Leonard Cockayne was a school teacher who had taught in both Australia and New Zealand. However, he found the occupation "uncongenial" and his father's death and the patrimony bequeathed him in 1884 left him financially independent to follow his passion as a collector and gardener of New Zealand native plants. His intention was to establish, as he described it, his "unorthodox garden". This was the Tarata Experimental Garden at New Brighton, near Christchurch. He had a gardener's attitude to his plants, i.e. that each was a precious specimen and to be treated as such. While he observed ecosystems, he never sought explanations for the changes he observed occurring or viewed species as part of a wider whole.

Despite only fragmentary formal training, his enthusiasm for collecting and cataloguing, in combination with being an incredibly prolific writer (over 1000 letters in one year), was further added to by sending thousands of seeds and samples to other collectors round the world. This brought him to the notice of Professor K. von Goebel of the Botanischer Gartens and the University of Munich in the early 1890's, and was the beginning of a long correspondence between the two men. This association was to be a turning



Leonard Cockayne in 1928. His un-earned and honorary qualifications put him out of reach of normal scientific fact-checking and scrutiny. His impact on New Zealand environmental policy has been devastating, by preventing the re-growth of the big ancient forests

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point in Cockayne's career, and led to his being awarded an honorary PhD from the University of Munich in 1903. Cockayne saw the possibilities of such an honour as he expressed in a letter at the time to von Goebel:

> *"Of course, the possession of such an exceptional honour, will be of the greatest assistance to me in my future relations with the government of this country, and may procure me privileges for carrying out botanical work which would otherwise be undreamt of."*

Despite the honour which gave him credibility in scientific circles and which he used to further his growing career as a botanist, it appears he also indulged in more covert self promotion. His biographer, A. D. Thomson is of the view that some of the anonymous biographical material circulated about him appears to have been written by Cockayne himself. It was also around this time (1903) that he sold the Tarata Experimental Garden to devote more energy to his budding career as a botanist.He also used his wider contacts to seek fundsand sought testimonials from well known botanists to use in influencing the government to create a position of government botanist, which Cockayne thought he would naturally fill.

Though unsuccessful in becoming a government botanist, Cockayne was still able get government funding for much of his survey work and at the same time, he continued to be a prolific writer of both published works and papers. He had become the senior scientific figure of his field in the colony, something that can be a double edged sword, especially in a small scientific community. A.D. Thomson, in his *The Life and Correspondence of Leonard Cockayne* reports (P22):

> *In this context, some impressions conveyed to me on 1/3/73 by a retired former leading New Zealand scientist are of interest: "I rather have the impression of the old man (Cockayne) was rather formidable and cowed a whole generation of NZ botanists into accepting his statements on ecology without examining them critically. Somehow, instead of stimulating ecological work he seemed to suppress it – no one was prepared to question his statements by publication of opposing views".*

As increasingly Cockayne was developing links with amateur botanists to extend his survey, he was also proselytizing an almost religious fervour in his followers. In a 1912 letter to von Goebel he wrote of "the holy fire of enthusiasm without which, all is as nothing". Later, there is his request to his friends for sending out the "Fiery Cross", a botanist's evangelical crusade!.

From a collector's vision to an ecological dogma...

In view of Cockayne's obvious gardening origins, and his inability to see his specimens as part of an ecosystem, there is the whole issue of his complete blindness to the evidence that was all around him of the evolutionary origins of the New Zealand's forests. It was Cockayne himself who observed and reported on a transition occurring, the decline of forests of slow growing conifers, forests that came to us from Jurassic times which were being taken over by fast growing palatable broadleaf's. He never once considered that there may have been a balance factor that had ensured the forest dominance of the conifers such as the podocarps, and that kauri had previously been maintained by the browse of an avifauna which filled the functions of elephants, giraffe, deer and antelopes in other lands.

There was also other evidence he should have been aware of; it was known that until comparatively recently the Canterbury plains were forested, as the remnants were there for all to see. There was also the evidence that these forests must have been inhabited and browsed by substantial numbers of moa. Canterbury Museum had considerable material from Haast's excavations at Rakaia to support this, as well there was such a vast area of moa remains at the Waitaki mouth's Maori kill site, so much that a railway line was built in to mine the material for fertiliser. Yet in a 1926 monograph written for the Forest Service, Cockayne states:

> *"In the forests of primitive New Zealand, except for certain species of moa, there were **no** grazing or browsing animals, while so far as the giant birds were concerned these would chiefly live in the open."*

He inserted the italicised "no" for emphasis! Further evidence of Cockayne's denial of moa impact around the same time is an account in the *Christchurch Sun* of an interview with a visiting botanist, G.E. Du Rietz at which Cockayne was present. In the course of the interview, Du Rietz was commending New Zealand on the diversity and primeval nature of the vegetation. Cockayne apparently agreed, and added:

> *"There is more vegetation that has not been nibbled and had its nature changed by grazing and browsing animals. If I could only tell those people who introduced deer what I think of them..."*

The interviewer then records "Dr.

Cockayne went off at a tangent"! Cockayne's attitude to forest browse was becoming more extreme, as can be seen in the second edition of his *Vegetation of New Zealand* of 1928 where he describes the sight of deer browse as: "heart rending". In this book he also outlines his abhorrence of exotic plants. By the time of the "Deer Menace Conference" of 1930, he was in full voice as the evangelising radical gardener/botanist bearing his "fiery cross" to save his precious forest garden from browse. At the Deer Menace Conference as the Forest Service's delegate, Cockayne claimed animal browse would lead to the destruction of forest and cause massive erosion which, through river borne gravels, would cause destruction of farms and towns. By such alarmist rhetoric, he ensured that it would be government policy that all mammalian browsers must be eradicated. That policy still persists today. It was also at that time, the years 1930, and 1931, that Cockayne was president of what has become New Zealand's largest and most powerful conservation organisation, the Royal Forest & Bird Protection Society, a body which in the 21st. century, despite all evidence to the contrary, continues to maintain both Cockayne's exotiphobia and the claim that the forest was never browsed.

A single moment in time, frozen under a bell jar

Essentially, Cockayne's vision was denying evolution and the effects of change by, in essence, putting the world under a bell jar, thus preserving it as he saw it about 1900. It was not the world before human intervention by Maori, but a world where early human intervention had destroyed most of its fauna and all its major browsers. The Maori had also burned around 40% of its forests and the forests remaining were in a state of significant compositional transition from pre-European intervention. Such was Cockayne's authority his "vision" was so accepted, seemingly without question by the scientific establishmentthat almost nothing could challenge it. Today with Cockayne's mantra embedded on governmental policy, and further urged by the adherents of the Forest & Bird Society, anti exotic wildlife policies prevail; it is just the tools that have changed. No longer service rifles, it is aerial broadcast of whole forest ecosystems with "super toxins", primarily 1080 to eradicate selected "pests" that are claimed to be destroying iconic birds and forests.

From time to time, further evidence comes to light that demonstrates Cockayne's view was flawed, that moa and other birds browsed the land from alpine herbfields to the lowland swamps but this is either studiously ignored, or "defensive" studies are made by members of the academic/scientific establishment to disprove such evidence; studies which claim that juvenile divaricating plantform is a response to climate and not browse. A 1941 paper which chronicles the gizzard contents of moa remains found in a swamp in North Canterbury had so little impact, that one of the authors (Roger Duff) subsequently wrote in several journals that the moa was a grazer of open country.

In the 1950's, the Cockayne mantra was seriously challenged by a young American scientist who joined the Wildlife Service of the Department of Internal Affairs. Thane Riney was put to work on the departments animal eradication operations. He was able to disprove Cockayne's claim erosion was caused by animal browse, but his career in New Zealand was short lived. His report on the Lake Monk expedition showing that browsers (deer and possum) did not eat forests to death, but their population came to a dynamic equilibrium with time, creating a stable and sustainable relationship with the forest. In the days before the concept of "re-wilding", Riney had described a spontaneous re-wilding by surrogate browsers. It caused considerable angst in the Forest Service and for his troubles, he was publicly disparaged by senior forest service officials. So too was Professor William Graf who was at the time visiting New Zealand. Comments in his report to the Hawaiian Commissioners such as:

> *"The oft repeated and widely believed statement about the 'vegetation which develops in the absence of grazing and browsing animals' simply does not stand up under close scrutiny."*

were greeted with hostility. A 1981 study of moa gizzards by Burrows, McCulloch and Trotter and published by the Canterbury Museum concluded:

> *"The present study confirms beyond doubt that members of the genus Dinornis were browsing animals which inhabited forest or forest margins. No evidence has emerged which shows that they habitually lived in grasslands..."*

Brave as it was, it did nothing to cause a re-examination of forest man-

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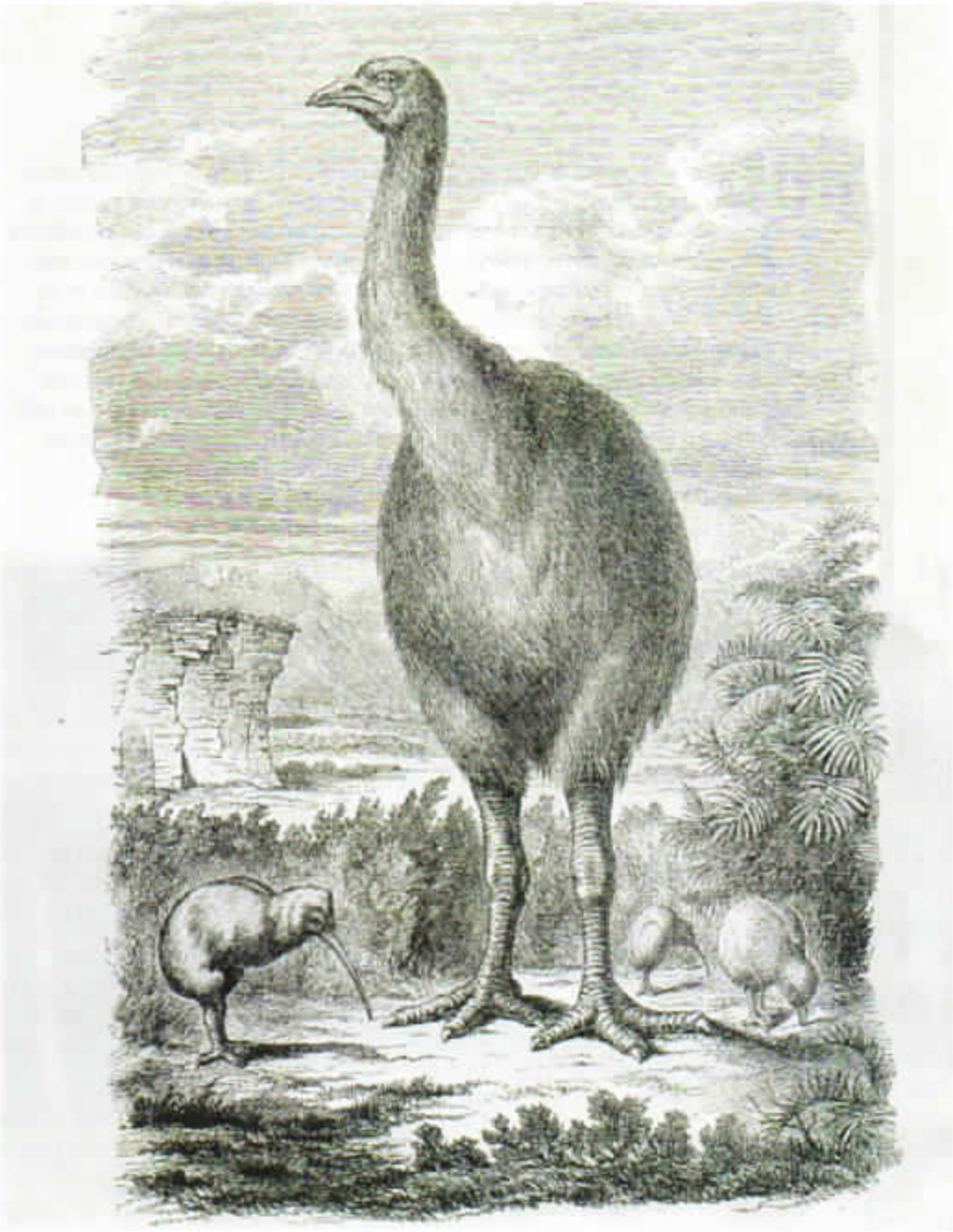
agement. It would not have needed a great intelligence to connect together the dots laid out in a 1989 paper by Les Batchelor of Forest Research. He estimated on the basis of the production ability of the forest, there must have been between six and twelve million moa. As the land was substantially forested, they must have been browsing the forest.

Probably one of the world's greater ecologists of the later parts of the 20th century was New Zealander Graeme Caughley, D.Sc Ph.D. In his paper titled "New Zealand Plant Herbivore Systems, Past and Present" delivered at the same conference as Batchelor's, he was even more forthright; forests without browse were in "an un-natural" state. He proposed two suites of deer as the only viable surrogates to the browse of the moa. As one, a European suite is largely here, ie. Red and fallow deer, only the introduction of roe deer would have been required to complete it. Despite the eminence and local experience of Dr. Caughley, the concept of utilising exotic browse was alien to a research establishment paid to support governmental policy, and ultimately the effect has been to make the New Zealand scientific community push its head deeper into the sand.

Making reality fit the "vision"?

Attempts to eradicate browsing animals using 1080 poison broadcast by air began in the 1950's and were on-going, with only minimal monitoring of impact. To assess the effects on forest floor insects, a study was carried out in the early 1990's by entomologist Mike Meads on the impact of aerial 1080. It demonstrated that a poison originally registered as an insecticide logically did considerable harm to forest floor insects. However, Meads' study was not what New Zealand's conservation authorities wanted to hear, and in an effort to kill the study, it was peer reviewed by no less than six other scientists, whose alterations rendered the original text almost unintelligible. The study was finally buried and Meads' career and reputation left in tatters. The event was a salutary lesson to scientists on the dangers of independence and integrity.



Buttressed by a compliant science and academic community, large and profitable state owned poison factories and state agencies who see in New Zealand's conservation industriesa continued and comfortable existence, Cockayne's vision is still entrenched, and due to recent developments such as the more recent "vision" of physicist Sir Paul Callaghan, there are moves to extend what has become "pest" eradication to the whole country. This would include, according to a DoC and Landcare Research scoping paper, all browsers such as deer, chamois and tahr.

Recently two papers have appeared by Wood, Wilmshurst and others describing South Island moa coprolite (dung) studies. Titled "High Resolution Coproecology: Using Coprolites to Reconstruct the Habits and Habitat of New Zealand's Extinct Upland Moa" and "Resolving lost herbivore community structure using coprolotes etc." They support previous gizzard studies which show that, where moa lived in the forest, they were forest browsers, but they go further. Their analysis shows material (often pollens) from most plants of the forest including podocarps and beeches. Diet included fuschia, broadleaf, wineberry, as well as plants such as coprosma and forest vines such as muehlenbeckia, types which tend to dominate the forest edges and understory. In open areas there is evidence of browse of herbfields.

It is in their results that the distor-

tion of science in New Zealand manifests itself. They note:

> *"Our results show that moa lack extant ecological analogs and their extinction represents an irreplaceable loss of function from New Zealand's terrestrial ecosystems"*

This is technically correct, though as Caughley pointed out, there is no forest ratite to replace the moa, but there are other browsers such as deer (and possum) which would provide not the same browse, but a browse that would help maintain the forest in as near to its pristine condition as it is possible in the 21st. century. It also does not mention that though moa were the principle browser, there were many others including the extant kereru (pigeon) and paradise shelduck, the functionally extinct takahe and kakapo as well as many extinct geese and flightless ducks that have been overlooked as herbivores.

Like Cockayne, the researchers overstate the impact of exotic browsers such as deer on the forest. It ignores that by Landcare Research's own numbers, the deer population in New Zealand is around 250,000 animals, only a fraction of both Batchelor's and Cauley's multi-million estimates for moa.

As ruminants, deer are efficient converters of green matter to energy, hence their food requirement compared to a bird with short passage times is much lower and so their per capita impact will be low. Deer had not long colonised many forest areas before they were put under heavy pressure from culling, meat recovery operations and finally aerial poisoning; like possum, their numbers in the forest are low. My own experience dating from the 1950's to today is that as a consequence of increased commercial pressure and "pest" control operations, forest understories are far denser than 50 years ago. New Zealand's large herbivore community underwent a dramatic shift from being bird dominated to, after a significant spell of around 500 years, to a much lesser and sporadic mammal dominated one.

The authors do briefly mention "rewilding", the concept of re-introducing missing parts of an ecosystem to try and achieve as near as possible the original balance, in this case browsers. Here there is the added difficulty that there are no large forest ratites suitable for New Zealand's climate, and there are only, as Dr. Caughley proposed, mammals. In the context of New Zealand, that would fly in the face of the rigid orthodoxies of New Zealand's conservation mantras, primarily, that "these forests were never browsed"! At this point the researchers back off, their closing sentence pretty well sums it up:

> *"The soil compaction and scarification impacts of introduced herbivores also likely far exceed those of moa."*

It seems the step forward is a step too far. Do the fates of Meads, Riney and

NZ's 250,000 deer now perform the browsing function once carried out by millions of giant moa, but not if DOC gets its way

others, the loss of funding and career opportunities that those who have questioned the orthodoxies of New Zealand science have suffered enter the equation. We can only speculate, but until that is addressed, re-wilding and the restoration of a complete ecosystem will only remain a dream.

It all overlooks the wider issues of present management, dogmatically trying to constrain a dynamic system in a frozen state by ecosystem poisoning. Initially to eliminate deer browse and since the 1950's also 1080 poison spread by air over whole forests including waterways; supposedly selectively targeting the "pest" species. In fact, 1080 is a metabolic poison that affects any creature that requires oxygen as part of its metabolic process. Although it was originally registered as an insecticide, it kills birds, animals and even the forest insects that work the leaf litter to make the soil. Generally the faster breeders like rats recover first and come to dominate the forest. Many native birds like kea are right now being driven to extinction. It remains on one hand Cockayne's followers like religious zealots, who bearing their "fiery crosses' ignore the massive collateral damage in pursuit of their greater goal of a frozen in time "eco-purity" and on the other, by the cynical venality of the toxin industries which will continue to pursue their profits until they have finally destroyed it all.

A policy of throwing browsing animals out of the forest means big trees like totara and kauri are not getting the chance to regenerate as their seedlings are crowded out by broadleaf shrubbery

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