Article

Science and managerialism in New Zealand

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Scientists and science organisations operate within their current social settings and must cope with society-related difficulties that may impinge on the science enterprise. One such current 'brake' to the easy and efficient pursuit of science is excessive bureaucracy, or 'managerialism', in science organisations. This style of administration arises from the ideology of neoliberalism, imposed on institutional administrations since the 1980s in many Western countries and copied in New Zealand. These policies have had many negative impacts on the New Zealand public sector, including education and science. Decades of managerialism have had the effect of largely removing scientists from top or high positions in many New Zealand science organisations (e.g. Crown research institutes and natural history museums), replacing them with generalised unspecialised senior managers many of whom lack scientific qualifications, experience and commitment. With scientists no longer at top tables to keep science at the forefront in the organisations, there can be a tendency for science to under-achieve. Science institutions might be better-run with small, efficient bureaucracies led by people with science knowledge and passion. Yet, current managerialist systems are too entrenched, and too self-perpetuating, to be easily overturned. The economic body-blow, following in the wake of the 2020 coronavirus pandemic, may give an opportunity for change to a better system of organisational management.

***Keywords**: science administration, neoliberalism, managerialism, natural history museums, CRIs, universities*

Introduction

Scientists and science organisations operate as part of a larger society, with its varied and ever-changing social settings, some of which may pose difficulties for the science enterprise. There is some evidence that excessive bureaucracy is a current difficulty for science, as for many other endeavours. The strong business-orientation of many science organisations was one of several problems identified in the New Zealand Association of Scientists' recent comments on the fitness-for-purpose of the local science system (Anon. 2020).

By the late 1980s, the prevailing politics and economic philosophies in Western countries had changed to neoliberalism. From small beginnings as 'Reaganomics' and 'Thatcherism', in the USA and UK respectively, parroting of the new and fashionable ideas by all Western regimes caused a sort of mass-hysterical swing. Wholesale attitudinal and social changes, that seemed to be the equal and opposite of the post-war nationalisation of strategic industries and implementation of the welfare state, took place in most Western countries. The New Zealand version was 'Rogernomics', unleashed by Labour after it won the 1984 election (Kelsey 1997, King *et al*. 2015). Government agencies were changed structurally to become corporate in style (Schick 1996) with no regard for social consequences. The favourite government buzz-words were 'economic efficiency' and 'accountability'. At the national level, neoliberalism favours small government, privatisation of public assets, international free trade and movement of capital, and the freedom to bypass local workers to engage low-wage labour in foreign factories.

At the institutional level, as those of us with long work experience know, neoliberalism meant that management systems were changed, old wisdoms derided and common sense down-played. A state of institutional amnesia was encouraged (Jesson 1999), with corporate memory for how things were done, and why, considered unhelpful – even a threat. Previous mechanisms for fiscal and professional responsibility were deemed inadequate; trust in staff has been progressively reduced (Shore & Wright 1999) and many activities micro-managed to demonstrate, or create a pretence of, managerial control. Length-of-service is discredited in salary progression, and under the new ideology, 'performance' is the only consideration. This is assessed by complex and time-consuming systems of performance-assessment, despite uncertainty that benefits outweigh costs (Seddon 2002, Bowman 2010). There are handsome salary packages for top managers (Bertram 2018), with austerity more likely for the wages of the lower ranks. There are numerous external consultants: 'we came, we saw, we invoiced'. Organisations must have strategic plans, mission and values statements, and key performance indicators (Shore & Wright 1999, Easton 2003). Every aspect of the running of the organisation is spelled out in policy and procedure documents. Box-ticking is a major imperative, which often forces initiatives through without exceptions or nuances based on specialised knowledge. A new philosophy is that 'what cannot be measured is of little value' (Shore & Wright 1999). Process has sometimes become more important than results. From small beginnings around 1990, new-style managers created self-perpetuating and self-reinforcing structures that are now deeply entrenched.

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For a generation now, New Zealand's universities, government research agencies and public knowledge-based organisations (art galleries, museums, public libraries, etc.)—including most of the country's science institutions—have been run in a corporate-mimicking style. This has never been entirely appropriate, for many reasons, not least because the value of the tangible assets of these institutions is not in parcels of privately-owned shares whose price rises and falls on any stock-exchange. However, the ideology is that 'market forces provide the best model of accountability and, where they are absent, it is the duty of government agencies to introduce them through pseudo-market mechanisms' (Shore & Wright 1999). This business-thinking has given rise to styles of management called 'managerialism' or the 'audit culture' (e.g. Shore & Wright 1999). It is a 'new form of coercive and authoritarian governmentality' that involves 'the re-invention of professionals themselves as units of resource whose performance and productivity must constantly be audited so that it can be enhanced' (Shore & Wright 1999). The way in which some organisational administrations have now implemented top-down control of money, resources and opportunities, with the organisation's specialists (e.g. scientists, hospital physicians) regarded as money-generating technicians for the benefit of management, has been called 'managerial imperialism' (Ginsberg and Buchwald, quoted by Otto 2016: 421).

Running New Zealand's science institutions in ways that copy the structures, attitudes and language of the capitalist business world creates problems (Edmeades 2004). At the University of Auckland, for example, this style of management has been at odds with the scholarly community in which 'trust and engagement are the keys to high performance and creativity' (Haworth 2011). Problems with corporate-style behaviour in non-profit, public agencies have included recurrent organisational restructuring, increased and excessive bureaucracy and the marginalisation of science from organisational decision-making.

In this essay I give a personal interpretation of these developments, with supporting comments taken from the writings of many commentators. My own work experience has been mostly with large encyclopaedic public museums that are devoted in part to the natural sciences (botany, zoology, geology). Some of the detail covered here is particular to museums, but many of the issues apply generally to diverse science agencies including university science departments. I highlight the general problem others have noted, that neoliberalism has shifted control of science organisations from practising scientists to generic managers with little science knowledge. I believe that this in turn has weakened and diminished the science project, denying science some of its rightful voice within science organisations and by extension its proper place in society. I take an admittedly one-sided view of what I see as the negative impact of the audit culture on science. If there are benefits to science from managerialism, beyond the faint praise of providing systems that at least function day-to-day, then they are not particularly evident to me, and others can argue for them.

Endless disruption

Part of the corporate-mimicking pretence in the non-corporate public educational and research organisations has been the new freedom of directors and senior managers to make sudden, radical organisational changes. Though largely free from the pressures of the real private sector (Anon. 2020), managers act out cycles of change as if they are locked in fierce commercial competition. Individual staff roles, and organisational assets like laboratories, libraries and museum collections, become play-things to be favoured or dropped as managers pursue intermittent restructurings (Sadleir 2003, Bertram 2018, Chapple 2018). They can even 're-invent' the purpose and scope of the organisation, conveniently bypassing decades of established past practices. The result has been endless transformation and radical change (Spencer 2018), unrestrained by the tradition and precedent that used to keep things on the rails. Universities in Australia, New Zealand and the UK, for example, have morphed from providers of free education to local students who met high entry standards, to sellers of education to almost anyone from home or abroad who will pay (Daylight 2017).

In recent decades, New Zealand's four main museums (in Auckland, Wellington, Christchurch and Dunedin) have been managed by corporate-style leaders. Many directors have been charismatic, imaginative and level-headed, and during this period much has been achieved, particularly in big-ticket items like building additions and renovations, exhibition development, and implementation of new technology. However, we cannot ignore that the neoliberal period brought repeated ugly and unnecessary disruption to our museums, in stark contrast to the preceding century of calmness and stability in museum administration. Since 1997, five museum CEO-style directors have caused five major upheavals at three of the four museums: Auckland Museum (around 1997 and 2008), Museum of New Zealand Te Papa Tongarewa (around 2012 and 2018), and Otago Museum in Dunedin (more gradually, with a culmination around 2012). The ensuing staff layoffs and institutional demoralisation produced unfavourable newspaper headlines (Gill 2018). Organisational reputations were damaged and we usually saw, soon afterwards, the departure of the offending director. Our museums still perform similar tasks to what was done 40 years ago, with people in much the same roles. So we can now see that the organisational convulsions were gratuitous, with no end-goal or long-term purpose or outcome, and this discredits generally the managerial style of museum management.

After several restructurings you might think a public service organisation would need a period of calm and stability. But under the corporate-parroting model, no top managers want 'quiet consolidation' on their CVs. Regular change is perhaps also needed to make out that the diversion of resources to fund so many managers is actually achieving something. And so there is an endless search for novelty and reconfiguration – 'permanent revolution'. Restructuring of New Zealand science organisations continues, with current proposals to reduce science capacity at Massey University (Morton 2020) and Waikato University (Morton 2021).

Increased bureaucracy

The neoliberal revolution was supposed to put an end to government departments under the welfare state that were seen as over-staffed and inefficient. Instead, managerialism and corporate mimicry in our public organisations have often delivered an ever-increasing bureaucratic quagmire many times bigger than before (Monbiot 2016). In the decade 1994–2004, the number of people employed in scientific research and development in New Zealand increased by around 5% per annum, but, meanwhile, those employed in policy, administration, management and audit of science and technology increased by about 15% per annum (Burns 2007). Watson (2008) felt that for many New

Zealand researchers 'the current administrative overburden is simply crushing'.

Academics at the University of Auckland have been concerned at the 'massive growth in the superstructure of 'managers' and their flotillas of PR, HR, 'Advancement', Information, Development etc officials' and 'poor leadership from that bloated bureaucracy' (Hazledine & Kelsey 2018). In that university's Faculty of Commerce, 'the ratio of managers and their ilk to front-line teaching, research and support workers has increased from two managers to every 40 lecturers to about two to five over the past 30 years' and 'our work has not been made easier or more effective as a result' (Hazledine 2016). Increased bureaucracy has also brought meddling in science communications in New Zealand, with managerial curbs on the freedom of scientists to communicate directly and publicly about their specialist subjects (Anon. 2009, Hendy 2016).

When I started at Auckland Museum in 1982, it was run—reasonably successfully—by an administration of seven staff: a director, his secretary, an accountant, three administrative clerks and a receptionist-telephonist. Precise details of staffing for 2013–14 (when I retired) are not publicly available, but the director had an 'executive team' of six assistant directors, there were some 20 other highly-paid managers and dozens of lower-level managers[1]. As the numbers of managers steadily increased over these three decades, I found that most administrative tasks and activities were made more difficult and complicated, and that the regime was prepared to devote much time and staffing to gratuitous micro-management[2].

We need detailed comparisons of organisational achievements before and after the managerial take-over and the obsession with audit and control. Lowe (1994) provided an early comparison, stating that by the early 1990s New Zealand's Department of Scientific and Industrial Research (DSIR) was publishing about 1200 scientific papers per year, but that fell to 350 in the Crown research institutes (CRIs), created in 1992 from the abolition of the DSIR. Instead, the average CRI was generating about 5000 pages of grant applications per year and there were new research managers, not to pursue research but to draw generous salaries to administer the CRI system. Edmeades (2004) concluded that the commercial CRI model had been unsuccessful, increasing the transaction costs of otherwise good services and showing an overall net decrease in productivity and efficiency.

In museums, the strength of the temporary, changing exhibition programme (additional to the 'permanent' exhibits), points to the organisation's vitality and public engagement. To get a quick indicator of achievement I tallied the number of temporary exhibitions, large and small, reported in Auckland Museum's annual report for the start and end of my working career. In the years 1982–83 and 1983–84, with a small display team, and little bureaucracy to curb trust and freedom of action, the museum mounted 14 or 15 temporary exhibitions each year. In 2012–13 and 2013–14, with vastly increased staffing and funding, only four or five temporary exhibitions are mentioned in each annual report.

The suspicion is that our current over-bureaucratised organisations are tending to achieve less with more. Increased bureaucracy in public-service organisations slows their agility and responsiveness, wastes resources and drains the energy and productivity of staff. This is bad for science and scientists (and of course for all other scholars, researchers and teachers in these institutions).

Science no longer at top tables

One principle of the neoliberal approach to institutional management, which has damaged scientific research organisations, is that you do not need knowledge of the institution's intellectual specialties to manage them. This is the 'myth of the generic manager—the notion that anyone with the basic set of management skills can manage any government body, whether it is an environmental agency, an economic agency, a museum or a hospital' (Chapple 2018). Chapple pointed out that: 'These managers have no expertise in the fields they are empowered to oversee. They lack institutional knowledge. They get no respect from their staff for their earned specialist competence because they have none.' In many science organisations the recruitment of large numbers of generic managers to top positions has diluted the number of staff with science-knowledge and pushed scientists to lower positions in the hierarchy. Frequently, scientists now have little influence on organisational direction and decision-making. New Zealand science policy 'has resulted in a gradual disempowerment of science and scientists' (Watson 2008).

Between 1926 and 1992, the divisions of the DSIR evolved into organisations headed and run by active scientists, without control of research priorities and spending of allocated funds by lay bureaucrats (Robinson 2015, Galbreath 2017). This ceased in the CRIs, in which the current scarcity of scientists at top levels of governance and management has tended to stifle science and creativity (Campbell 2019). The trend in the government-linked agencies became for active scientists to be excluded from policy, advisory and governing committees, while managers with increasing control of science had little understanding of it (Gregory 2016: 49). In 2018, senior ministry staff implementing New Zealand's biosecurity needs, including response to the cattle disease caused by *Mycoplasma bovis*, notably lacked science or agricultural credentials (Fox 2018).

In 1987, various smaller ecological and land management and research units, some with scientists at the helm (e.g. Wildlife Service), were amalgamated into a monolithic, managerialised Department of Conservation. The department has suffered repeated restructurings since then and recent critics believe it has lost its way, through such factors as its embrace of corporate management methods (Williams 2018). At least some of the problems are said to involve the interface between science and operations, suggesting a degree to which the department's scientific work may be suffering.

From their origins around the 1860s until the 1980s, New Zealand's four largest museums were led by scientists or anthropologists who had risen through the ranks. From having been curators themselves, they understood the detail and complexities of the many subject disciplines and collections of the encyclopaedic museum. Before 1990, curators to a certain extent assisted directors with the running of museums. By the 1990s, governing boards had put museums in the hands of directors and top managers who mostly had no specific experience of encyclopaedic science/humanities museums but instead came from the 'cultural sector' generally or unrelated fields. When I started at Auckland Museum in 1982, science curators were level 2 in the organisational structure. When I retired, in 2013, they had sunk to about level 4.5, as new layers of management had been imposed above them. It marked a transition from

a museum with knowledge of collections (including science knowledge) at its heart, to one with bureaucratic process as a principal driving force.

Business-style grant-funding

The corporatisation of grant-funding systems in the new managerial environment is a major area with adverse impacts on science. Phillips (1999) had early concerns with proposals for funding reforms whereby scientists 'can only get money to work on things that the Ministry [of Research, Science and Technology] (a) can comprehend and (b) considers important for political reasons'. Edmeades (2004) discussed how the principles of contestability and contract theory are inappropriate to science funding. Watson (2008) urged lower transaction and compliance costs, and increased bulk funding to provide stability for long-term programmes. More recently, Chambers (2017) discussed the Marsden Fund, questioning changes that now allow chunks of money to go to overheads and salaries of permanent staff. While the Royal Society of New Zealand manages the Marsden Fund competently, it is doubtful that it adds much value to the process in return for its take (Chambers 2017).

Poor support for museum science

Our four large encyclopaedic museums are uneasy partnerships between natural history and human history (anthropology and applied arts), with the addition of fine art (from the former national art gallery) at Te Papa. New Zealand seems to be too small (or too meagre in ambition) to support separate specialist museums in the main cities. The museums play a big role in science, housing large natural science collections that are a major part of the country's permanent and verifiable record of its biodiversity (e.g. Gill & Coory 1999, Gill 2006, Nelson 2015). For a century and a half, museum scientists have helped to formulate the taxonomy and nomenclature essential to a full understanding of New Zealand plants and animals. Since science covers roughly half of the museum's purpose and collections (or a third at Te Papa), there is an argument for science receiving that proportion of the available funding and staffing. However, museum science, particularly at Auckland Museum and Te Papa, has tended to struggle since the 1990s under managerialist administrations, many of whose leaders and decision-makers have had little enthusiasm for science or knowledge of it.[3]

Of course, in recent decades some of the wider social, political and technological contexts, and public expectations, have changed for New Zealand museums. However, public interest in the natural sciences remains high, and the public appetite has continued as strong as ever for the museums' long-term and temporary natural science exhibitions. I also argue that natural history curators have shown considerable adaptation. For example, digitisation of collection records at Auckland Museum (a prelude to having such records available publicly on-line) was introduced and led by its natural sciences staff[4].

Museum of New Zealand Te Papa Tongarewa

When the new Te Papa building opened in Wellington in 1998 (Dutton 1998, Dalrymple 1999), the place of science in the organisation seemed small. By the time of a restructuring around 2012, scientists at Te Papa were feeling even more excluded, their role 'steadily diminished under a succession of chief executives who have shown little interest in, or commitment to, the institution's crucial work in ... taxonomy' (du Fresne 2013). Nobody on the government-appointed Te Papa board had a scientific background, and scientists were absent from the top tier of Te Papa's management (du Fresne 2013). The cycle repeated in 2018, with a new regime proposing further cuts to staff managing natural history collections: a cut to a new low of 4.2 full-time equivalents (FTEs), down from 10 staff before 2012 (Carter & Rudge 2019). The head of Te Papa at that time had never before worked in a museum (he previously ran a district health board; Chapple 2018) and there were still no natural scientists, with hands-on experience of the museum's natural history role, in top-tier management or on the governing board. Rawlence & Worthy (2019) considered that the senior management was destroying Te Papa's credibility as a national scientific research institute.

Auckland Museum

Auckland Museum appointed its first specialist curators in the early 1930s with what amounted to 3½ natural history curators (and 1½ in human history). When I joined the organisation in 1982 I was one of five science curators. Two of these positions were made redundant in 1997, the year after new governance arrangements brought in a trust board headed by someone from the corporate world (Corbett 1997, Johns 1998). Critics noted that the current director had 'a double degree in fine arts and no sympathy for science' and detected 'a rising head-count of administrators versus a decreasing number of curators' (Corbett 1997). One of the science curator roles was re-established in 1999 (Anon. 1999), so that when I departed in 2013 there were four natural history curatorial positions, or 4½ to include a manager who also did a curatorial role.

By tallying FTEs for 1983 and 2013, I estimate that Auckland Museum's total staff numbers increased by about 370% during my tenure[5]. Despite this massive increase in resourcing, successive administrations kept the number of science curators at 1980s levels, thus preventing science from benefiting from the largesse. Meanwhile, the lack of a geology curator, and the need for additional botany and invertebrate zoology curators, were obvious problems for science at the museum. Auckland Museum created new positions for collection managers, exhibition developers and label writers to take over many curatorial tasks. This is itself part of a troubling trend in museums, whereby the new-style administrations employ yet more generalists, not understanding, or not caring, that they are thereby undermining specialist knowledge and curation (Knell 1995)[6].

In 1982, Auckland Museum's curators (natural history and human history) were the biggest single group of back-of-house staff, reflecting the museum's emphasis on knowledge of its collections, and in line with public expectations of how a museum is staffed. By 2013, curators had become a small outpost at the edge of an ocean of administrators. While there was minimalism and austerity in the 4½ science curators, in 2013 the museum was employing about 22 FTEs across commercial development, commercial events, communications, marketing, 'masterplan delivery', HR, sponsorship, tourism and market research. In my view the museum's staffing priorities were upside down.

Otago Museum

Otago Museum had two natural history curators in the 1980s and 1990s (Otago Museum annual reports), but after new leadership around 2000 these experienced staff departed and the collections were run by a succession of mostly recent graduates with little or no museum experience. Specialised knowledge seemed to be replaced by inappropriately strict risk-aversion. I visited Otago

Museum in 2008 to measure bird study-skins, and had the experience (unique in my world-wide visits to bird collections) of being watched continuously by a staff member, presumably to ensure I did no wrong[7]. Entomologists regularly send and receive insect specimens by mail or courier so that specialist colleagues can identify them, and borrowing insect specimens from public museums is common. In 2010 Otago Museum suddenly required insurance cover of over $7,000 on a single entomology loan making loans impossible[8]. The signs were that Otago Museum, with uninformed, corporate-style leadership, ceased to function as a proper natural science organisation for several years. Circumstances have improved since 2012, but unnecessary damage was done.

Discussion

Despite repeated detailed and eloquent complaints about managerialism and excessive bureaucracy in government agencies and academia (e.g. Shore & Wright 1999, Easton 2003, Haworth 2011, Hazledine 2016, Bertram 2018, Chapple 2018), nothing changes. The present systems are too self-supporting, self-perpetuating and self-serving to change. A new generation of scientists works under the 'crushing administrative overburden', perhaps not realising that it has not always been this way and does not need to be.

The most serious problem is that managerialism prevents scientists from controlling and directing their own discipline. 'Science for and by scientists will deliver the most benefit to the New Zealand government, to the people of New Zealand and to science itself' (Robinson 2015). Edmeades (2004) concluded that 'science should be managed by those who embrace the values and beliefs of science'. With bureaucrats in government agencies directing research towards commercial innovation supporting economic growth, scientists cannot bring to due prominence their critical analyses on major questions of the time, such as the dire forecasts of global damage and disruption (Robinson 2015).

Arguing for scientists to be at top tables in science organisations is not to suggest that scientists make superior managers. Some do not. But neither do too many of the current generic managerialist managers. Scientists would make the management no better—or no worse—but they would ensure better decisions for science, and surer promotion of science, within and beyond organisations.

The neoliberal experiment has been a spectacular failure (Stiglitz 2019). Market-driven ideologies and the commercialisation of universities and other research and scholarly academies are 'hampering creativity and undermining collegiality' (Clements & Matheson 2019). Public science organisations should not try to be businesses, yet that is currently how they are set up to behave. Science might be better served by administrations that favour organisational stability, small bureaucracy and trust in staff, and that are led, not by generic managers, but by leaders with a passion for science based on first-hand knowledge and experience. Fiscal prudence is essential, but the drive should be for scientific productivity and excellence, not corporate-style emulation and spin.

The pressure for change continues. In July 2020, 600 Australian university academics signed an open letter calling for 'a return to a more democratic, cost-effective and functional structure for Australia's universities' (Pelizzon *et al*. 2020). The universities used to be administered by a collegium of distinguished academics with specialised knowledge. Now there is an executive cadre of 'astonishingly well-paid, institution-hopping, administrators without 'long-term institutional knowledge and memory'. The petitioners want senior and middle executives selected through internal processes (thereby ensuring background institutional knowledge) rather than by a commercial corporate recruitment strategy.

But we are up against 'a hegemonic force—a neo-liberal revolution—that has shaped political attitudes in western democracies across the globe for more than a generation and that now represents a norm so powerful that it is not even recognised as such by those who might be expected to oppose it' (Gould 2016). Only a 'paradigm shift' will dislodge neoliberalism, yet even the global financial crisis of 2007–2008 brought little or no reform to managerial excesses. Now the 2020 coronavirus pandemic has illuminated, once again—and even more starkly—the failings of three decades of neoliberal economics. We were helped through the initial stages of the pandemic by *public* health systems, *government* agencies, low-paid supermarket workers and totalitarian-style lock-downs—not by multinational corporations, CEOs with high salaries, or by free markets and 'user-pays'. Perhaps the body-blow to Western economies, now working its way through the system, will be the tipping-point that forces reform of excessive and wasteful managerialism and ushers in a simpler and more productive administrative environment for science in New Zealand. (But don't bet on it!) Meanwhile, we can at least describe and review aspects of the problem, as I have tried to do here.

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Endnotes

1. Auckland Museum annual reports after 2006–07 no longer include a staff list. In 2013–14, leaving aside the director, Auckland Museum reported 30 managers earning $100,000–200,000 per annum (Anon. 2014). These were only the higher earners, with many lower-level managers besides.
2. My personal experience of excessive bureaucracy at Auckland Museum included a memo to all staff in 1997 from the accounts department announcing an end to 'petty cash', a decision all subsequent regimes continued. After 1997 I needed to seek a manager's signature for every purchase, even a box of pencils. Gratuitous micro-auditing of people who could be trusted, adds up across the many staff and many activities, year after year, to a big cost in time and resources. In 2010, I travelled to another city to attend an annual national conference in my subject specialty (at a total cost of $1260). The request and justification form took six weeks to be approved and needed the signatures of five top managers, including the director.
3. For 20 years I co-edited and/or produced the scholarly journal *Records of the Auckland Museum*, published annually since 1930. The task was made harder by having to seek funds for typesetting and printing from a succession of managers for most of whom 'scholarly journal' was an unknown concept. Funding was twice declined with no volume produced those years. In the end, I had a two-page list of FAQs that I could hand to each new manager to help explain the importance of the *Records*. This should not be needed in a major museum. It was not needed at Auckland Museum before the 1990s when senior staff understood scholarship and indeed had initiated the *Records* in the first place.
4. Computer databases for collection records at Auckland Museum were introduced in 1989 in an initiative from the botany department that was copied by other natural history sections. Computerisation of records was led by science curators and their technicians; it was 2002 before the management implemented a museum-wide system. By 1990, I, for example, had records digitised for 1,000 land

vertebrates specimens, and by 2001 for about 13,000 specimens. By 2006 I had over 1,000 records with attached images.

5. In the 1983–84 financial year, the total paid staff of Auckland Museum (listed in the annual report) was about 57 FTEs (including security and shop staff, but excluding coffee lounge staff). In 2013–14, the total staff was about 213 FTEs (based on an internal staff directory I had at the time), a 370% increase. Vodanovich (2012) reported the museum's total FTEs as about 170; if that is the correct number it makes a 300% increase.
6. Undermining of specialist curation is illustrated by the recent blanket imposition of shelf-numbering (as used for human-history collections) in natural history collection stores at Te Papa and Auckland Museum after responsibility for collections was transferred from science curators to more generalist collection managers. Showing object locations by shelf-numbers recorded in computer databases is redundant in situations where natural history specimens are arranged following the Linnaean classification sequences laid out in published taxonomic directories. But shelf-numbering conveniently bypasses the need for specialist scientific knowledge and permits "robotic" retrieval of specimens by uninformed staff. However, it later becomes an impediment to curation. When natural science collections expand, or taxonomic sequences get revised, rearrangement of specimens on shelves—previously a simple matter—now needs extensive updating of shelf-numbers in computer databases.
7. No museums have the staff resourcing to keep research visitors under individual scrutiny, and nor is it necessary or desirable. Museums employ curators for their knowledge of, and involvement in, specialist disciplines. By this they can recognise *bona fide* researchers who can be trusted with unsupervised access to research collections.
8. The researchers concerned declined to borrow the insects, to the detriment of their own research and to Otago Museum, which would have had their insects sorted and identified at no cost (R. Palma, pers. comm. to BJG, Oct. 2010).

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