Surveillance

MINISTRY FOR PRIMARY INDUSTRIES REPORTING ON NEW ZEALAND'S BIOSECURITY HEALTH STATUS

VOLUME 46, NO 2, JUNE 2019

INSIDE:

Biosecurity New Zealand
Ministry for Primary Industries
Manatū Ahu Matua



Surveillance
ISSN 1176-5305

Surveillance is published on behalf of the Director Diagnostics & Surveillance (Veronica Herrera). The articles in this quarterly report do not necessarily reflect government policy.

Editor: Michael Bradstock
Technical Editors: Jonathan Watts, Lora Peacock

Correspondence and requests to receive *Surveillance* should be addressed to:
Editor
Surveillance
Ministry for Primary Industries
PO Box 2526
Wellington, New Zealand
email: surveillance@mpi.govt.nz

Publication: *Surveillance* is published quarterly in March, June, September and December. Distribution via email is free of charge for subscribers in New Zealand and overseas.

Editorial services: Words & Pictures, Wellington
www.wordpict.co.nz

Surveillance is available on the Ministry for Primary Industries website at www.mpi.govt.nz/publications/surveillance/index.htm

Articles from previous issues are also available to subscribers to SciQuest®, a fully indexed and searchable e-library of New Zealand and Australian veterinary and animal science and veterinary continuing education publications, at www.sciquest.org.nz

Surveillance is published as the Ministry for Primary Industries' authoritative source of information on the ongoing biosecurity surveillance activity and the health status of New Zealand's animal and plant populations in both terrestrial and aquatic environments. It reports information of interest both locally and internationally and complements New Zealand's international reporting.

Contents

Editorial

Robust decision-making with little data

The Ministry for Primary Industries, or indeed any border biosecurity authority, is put in an unenviable position every time a new organism is detected post-border. We all know the huge damage that some exotic invaders can do to our crops, our livestock, our natural environment and our lifestyles. Fortunately these are exceptional; most exotic invaders are much more benign, causing little or no significant damage to the things we care about. But when something new is found within our borders how do we know whether it will be damaging or not? How can we know if it will spread and flourish here? How can we be certain it isn't *already* widespread? And how can we judge what level of incursion response is appropriate? Biosecurity partners grapple with such questions every time our broad-reaching surveillance system detects a new exotic immigrant. Important and sometimes expensive decisions must be made quickly, often with few helpful data available.

I'm not employed by MPI, but I do work with the Ministry often. Nearly two decades ago I was a fresh, young scientist publishing "impactful" papers that were seldom read and even less often acted on. Then, in the early 2000s, I was pulled into the world of biosecurity by a notorious spate of moth incursions in Auckland and Hamilton, including painted apple moth (PAM), fall webworm and gypsy moth. The first thing I learned was that decisions needed to be based on science. The second thing was that in most cases there were few data to base those decisions on. As a population modeller I was used to estimating parameters from sketchy data but completely new to me was the urgency of the resulting decisions and the scale of their impacts. Sometimes we in the PAM Science Technical Advisory Group would discuss a problem facing the eradication teams and then – boom! – just hours later there would be a change in the response. This was Applied science with a capital A, and the wealth of the nation potentially at stake. It was heady and terrifying, but above all it made me aware of the sheer size of the challenge of border biosecurity and gave me a deep respect for the hard-won experience and wisdom of the response teams.

Painted apple moth changed my life. Since then my research has focused on trying to help our border authorities make the best decisions possible with little data and while under pressure. Modelling is an ideal tool for this, because you can easily manipulate your model systems to ask "What if?" questions, and thus compare the potential outcomes from different decisions or levels of intervention. More importantly, models provide a framework to integrate expert knowledge and identify critical gaps in understanding. Yes, I still "make stuff up" based on similar species and situations, but models enable you to test how influential such assumptions are and to weight your decisions accordingly. And models can guide you to collect the data that will have the biggest influence on the decision to be made.

One thing I have learned after years of working alongside MPI is that good decisions can be made even when few data are available. Often it takes a mental shift from thinking "What should we do?" to "What more information do we need to make this decision?" For example, when an Australian pasture tunnel moth was found near Hamilton in 2010 very little was known about the species except that it was a potential threat to New Zealand's most valuable crop, ryegrass. The feasibility of eradication depended a lot on how widely distributed it was, but how could you possibly find that out when dealing with a subterranean species present at low density in the vast, grassy landscapes of the Waikato? With MPI incursion investigators, we flipped the question from "How extensive is the population?" to "Is it already distributed further than 1 km – in which case eradication is not likely to be feasible?" This question led us to do a small cheap local survey that showed eradication was not possible. (The tunnel moth was later found to be widespread, but it has not yet caused significant damage to pastures.)

Under Government Industry Agreements (GIA) New Zealand's primary-production sectors are increasingly involved with decision-making for biosecurity readiness and response. Good communication is imperative in this climate of joint responsibility, with all parties ideally sharing a common understanding of the biology, ecology and practicalities of each biosecurity decision. I am currently working with MPI on a tool for visualising the early spread of simulated invasions and overlaying different types of surveillance on top of that. The model is deliberately simplistic and generalised so that we can approximate the spread and detection of a wide range of different species under a variety of surveillance scenarios. This will enable partners in decision-making to jointly explore the range of potential circumstances surrounding any real-world detection. A secondary aim is to develop rules of thumb to infer population size and extent, and therefore eradication feasibility, from the limited information available at the time of detection: What species is it? Does it grow and/or spread rapidly? How easy is it to detect? How many individuals were found in how many different places? By calibrating the results with species that we do know a lot about, we hope to be able to draw inferences about other species that have been less well studied.

I find that border biosecurity provides an exciting and challenging opportunity for multi-disciplinary applied science. The Better Border Biosecurity (B3) collaboration and Biological Heritage National Science Challenge bring together diverse skills to address the challenges of plant-sector biosecurity, and it is exciting to be a part of a team that is tasked with making

our already world-leading biosecurity systems even better. But a common theme will always be the need for robust decisions without the ideal data on which to base them. Better data is an important aim of New Zealand's current Biosecurity Strategy through harnessing the capabilities of all Kiwis, new tools and technologies, and greater data sharing. But ultimately what matters is how the available data, no matter how imperfect, are used to make robust biosecurity decisions.

Dr John Kean
Senior Scientist
Biocontrol and Biosecurity Team
AgResearch Limited
john.kean@agresearch.co.nz

Quarterly report of diagnostic cases: April to June 2019

Gribbles Veterinary Pathology

Bovine

Blood was submitted from a 2-year-old lactating Jersey cross heifer in mid Canterbury that was losing weight, had an increased respiratory rate and was jaundiced. The animal was born in Canterbury but the farm had brought in cattle from the North Island. It was severely anaemic (PCV 0.09; reference 0.24–0.40) and small numbers of organisms resembling *Theileria* sp. were seen on the blood smear. The blood was positive for ***Theileria orientalis*** **Ikeda** on PCR testing.

Several cows on a Westland farm had skin lesions consistent with photosensitivity. GGT testing of serum from nine of these animals showed markedly increased concentrations of 810 to 3,432 IU/L (reference range 3–47), supporting the clinical suspicion of hepatogenous photosensitisation, which was most likely due to **sporidesmin toxicity (facial eczema).**

A 6-month-old Friesian bull calf from a Rotorua district farm developed generalised crusting skin lesions. It continued to eat well but began shade-seeking and separating itself from the mob. Skin samples were collected at necropsy and processed for histopathology. Microscopic examination revealed thick, laminated crusts of keratin and neutrophils containing numerous bacterial cocci arranged in parallel chains. These were considered to be compatible with ***Dermatophilus congolensis***. **Dermatophilosis** occurs sporadically in cattle, and maceration of tissue from wetting, ectoparasite damage and abrasions are predisposing factors.

One of three calves on a North Otago smallholding died after exhibiting neurological signs including staggering, collapse and thrashing. There was no response to treatment with vitamin B1 (thiamine). Necropsy findings included pericardial effusion, adhesion of the lung to the diaphragm, and worms in the faeces. The most significant histological findings were in the brain, characterised by subacute multifocal neutrophilic and lymphohistiocytic vasculitis and meningoencephalitis. These findings were strongly suggestive of **sporadic bovine encephalomyelitis** caused by ***Chlamydia pecorum***.

Four of a group of 94 female Friesian weaner calves became ill on a Horowhenua dairy farm. Two calves were found dead near water troughs. Both were in good body condition. Another calf died after being found depressed and dehydrated, while another had fever and respiratory signs but recovered after antibiotic and anti-inflammatory treatment. Necropsy findings included fibrin strands on the peritoneal serosa and congested ventral lung lobes and intestines. Histology confirmed a fibrinous peritonitis with intralesional bacterial colonies. A heavy growth of ***Pasteurella multocida*** was cultured from the lung and peritoneal fluid. These findings confirmed a diagnosis of ***Pasteurella multocida*** **capsular type B septicaemia**.

A 2-year-old Jersey bull from a Rangitikei farm developed multiple cutaneous growths over the body. Cutaneous lymphoma was suspected and samples of four masses were submitted for histology. All were similarly composed of fibroblastic dermal proliferations covered by markedly hyperplastic epidermis. Keratinocytes displayed viral cytopathic change, confirming a diagnosis of **multiple fibropapillomas**. Cutaneous fibropapillomas in young cattle are caused by **bovine papillomavirus** types 1, 2 or 5, can be single or multiple, and usually spontaneously regress within a year of first appearance. These tumours can be transmitted to in-contact cattle and may interfere with mating.

Six of a group of 80 rising-2-year-old dairy heifers died suddenly on a North Canterbury farm. The heifers had been in a grass paddock with access to a rubbish pit. Deaths ceased once the animals were removed from that paddock. An acute toxic syndrome was suspected. Gross and histopathological examination was complicated by autolysis. Subtle renal tubular necrosis was the only histological change of note, supporting the possibility of a toxic event. Faecal cultures, parasitology, haematology and aqueous humour nitrate testing were negative or unremarkable. Lead concentrations in the livers of two of the animals were < 0.1 mg/kg but arsenic concentrations in the livers were 10.9 and 11.2 mg/kg (toxic level > 4), compatible with a diagnosis of **arsenic toxicity**.

Two adult Jersey cross dairy cows on a Taranaki farm became dehydrated and developed muddy, jaundiced mucous membranes and red urine. The PCV of a blood sample from one cow was 0.10 (reference range 0.24–0.40). One of the cows died within 12 hours after clinical signs were first seen. Previous blood tests of in-contact cows had demonstrated serum zinc concentrations below the recommended range for adequate facial eczema control. GGT activity in a serum sample from the surviving cow was 618 IU/L (reference range 3–47). Histological examination of liver from the dead cow revealed severe bile duct damage, portal oedema and fibrosis, and proliferation of small bile ductules. There was red pigment consistent with haemoglobin in renal tubules. Taken together, these findings were consistent with severe **sporidesmin toxicity**.

Six of fifty 7–8-month-old calves suddenly died on a farm in Wairarapa. They had been vaccinated with a 10-in-1 clostridial vaccine 13 days earlier. Haematology revealed a haemolytic anaemia (with no evidence of *Theileria* sp.), significant numbers of Heinz bodies, and red blood cell fragments or "ghost" cells were seen on examination of a blood smear, making zinc, copper, brassica, sporidesmin or water intoxication unlikely. Histopathological examination of tissue samples revealed a severe centrilobular hepatocellular necrosis consistent with hypoxia, and a haemoglobinuric nephrosis consistent with intravascular haemolysis. Blood selenium and serum copper concentrations were within normal reference ranges and PCR tests for *Leptospira* spp. on blood and urine were negative. *Leptospira interrogans*

serovar Pomona MAT testing showed a positive titre of 1:25,600 in two of three calves tested. Titres measured on the same calves 13 days later were > 1:51,200, supporting a diagnosis of ***Leptospira interrogans* serovar Pomona infection.** The negative *Leptospira* PCR results on urine and blood in these calves was not surprising as affected animals are often only bacteraemic or bacteriuric for a short period (< 7 days). Of the *L. interrogans* serovars, Pomona produces the highest levels of a haemolysin that was recently identified as Sphingomyelinase Sph2, which is responsible for the haemolytic disease through stimulation of Toll-like receptors and proinflammatory cytokines. Haemolytic disease is usually only evident in calves, lambs or fawns less than 6 months old but the underlying reason for this age-dependent susceptibility has not been fully elucidated.

A 6-month-old male Friesian calf from Rotorua with severe generalised skin lesions was euthanased. Histological examination confirmed that the lesions were the result of ***Dermatophilus congolensis* infection**. Other tissues were not processed but there was no evidence of a vasculopathy in the skin tissue to suggest any concurrent photosensitisation.

Three dairy cows on a Waikato farm had eye lesions consistent with **infectious keratoconjunctivitis (pink eye).** ***Moraxella bovis*** was isolated on bacterial culture of samples collected from the eyes of these cows. This organism is commonly associated with this condition.

Multiple sporadic cases of disease consistent with acute **sporidesmin toxicity** (facial eczema) were seen at the Hamilton laboratory during February and March. The affected cattle were reported to have skin lesions consistent with photosensitisation, and elevated GGT concentrations were found in blood samples submitted to the laboratory. These findings were considered typical of this disease, which is commonly seen in late summer and autumn.

On a Southland dairy farm a group of 91 calves weighing 150–200 kg were each injected with 10 mL of a trace mineral supplement containing copper and selenium. The dosage recommended by the manufacturer was 1 mL/50 kg so this was more than twice the recommended dose of this product. Two days later seven calves were found dead and another 10 were seen to be depressed, with sunken eyes. Necropsy of two of the dead calves revealed petechial haemorrhages over the heart, kidneys and serosa of the distal intestine and colon. Liver selenium concentrations in both calves were very high (145,186 and 77,336 nmol/kg; toxic level > 30,000), supporting a diagnosis of **selenium toxicity.**

Over a period of a week, eight out of 600 milking cows on a Southland dairy farm were noticed to have a marked weight loss and reduction in milk yield. The cows were depressed and dehydrated on clinical examination but no other specific signs were noted. Necropsy of one affected cow revealed that both lungs were entirely consolidated and contained a large number of abscesses. Culture of lung tissue yielded a heavy mixed growth of enteric bacteria, which were considered likely to be contaminants. Histopathological examination revealed a severe acute fibrinosuppurative bronchopneumonia. A multiplex PCR for a variety of respiratory pathogens identified only a high concentration of ***Histophilus somni.*** Abscesses are not usually a feature of acute pneumonia caused by *Histophilus* spp. infection, but in this case they may have been the result of earlier exposure of the lungs to a bacterial shower from a ruminal acidosis.

A large group of 5-month-old calves were transported to a Central Otago farm for grazing. The grass on this farm was long and mature. Three weeks later, shortly after the calves were moved to another similar paddock, one was dead, another was recumbent and a third was still standing but appeared weak. All the affected calves were very thin but there was no evidence of diarrhoea. The live recumbent calf was struggling to breathe and died a few minutes later. A necropsy of this calf showed extensive consolidation of about 90 percent of both lungs. Histopathological examination of the lung revealed a severe acute fibrinosuppurative bronchopneumonia. A multiplex PCR for multiple respiratory pathogens identified only ***Histophilus somni.***

A large group of 200 calves were brought on to a Southland dairy farm. Shortly after their arrival it was noticed that about 50 of them had developed signs of keratoconjunctivitis (pink eye). Conjunctival swabs were taken from two severely affected calves and four mildly affected calves. ***Moraxella bovis*** was detected by PCR testing in both of the severely affected calves but not in the mildly affected calves. This finding could have implications when selecting which animals to treat when large numbers of animals are affected and there are economic constraints.

A group of 50 cows, calves and bulls on an Otago vineyard were tested for **bovine viral diarrhoea virus** (BVDV) after one of the 6-month-old calves died from mucosal disease. Thirty of the 33 remaining calves were identified as persistently infected, using PCR and BVD antigen ELISA testing. All the infected calves were in poor body condition. One of the breeding cows was also found to be persistently infected but BVDV was not detected in the remaining adult animals.

Over a short period there were three incidents in which small numbers of dairy calves in Otago and Southland died suddenly owing to infection with **bovine adenovirus type 10**. The diagnosis in these cases was made after the virus was detected in intestinal contents by PCR, and intranuclear viral inclusion bodies were found in the endothelium of mucosal or submucosal blood vessels.

Blood samples from a group of 17 Devon bull calves from an Otago sheep and beef property were tested as a single pool for **bovine viral diarrhoea** (BVD) by PCR. The pooled PCR result was strongly positive. Each bull was then tested individually with a BVD antigen ELISA test. One bull had a weak positive result and a repeat test a month later showed a similar result. This bull was the only one in the group that was smaller than the others and in poor condition. As this pattern of results was unusual (i.e. a strongly positive PCR test on the pooled samples but only a weak positive BVD antigen ELISA on an individual animal), and as there was a close association with sheep on this farm, it was decided to conduct further testing. A specific PCR test for BVD was negative. This supported the suspicion that infection with the closely related **border disease or hairy shaker disease virus** was the reason for the positive result with the less-specific PCR test originally used for screening. This phenomenon has been observed previously, but is rare.

Ovine

Thirty 5-month-old lambs in a group of 350 grazing a crop of chicory on a North Canterbury farm became sick over a 2-week period and all died. At necropsy all the lambs examined had pronounced perirenal oedema and ascites, and the kidneys were enlarged and pale. Histologically the kidneys had widespread multifocal tubular necrosis consistent with a toxic renal injury. The chicory crop had abundant redroot (*Amaranthus retroflexus*) in it, so ***Amaranthus* or redroot toxicity** was deduced to be the likely cause of the acute renal disease.

A veterinarian was called to perform pre-mating examinations on a group of rams in North Canterbury. Some had palpable lesions of epididymitis and were immediately removed from the group. Blood samples were collected from 29 animals and ELISA tested for *Brucella ovis* antibodies. Twelve of the 29 were positive to this test, confirming a significant ***Brucella ovis* infection** problem in this group of animals.

About six two-tooth ewes on a Wairarapa sheep farm developed unilateral facial swellings with a foetid odour. The affected ewes were grazing a lucerne crop and had been drenched several weeks previously. One ewe was euthanased and its head submitted to the laboratory for examination. There was a ragged tear about 7 cm long in the buccal mucosa of the cheek, extending deeply into the underlying muscle. There was a wad of grass and foul-smelling serosanguinous fluid within the defect. Histology of the affected area revealed a defect lined by necrotic cellular debris and numerous bacterial colonies. Culture of the masseter muscle produced a heavy mixed growth including ***Fusobacterium*** and ***Listeria*** spp. These findings were consistent with a **traumatic injury**, possibly the result of drenching with poor technique or faulty or damaged equipment.

Sixteen out of 210 mixed-age ewes from Levin were found dead over a 2-week period from late December to early January. Necropsy revealed haemorrhagic intestines and enlarged congested mesenteric lymph nodes. Histopathological examination revealed a severe fibrinonecrotising enteritis and lymphadenitis. Large numbers of rod-shaped bacteria were present within the lymph node. A heavy growth of ***Salmonella* Hindmarsh** from the intestinal contents of two of the affected ewes confirmed **salmonellosis** as the cause of this outbreak.

Forty of a group of 350 East Friesian lambs from Hawke's Bay were found dead. Necropsy revealed jaundice, red urine, white spots on the kidney and a bronchopneumonia. Histopathological examination revealed lesions in the kidney and liver suggestive of a haemolytic anaemia and ***Leptospira interrogans* Pomona** MAT titres were markedly elevated (> 1:1,600). Both of these findings strongly support a diagnosis of **leptospirosis.** Histopathological examination also revealed a severe suppurative bacterial bronchopneumonia that may have been an additional co-morbidity in these lambs.

On a large Central Otago sheep station it was noticed that among a group of 540 weaned lambs yarded for drenching there were two in poor body condition. One lamb died in the yards and the other died overnight. A necropsy by the attending veterinarian revealed abundant blood in the abdominal cavity and a necrotic spleen. Histopathological examination of a number of tissues from this lamb showed a multicentric lymphocytic periarteritis affecting the kidney, liver and lung. In some of the affected tissues, especially the kidney, the walls of the affected blood vessels were markedly thickened. These findings resembled those seen in chronic malignant catarrhal fever of deer, which is caused by the sheep-associated **ovine herpesvirus, OHV-2**. This virus was subsequently detected by PCR testing of blood from this lamb.

Four of 2,000 merino lambs on a large Otago sheep farm died after a short period during which they displayed neurological signs including blindness. Histopathological examination of the brain of one of these lambs showed a severe neutrophilic meningitis and ventriculitis. A moderate number of short gram-negative bacilli were found in these lesions. Fresh tissue was not available for culture but these findings are consistent with ***Histophilus somni*** meningitis. As well as meningitis, this organism can also cause suppurative arthritis and testicular and lymph node abscessation in lambs, as well as pneumonia in cattle.

On a farm in Te Awamutu some East Friesian lambs were presented with swollen heads. Necropsy by the attending veterinarian revealed a severe pleuropneumonia. Histopathological examination showed severe **fibrinosuppurative pleuritis** with intralesional bacteria. Bacterial culture was not possible but *Pasteurella, Histophilus* or *Mannheimia* spp. were considered the most likely candidates for this finding. The skin lesions were consistent with **photosensitisation of hepatogenous origin**. The exact cause was not evident but lesions were not typical of sporidesmin toxicity/facial eczema and another hepatotoxin was considered a more likely cause.

Severe keratoconjunctivitis (pink eye) lesions were present in about 300 one-year-old hoggets on a farm in the King Country. There had been no response to topical treatment with oxytetracycline powder. On culture there was heavy growth of ***Staphylococcus aureus*** and ***Escherichia coli***, and PCR testing detected ***Mycoplasma conjunctivae***.

Camelid

An alpaca cria from Northland was weaned but then reattached to its dam because it became unwell. Despite supportive care it became recumbent and then moribund. Necropsy after euthanasia showed multifocal pulmonary consolidation and a discrete mucosal ulcer in the pyloric region of compartment 3 of the stomach. Histopathological examination showed a bronchopneumonia and pulmonary vasculitis with fungal hyphae that had characteristics consistent with zygomycetes within the lumen of blood vessels and also in the vessel walls and interstitium of the lung. There was also an ulcerative gastritis with similar fungal hyphae seen within this lesion, leading to a diagnosis of **fungal gastritis and embolic pneumonia**. A combination of stress, the use of antibiotics, and probiotic treatment may have predisposed the cria to this condition.

Haemonchosis was diagnosed on several occasions in alpaca during this period. In one case a necropsy on an 8-month-old alpaca in Westland revealed findings suspicious for this disease. A faecal egg count showed 11,400 nematode eggs per gram of faeces, and worms recovered from the gastrointestinal tract were identified as ***Haemonchus contortus***. In another case an alpaca of unspecified

age from South Canterbury was noted to have pale mucous membranes and a high faecal egg count. All of the larvae recovered from the faeces after larval culture were *Haemonchus* spp. Histopathological examination of the abomasum revealed mucosal hyperplasia and mucus metaplasia considered to be consistent with parasitism.

A 1-year-old alpaca from mid Canterbury had an **abscess** on the shoulder that did not respond to treatment with amoxicillin. The attending veterinarian drained 3–5 litres of purulent material from the lesion and irrigated it. One sample of the purulent material and another of material aspirated from the deeper tissue were submitted for bacterial culture. A ***Lactobacillus*** species was isolated from both samples in heavy, predominant growth. Sensitivity testing was not requested. Two weeks later another visit revealed a persistent, large swelling with large areas of tissue necrosis, fibrosis and deep tracts within the affected area. Histopathological examination of a biopsy revealed chronic suppurative inflammation with surrounding fibrosis and abundant large intralesional gram-positive rods consistent with *Lactobacillus* sp. This organism is common in the environment and the gastrointestinal tracts of humans and animals and is not usually considered to be a primary pathogen; however, its predominance in this case suggested a significant role in the pathogenesis of this lesion.

Cervine

An experienced deer veterinarian suspected that a group of 8-week-old red deer in Canterbury were showing clinical signs consistent with copper deficiency. There was a history of lime being applied to the property. Serum samples collected from four animals all showed copper concentrations below the limit of detection of the test (< 3 umol/L; adequate range 8–22), supporting the clinical suspicion of **copper deficiency.**

Equine

A 19-year-old Thoroughbred mare from the Auckland region that was 3 months pregnant developed swelling of the nose and udder along with mild tachycardia. Haematology and biochemistry tests showed increased serum amyloid A (154 µg/mL; reference range < 10) and neutrophilia with a left shift. Neutrophil numbers were 8.2 x 10^9/L (reference range 2.9–6.9 x 10^9) and band neutrophil numbers were 0.7 x 10^9/L (normal level 0). These changes were suggestive of active inflammation. Bacteriological culture of a milk sample yielded a heavy growth of ***Streptococcus equi* ssp. *zooepidemicus***, consistent with **streptococcal mastitis.** This bacterium causes opportunistic infections and was reported as the most common isolate in a series of equine mastitis cases (McCue, 1989).

A 13-year-old Warmblood gelding from Auckland had a skin mass in the scrotal region at the site of a previous surgical incision for castration 12 years earlier. Histopathology of the mass showed a marked pyogranulomatous cellulitis with non-pigmented intralesional fungi, consistent with **hyalohyphomycosis**. Skin infections of this sort are generally caused by environmental opportunist fungi such as *Pseudoallescheria boydii*, which may be introduced into the skin through a wound.

Scrapings from a lesion on the cornea of a 4-year-old mare from Auckland were submitted to the laboratory for cytological examination. There was a neutrophilic inflammation with myriad fungal hyphae. Culture of fresh material collected from this site yielded a heavy growth of ***Microsporum* sp.** These findings were consistent with an unusual case of **keratomycosis**. In horses this is often associated with opportunistic fungi (commonly *Aspergillus* spp.) and may be a sequel to topical antibacterial or corticosteroid treatment.

Porcine

Swabs from the lungs of three pigs from a Canterbury piggery were received for culture at the laboratory. The submitting veterinarian considered the lesions seen at necropsy to be typical of ***Actinobacillus pleuropneumoniae* infection.** This bacterium was recovered in heavy growth from all three samples, supporting the clinical suspicion of this disease.

Avian

A 2-year-old backyard laying hen from Waikato was euthanased as it was observed to be unwell and the owner had lost several birds in the past with what were considered to be similar signs. No specific gross pathology changes were noted at necropsy. Histopathological examination revealed a bacterial salpingitis with extension of inflammation to the coelomic cavity. Culture of saved fresh tissue yielded *Escherichia coli* along with *Enterococcus* sp. and *Proteus mirabilis*. This condition of **bacterial salpingitis and coelomitis** is thought to be due to ascending infection, usually by *E. coli,* and may involve other predisposing factors such as an unsanitary environment or other concurrent infections.

Two parakeet chicks from an Auckland zoological collection died suddenly, with the remainder of the clutch dying soon after. Histopathological examination of tissues from the chicks showed hyperplastic and hyperkeratotic stomatitis, oesophagitis, ingluvitis and ventriculitis with intralesional yeast and pseudohyphae, consistent with **candidiasis**. This is usually linked to immunodeficiency.

Canine

A 6-year-old Japanese Spitz from Christchurch had dog-bite wounds that became infected. A swab from the wounds yielded a heavy mixed bacterial growth including a *Staphylococcus aureus* isolate that was resistant to cefoxitin as well as oxacillin. Cefoxitin resistance is used at the laboratory to screen for meticillin/methicillin resistance, so this isolate was considered to be a likely **methicillin-resistant *Staphylococcus aureus* (MRSA).** Such isolates are rarely seen at the Christchurch laboratory. The submitting veterinarian was advised to discuss the implications of this finding with the owners of the dog.

A faecal sample from a 5-month-old female spayed French Bulldog was positive for ***Salmonella* Mbandaka** and ***Giardia* sp.** when tested by microbial culture and ELISA respectively. A faecal sample tested one month earlier had been positive for both *Giardia* and *Cryptosporidium* on ELISA testing but had been negative for *Salmonella* on culture. No history was available, but as a diarrhoea-testing panel had been requested it was likely that this young dog had chronic diarrhoea.

Blood samples from two dogs from the same breeder were received for testing for Von Willebrand's factor (VWF). One dog, a 22-month-old entire male, had a VWF of 8 percent – within the range we would expect in an animal

with significant haemorrhage. The other dog, a 16-month-old entire female, had a VWF result of 38 percent. This is within the range expected in dogs that carry the Von Willebrand's disease trait but are unlikely to experience clinically significant haemorrhage. Normal dogs are expected to have results of 70–180 percent of the control sample, while 50–70 percent is considered equivocal, < 50 percent suggests a carrier state and < 36 percent indicates a carrier prone to haemorrhage (Stokol & Parry, 1993). It is recommended that dogs be re-tested 1 month after the initial test to confirm the result, or after 6 months if the dog was less than 6 months old when first tested. In this case, both dogs had been tested at an overseas genetics laboratory and the results indicated that they were both carriers of the **Von Willebrand's disease** trait.

A 6-year-old male Shih-Tzu cross dog from Hamilton was presented for veterinary examination with a 6-month history of vomiting, regurgitation and weight loss. A complete blood count was performed and the only abnormality noted was a mild increase in the number of nucleated erythrocytes. Some of these also exhibited a degree of basophilic stippling of the cytoplasm. A blood lead test was recommended and the concentration was found to be elevated, at 0.63 mg/L (reference range 0–0.3). A diagnosis of chronic **lead poisoning** was made. Upon further questioning it was found that the owners of the dog were in the midst of household renovations and pre-1970 paint was being stripped from the walls. This was the most likely source as lead-based paint was commonly used until the 1980s when the detrimental health effects on humans were realised.

Feline

A 6-year-old female spayed Domestic Shorthair cat was presented to a Wellington veterinarian with multiple white coalescing plaques on the ventral surface of the tongue. One lesion was biopsied. Histopathological examination revealed a focal plaque of mucosal hyperplasia. Scattered keratinocytes displayed viral cytopathic changes of finely granular basophilic cytoplasm, large vesicular nuclei, and/or perinuclear clear haloes (koilocytes). These findings were consistent with **feline oral papilloma.** Oral viral papillomas are infrequently reported in cats (Munday, 2015). They present as solitary or multiple lesions and are generally incidental, although the risk of malignant transformation is unknown.

A 7-year-old male neutered Persian cat was reported by the owner to have had chronic diarrhoea since it was a kitten. There was no improvement with the use of special diets or anti-inflammatory therapy. Faecal samples submitted for testing were positive for ***Giardia* sp. and *Salmonella* Typhimurium phage type 56** on ELISA testing and bacterial culture respectively.

Reptilian

An 18-month-old bearded dragon (*Pogona* sp.), part of a small colony housed in a large cage habitat, was found dead. Necropsy revealed only a pale fatty liver. Samples of liver, lung, intestine, brain and stomach were collected for histopathological examination. Examination of sections of the liver revealed severe fatty change and moderate numbers of macrophages arranged in small aggregates. Gram staining revealed large numbers of gram-positive bacilli scattered throughout the liver. Bacteriological culture of saved fresh liver yielded three different species of bacteria: *Salmonella* Onderstepoort, *Escherichia coli* and *Listeria monocytogenes.* It was concluded that the gram-positive bacilli seen in the histological examination of the liver were ***Listeria monocytogene,*** (since the other two organisms are gram-negative) and that this was the most likely cause of death. It was speculated that this infection might have been associated with the accumulation of decaying vegetable food material in the cage. The *E. coli* was considered likely to be a post-mortem invader and the *Salmonella* present as part of an subclinical carrier state.

Lagomorph

A rabbit breeder in North Otago reported ongoing poor growth and diarrhoea among some of the younger rabbits. One rabbit died and was submitted for veterinary examination. Another from the same litter displayed diarrhoea and poor growth. There was faecal staining around the hocks of both animals. Numerous red worms were seen in the stomach of the dead rabbit. Multiple fixed tissue samples were submitted to the laboratory for histological examination. There were disseminated aggregates of necrotic debris and neutrophils, centred on large colonies of bacteria, throughout the intestinal mucosa and spleen. Gram staining showed that the bacteria were gram-negative. In addition, very large numbers of coccidial organisms populated enterocytes within the small intestine, caecum and colon. The final diagnosis was combined **nematode parasitism, coccidiosis** and **yersiniosis.**

Macropod

An adult wallaby from an Auckland zoological collection was being treated for an orthopaedic injury but then developed pneumonia and was noted to have a mesenteric mass. The wallaby was euthanased and necropsied. Histopathological examination of multiple tissues revealed lymphadenitis, peritonitis, myocarditis, meningoencephalitis, pancreatitis, myositis, hepatitis and dermatitis, sometimes in association with protozoal cysts consistent with ***Toxoplasma gondii***. Captive marsupials seem to be particularly vulnerable to **toxoplasmosis**.

Piscine

A 7–8-year-old seahorse from an Auckland zoological collection swam abnormally for several days and then died. Histopathological examination of multiple tissues revealed an abdominal neoplastic mass composed of sheets of epithelial cells, with areas of necrosis and mineralisation. There are few reports of neoplasia in seahorses, but expert opinion from a pathologist in the US who specialises in wildlife diseases was that this was a **dysgerminoma** (ovarian tumour).

SVS Laboratories

Bovine

Twenty-seven cows from a dairy farm (total at-risk animals unknown) in Buller were tested for antibodies to ***Mycobacterium avium* ssp. *paratuberculosis*** (MAP). One animal did not have antibodies, one was equivocal and the remaining 25 were ELISA-positive for MAP antibodies. As the test specificity is 98.6 percent, a positive result is reliable evidence of *M. avium* ssp. *paratuberculosis* infection. Equivocal test results suggest a low antibody titre or a non-specific serological cross-reaction. While it is not unusual to have cows with clinical evidence of Johne's disease, it is

unusual to see such a large number of affected animals from one farm.

Milk from an adult dairy cow in Matamata-Piako was cultured for mastitic organisms. ***Geotricum* spp.** were the sole organisms isolated in this case. *Geotricum* spp. are opportunistic, keratinophilic, yeast-like fungi. They are found widely in nature, including soil, and are thought to enter the mammary glands through wounds on the teats. However, these fungi are rarely reported as a cause of mastitis and some reports suggest there is an increased risk of infection in animals that have had a prolonged course of antibiotics.

In mid-February, serum and blood from a downer cow of unknown age in the Bay of Plenty were submitted for chemistry and a CBC. There was a marked hypocalcaemia of 1.13 mmol/L (reference range 2.00–2.60) and a moderate hypophosphatemia of 0.75 mmol/L (reference range 1.10–2.80), which were considered the cause of recumbency. The serum zinc level was 63 umol/L, which is above the recommended range for facial eczema prevention (20–35). The CBC had a mild mature neutrophilia that was attributed to stress. Antagonism from **excessive zinc** was considered the cause of the hypocalcaemia in this case.

Blood samples were submitted from an 18-month-old heifer from Waikato that had pale mucous membranes and tachycardia. The haematocrit was 0.12 (reference range 0.24–0.40) and reticulocytes were 159.4 x 10^9/L (normal range 0.0–1.0 x 10^9), indicating a regenerative anaemia. The bilirubin was 43.9 umol/L (reference range 0.0–13.0) and protein and liver enzyme levels were normal. No haemoparasites were seen on the blood smear. However, a PCR test for ***Theileria orientalis* Ikeda** was positive.

In late March an 8-year-old cow in Waikato that had calved 3 days previously, presented with lethargy, weakness, dyspnoea and mild dehydration, and appeared anaemic and jaundiced. It had skin lesions consistent with previous photosensitivity. The bilirubin level was 66.1 umol/L (reference range 0.0–13.0) and protein and liver enzyme levels were normal. The haematocrit was 0.10 (reference range 0.24–0.40) and haemoglobin was 30 g/L (reference range 85–130). Organisms consistent with ***Theileria*** were present on the blood smears. Haemolytic anaemia caused by the pathogenic ***Theileria orientalis* Ikeda** is most often seen in stressed cattle around calving time, but animals of all ages can be affected. Organisms may not always be visible on the blood smears and PCR can be helpful in identifying the remaining cases.

Caprine

Colibacillary orchitis was diagnosed in an adult male Saanen goat from Whangarei. Clinically the animal presented with enlargement of one testis, about three times the size of the other. The testis was submitted for histology and culture. Histology was consistent with a diffuse chronic severe pyogranulomatous and neutrophilic orchitis and epididymitis with intralesional bacteria. ***Escherichia coli*** was cultured from the lesion.

Ovine

Two 2-year-old sheep from Bay of Plenty presented with non-responsive neurological signs. Blood samples were taken, the animals were euthanased, and brains were taken and submitted under the transmissible spongiform encephalopathy surveillance scheme. The animals had haematocrits of 0.09 and 0.11 respectively (reference range 0.27–0.45), with marked increased reticulocyte counts of 160.7 and 406.9 x 10^9/L (reference range 0.0–1.0 x 10^9) and total protein levels of 47 and 40 g/L (reference range 56–88). Hepatic enzymes were mildly increased in one animal (GLDH 154 U/L, reference range 0–20; and GGT 99U/L, reference range 32–70). Histologically, within the brain there was vacuolation and rarefaction within white matter tracts of the brainstem. Cortical white matter, grey matter neuropil and neurons were unaffected. A diagnosis of **severe regenerative anaemia due to blood loss** was made. Parasitism is the most common cause of this, but unfortunately faecal samples were not collected in this case. Differentials for the changes in the brain include hepatic encephalopathy and some neurotoxins. While hypoxic and ischaemic changes are most commonly observed in the grey matter, **chronic hypoxia** can occasionally cause similar white-matter lesions and was suspected in this case.

Equine

A uterine swab from a horse in Waipa was submitted. Myriad bacteria were seen on cytology and ***Aeromonas* endometritis** was diagnosed on culture. *Aeromonas* is more commonly isolated from faeces in adult horses and foals, but has been reported to cause up to 1 percent of equine abortions in cases where a cause could be found.

A 9-year-old mare from Waikato had a brown plaque on the cornea. A scraping of the material for cytology revealed thick mats of fungal hyphae that were identified as ***Cladosporium* sp**. on culture. This fungus is ubiquitous but of low pathogenicity, with only a single previous case report of *Cladosporium* keratitis in a construction worker.

In early to mid-February four 3–5-month-old foals from two Waikato farms presented with diarrhoea. Three had severe panhypoproteinaemia (serum proteins 20–33 g/L; reference range 42–66) while the remaining foal had normal proteins (49 g/L). PCR of faecal samples from all foals revealed ***Lawsonia intracellularis*** infection.

Poultry

Various tissues were submitted from two 4-day-old chicks from a flock in the Auckland area that showed increased mortality. Fixed bursae of Fabricius were mottled tan to red-brown. Histopathology was consistent with acute haemorrhage and oedema in the bursa of Fabricius. Fresh liver samples cultured positive for ***Escherichia coli*** and a **coliform coelomitis** was diagnosed. Underlying causes for changes in the bursa of Fabricius include necrotising enteritis (*Clostridium perfringens* or coliforms), avian adenovirus infection and infectious bursal disease (IBD) virus. Acute IBD infection in young chicks may present as haemorrhage and oedema of the bursa of Fabricius and can predispose chicks to coliform infections leading to death. In this case, chicks were PCR-negative for IBD viruses. Follow-up samples from additional birds included spleen. These birds had similar changes to those seen previously in the bursa of Fabricius, in addition to splenitis, which further supported the diagnosis of **coliform septicaemia** in these chicks.

A bobwhite quail (*Colinus virginianus*) had weight loss and was slowly deteriorating despite treatment with antibiotics, ivermectin and supportive care. The bird was euthanased owing to a poor long-term prognosis and

submitted for post-mortem examination. The caeca were grossly enlarged from intraluminal haemorrhage, necrosis and mural thickening with diphtheritic-like membranes (intraluminal casts). Histologically, necrotising typhlitis contained numerous extracellular and intrahistiocytic protozoal trophozoites (histomonads) that were 10–20 microns in diameter. The trophozoites were irregularly round, lightly eosinophilic and occasionally contained single central basophilic nuclei 3–5 microns in diameter, consistent with ***Histomonas meleagridis***. In addition, the caecal lumen contained multiple cross-sections of adult nematodes with a smooth, thin cuticle, lateral alae, polymyarian/coelomyarian musculature, lateral cords, a pseudocoelom, an intestinal tract lined by columnar uninucleate cells with a brush border, an ovary and a uterus containing developing ova, consistent with the caecal worm ***Heterakis gallinarium***. A diagnosis of **blackhead disease** was made. Histomoniasis is an economically important protozoan disease that causes severe necrotising typhlitis and hepatitis in turkeys, chickens, peafowl, grouse, quail, other gallinaceous birds and ducks. Turkey poults, peafowl and pheasants are the most susceptible of the gallinaceous birds to infection, which is rarely recognised in chickens though they may serve as carriers. *H. gallinarum* itself is not considered a major threat to the birds but is a major carrier/vector for *Histomonas meleagridis*.

Four-week-old chickens were presented for suspected adenoviral infection. Multiple fixed tissues were submitted including livers and spleens. The spleens were enlarged but histology was unremarkable. Splenomegaly is a non-specific finding associated with disease and ill-thrift in chickens. The livers were diffusely pale and histology showed random areas of necrosis. Occasional scattered hepatocytes at the periphery of the lesions had a few eosinophilic to basophilic intranuclear inclusion bodies that peripheralised nuclear chromatin. **Inclusion body hepatitis**, an adenoviral infection, was diagnosed. Avian adenoviruses are widely distributed throughout the world and infect domestic birds of all ages. In growing chickens there is about a 10 percent mortality rate and birds are most commonly affected between 3 and 15 weeks of age. Historically, adenoviral infections were thought to be secondary to immune suppression, but this is no longer the case.

A turkey from Waikato had multiple exophytic proliferative lesions around its beak and a biopsy was submitted. Necrotising and proliferative granulomatous dermatitis was seen, with swollen keratinocytes (ballooning degeneration) containing 15–20-micron eosinophilic intracytoplasmic viral inclusion bodies (Bollinger bodies), strongly supportive of **avian poxvirus** infection. Avian poxvirus is a slow-spreading viral disease of domestic, pet and wild birds. Transmission commonly occurs through inoculation from direct contact with injured skin, through mechanical transfer (including cannibalism and artificial insemination), mosquitoes, blood-sucking arthropods and inhalation of aerosolised feathers and scabs containing virus. It may occur as either a dry or wet form; the cutaneous form (dry pox) is the more common. Lesions of the diphtheritic form (wet pox) may be seen in the respiratory, gastrointestinal, nasal and conjunctival epithelium.

Cage bird

A banded rail (*Gallirallus philippensis*) from Waikato presented for respiratory distress. Post-mortem examination revealed yellow-nodular foci in the cranial coelom. Swabs were submitted for culture and ***Aspergillus fumigatus*** was isolated. This fungus can affect all species of birds and infection in adult birds is usually through inhalation of large numbers of spores from heavily contaminated feed, litter or the environment.

An adult female Antipodes Island parrot (*Cyanoramphus unicolor*) from Hamilton had a history of chronic respiratory distress. The lungs had areas of tan-to-red consolidation and the air sacs had yellow-to-tan nodular thickenings. Similar changes were seen at the base of the heart. Histomorphologic findings included granulomatous pneumonia and airsacculitis with intralesional fungal hyphae. Fungal hyphae were positive to periodic-acid-Schiff staining and had non-parallel walls and non-dichotomous branching. Fungal culture confirmed mycotic pneumonia and airsacculitis caused by ***Mucor* spp**. In addition, **visceral gout** was also seen at the base of the heart, characterised by coalescing eosinophilic to basophilic radiating acicular crystalline deposits (urate tophi) surrounded by macrophages and a few multinucleated giant cells. Gout is mainly due to impaired excretion or overproduction of uric acid. Impaired excretion by the kidneys may be due to severe dehydration, severe renal disease, post-renal obstruction or nephrotoxic compounds. While visceral gout would have contributed to morbidity in this bird, mycotic pneumonia is more likely to have been the cause of death owing to the extent (> 50 percent of the lungs and multiple air sacs) and reported chronicity of respiratory disease.

A second, co-housed Antipodes Island parrot had a similar history of chronic respiratory disease and was euthanased because of the poor long-term prognosis. Histologic granulomatous pneumonia and airsacculitis with intralesional fungal hyphae were seen. ***Aspergillus fumigatus*** was cultured from the lungs. This underscores the role of environmental contamination as a source of fungal infection in birds.

Canine

A dog from Hamilton presented with an inflamed slightly raised superficial skin lesion with mild crusting and areas of erosions on the right flank. Histology was consistent with a dermatitis, folliculitis and furunculosis with pyogranulomatous inflammation. Periodic-acid-Schiff (PAS) staining showed PAS-positive, 5–6-micron-wide hyphae with thin, parallel walls and irregular septation within the follicular infundibula and hair shafts. A diagnosis of **dermatophytosis** (**ringworm**) was made and the owners were advised that the lesion was zoonotic and to take appropriate precautions.

A 3-year-old female Fox Terrier dog from Hastings presented with an obstructive mass on the lateral arytenoids that recurred following a previous debulking procedure. A **laryngeal rhabdomyoma** was diagnosed on histology. Rhabdomyomas are rare benign laryngeal neoplasms of dogs. They are slow-growing tumours arising from striated muscle and rarely metastasise. Complete surgical excision is usually curative but they will recur after incomplete excision, as appeared to have happened in this case.

A 6-month-old dog from Waikato had a history of vomiting for a few days and was anorexic and slightly jaundiced. The kidneys were enlarged on ultrasound. There was no pyrexia. The dog had only received one set of vaccines at 6 weeks of age with no boosters and there was no history of *Leptospira* vaccination. Liver enzymes were elevated with ALP 686 U/L and ALT 170 U/L (reference ranges 0–185 and 0–75 respectively) and bilirubin was 69.9 umol/L (reference range 0–6). There was azotaemia, with elevated creatinine (380 umol/L; reference range 45–135) and urea (31.9 mmol/L; reference range 2.6–10.2). No significant changes were seen on haematology. Serology for canine *Leptospira* IgM was positive and a diagnosis of **leptospirosis** was made. After 2 weeks of treatment the renal parameters were within reference ranges, with only mild increases in ALP and ALT.

Guinea pig

A 1-year-old female guinea pig from Bay of Plenty was received for post-mortem examination. Three other guinea pigs from the same enclosure had recently died. The animal examined had been showing neurological signs including hindlimb paralysis and incontinence and died a short time later. Post-mortem examination revealed bruising around the neck and shoulders, on both stifles and bilaterally at the sacroiliac joints. Traumatic injury could have caused similar lesions, but as multiple animals had died recently, a presumptive diagnosis of **scurvy** was made. Scurvy is caused by **vitamin C deficiency** and may be seen in species that cannot produce vitamin C because they lack L-gulonolactone oxidase and therefore require exogenous sources from food or supplements. As vitamin C is not stored in the body, a continuous exogenous supply is needed. While vitamin C is present in plant materials, it is easily destroyed by heat, UV light and oxidation.

Reptile

A water dragon (*Physignathus cocincinus*) from Rotorua was being monitored for gastrointestinal parasites. On routine faecal flotation and egg count, 7,600 epg of ***Oxyuris* sp.** (pinworms) were found. Pinworms are common in the distal part of the intestine, especially in lizards. Oxyurids have a direct life cycle and lizards living in captivity in small enclosures can re-infect themselves repeatedly, which causes the nematodes to multiply much faster than in the wild.

A bearded dragon (*Pogona* sp.) from Rotorua presented with ulcerative stomatitis. Biopsies were submitted for fungal and bacterial culture. *Scedosporium* spp. and mixed *Pseudomonas aeruginosa, Proteus mirabilis, Enterococcus* spp. and *Enterobacter* sp. were isolated. *Scedosporium* is a significant opportunistic fungal pathogen and reports suggest that some species are resistant to antifungal drugs. The isolated bacteria are reported to be associated with oral ulceration in reptiles, and **mouth rot with secondary fungal infection** was diagnosed.

New Zealand Veterinary Pathology

Bovine

Six dairy weaners from a group of 100 in Wairarapa presented with stumbling that progressed to recumbency. The brain from one affected animal was submitted for histopathology, revealing marked laminar cortical neuronal necrosis. This lesion is typical of **polioencephalomalacia** caused by **vitamin B1 (thiamine) deficiency**. Diagnosis is usually confirmed by a response to treatment in the surviving animals. Other causes of polioencephalomalacia include salt poisoning or lead poisoning, and lesions have also been associated with high sulphur intake.

A 6-month-old female crossbred calf from Waipa presented with a history of poor growth, straining and bloody faeces. The animal had been drenched with an oxfendazole/levamisole combination a few days prior to collection of a faecal sample for *Yersinia* culture and parasitology. The only laboratory finding was moderate numbers of coccidial oocysts. A diagnosis of **coccidiosis** was made; this disease is most commonly seen in calves 3–8 months of age and the number of oocysts seen in a single faecal sample does not necessarily reflect the severity of disease. The presentation of straining to pass faeces that contain blood is typical.

Twenty 6-month-old heifer calves from a group of 60 in Taranaki were ill-thrifty, with slight scour and pyrexia (39.2–39.4°C, normal range 38–39). Faecal culture from two of three affected animals yielded ***Yersinia pseudotuberculosis***. Enteritis caused by *Y. pseudotuberculosis* often involves animals that have recently been weaned, especially in association with some stress factor like inclement weather or concurrent disease (such as BVD).

A farm in Horowhenua had sudden death of four 5-month-old Friesian calves from a group of 500. Post-mortem examination of two of the affected calves revealed severe fibrinous effusions involving the pleural, pericardial and peritoneal cavities. Ulcerative lesions were also present in the terminal ileum. Histopathology revealed a severe fibrinopurulent enteritis with large colonies of associated bacteria. This was initially suggestive of enteric listeriosis, but that was ruled out after Gram staining showed that the bacteria were gram-negative. Culture of liver and lung samples yielded heavy growths of ***Pasteurella multocida***. Pleuritis and peritonitis caused by infection with *P. multocida* capsular type B strain has previously been reported in New Zealand calves (McFadden et al., 2011), although the strain was not confirmed in this case.

In Hauraki, two mixed-age dairy cows with diarrhoea and haematuria had an abrupt drop in milk production. Haematology revealed moderate to marked regenerative anaemia (HCT 0.15 and 0.11, reference range 0.24–0.40) with numerous Heinz bodies in both animals. One cow also had an inflammatory leukogram, with a neutrophilia of 11.9 $x10^9$/L (reference range 0.7–4.7 $x10^9$), neutrophilic left shift and mild hyperfibrinogenaemia of 7.6 g/L (reference range 2.0–7.0). There were electrolyte changes on serum biochemistry consistent with inappetence and diarrhoea but the most significant finding was elevated serum zinc concentrations. As a consequence of over-zealous supplementation to mitigate the possible deleterious effects of sporidesmin toxicity, both cows had serum zinc concentrations of 190 µmol/L confirming **zinc toxicity**. Prophylactic zinc administration in anticipation of sporidesmin toxicity aims to produce serum zinc concentrations of 20–35 µmol/L. Above this level, serum zinc concentrations may be regarded as progressively increasing toxicity.

A dairy cow in Kapiti presented with a chronic facial abscess on the right cheek that partly responded to drainage and tetracycline treatment. A wedge biopsy was submitted for histopathology, which revealed a florid pyogranulomatous inflammatory lesion with eosinophilic club colonies consistent with ***Actinobacillus lignieresii*** infection, giving a histological diagnosis of **actinobacillosis**. Entry is via damaged skin, often related to prehension of thorny or spiky forage such as gorse when pasture is in short supply.

Two abortions at 5 months' gestation in Jersey cows on a Horowhenua property were investigated via histopathology of fetal and placental tissues. There was non-suppurative encephalitis and non-suppurative myocarditis in both fetuses, as well as a suppurative placentitis in one. The findings in the fetal brains and hearts were consistent with **neosporosis.** Gram-positive cocci were seen in the placental lesions consistent with a **bacterial placentitis** (but cultures were not performed). Abortion caused by ***Neospora caninum*** infection is commonly related to a concomitant infection or other abortifacient factor, the stress of which triggers re-activation of latent tachyzoites in the dam, leading to fetal infection.

A dairy farm in Hauraki had six 8-month-old female Jersey calves from a mob of 35 present with cough, increased respiratory rate, pallor, distended jugular veins and increased heart sounds. Four of the affected animals died. Antemortem serum biochemistry from one of the animals that died revealed evidence of muscle injury, with CK 8,015 IU/L (reference range < 578) and AST of 1,045 IU/L (reference range < 179). There was also evidence of hepatocellular injury, with GLDH 95 IU/L (reference range 8–41), which may also have contributed to the AST elevation. Necropsy revealed tissue oedema, ascites, a swollen liver and congested lungs. Histopathology revealed evidence of **chronic cardiomyopathy** accompanied by hepatic centrilobular degeneration and necrosis (presumably caused by hypoxic injury or chronic passive congestion). Skeletal muscle also showed evidence of myofibre degeneration. A toxic aetiology was strongly suspected, with a most likely diagnosis of **chronic monensin toxicosis**.

A 2-year-old steer in Canterbury presented with a large mass in the lower aspect of the neck, extending towards the sternum. Biopsies submitted for histopathology revealed highly vascularised mesenchymal tissue with a proliferation of small vessels with well-differentiated endothelium, leading to a diagnosis of **cutaneous/subcutaneous angiomatosis.** This is an uncommon, usually benign vasoproliferative lesion reported in cattle aged 1–5 years and differs from the progressive form reported in dogs.

Equine

A 10-year-old crossbred gelding from Rotorua presented with a 15 x 15 x 10 mm firm lump on the distal foreleg, involving an area of non-pigmented skin. Histology revealed thickened and hyalinised walls of the superficial dermal vasculature with mild solar elastosis and moderate parakeratosis. These findings are consistent with **photoactivated vasculopathy**, a poorly understood entity in horses thought to be due to photoactivation of environmental substances (e.g. from pasture plants) that then either cause direct injury or act as allergens.

A 10-week-old Warmblood filly in Manawatu presented with a 1-day history of pyrexia, colic and diarrhoea. A faecal PCR panel detected *Salmonella* sp., confirmed on faecal culture as ***Salmonella* Typhimurium**. This is one of the more common *Salmonella* serotypes isolated from horses, and in foals can cause acute diarrhoea and septicaemia.

A 2-year-old Thoroughbred filly in Kapiti presented at an agistment centre with a thick purulent bilateral nasal discharge, pyrexia (40.4°C), enlarged submandibular lymph nodes and submandibular tissue swelling. Cultures of a nasal swab yielded a moderate growth of ***Streptococcus equi* ssp. *equi***, consistent with a diagnosis of **strangles**. Owing to its highly contagious nature, this is one of the most frequently diagnosed and costly infectious diseases of horses, particularly where young or naïve horses are mixed. Complications occur in about 20 percent of cases and include metastatic spread of *S. equi* ("bastard strangles") and purpura haemorrhagica (immune-mediated vasculitis).

A 13-year-old Crossbred mare in Manawatu presented with swelling of the right paranasal sinus. A CT scan revealed a suspected cyst of this sinus and fluid in the left rostral maxillary sinus. A thin bone-walled cyst measuring 4 x 7 x 5 cm was surgically excised and submitted for histopathology, which confirmed a **paranasal sinus cyst** with an outer ossified wall and inner respiratory epithelial lining. These progressively expansive, space-occupying lesions can cause facial distortion and compression of adjacent tissues, leading to potential epiphora, exophthalmos, secondary sinusitis, structural teeth changes and headshaking. Horses over 10 years old are reported to be more prone to secondary complications owing to the reduced ability of the mature skull to remodel/regenerate (Fenner et al., 2018).

A 12-year-old Stationbred mare presented at the Massey Equine Hospital with a 2-year history of serous/mucopurulent nasal discharge from the left nostril and poor performance during hunting. Radiographs revealed a mass measuring 11 × 9 cm in the left caudal maxillary sinus and a smaller mass in the right maxillary sinus. Histopathology of the surgically excised mass revealed a multicystic **myxofibroma** of the paranasal sinus. Myxofibromas are rare, with few reports in the literature. Some have been reported to progress to carcinoma and others have resolved with radiation therapy (D. Knottenbelt, personal communication).

Ovine

An outbreak of sudden deaths in 4–6-year-old Romney ewes in Taupo was reported. About 50 from a group of 1,200 animals were affected in the weeks immediately after weaning. Affected animals presented with pyrexia (40.0°C) and scours. On post-mortem examination generalised reddening of the intestinal tract was noted. Histology revealed severe atrophic enteritis, and ***Salmonella* Hindmarsh** was isolated from faeces. This is a relatively typical presentation of disease associated with *Salmonella* Hindmarsh, which results in outbreaks of scouring and death (sometimes in the absence of clinical signs), most commonly from December to June. Stressful events may trigger outbreaks.

A 7-month-old Romney cross ewe lamb from Wairarapa exhibited photosensitisation of the periocular areas and both pinnae, with swelling of the tissues surrounding the hooves of the hind limbs. Yellowing of mucus membranes and haematuria were also evident. In addition to hyperbilirubinaemia and hyperglobulinaemia, serum biochemistry revealed a marked elevation of both GGT (1,015 IU/L; reference range 32–70) and GLDH (1,079 IU/L; reference range 0–20), consistent with **facial eczema**.

Caprine

A single 3-year-old female goat from Hamilton presented with recent loss of condition and reduced milk production. A submandibular lump was also present that had been growing for more than a year. The goat was euthanased and post-mortem examination revealed an 18-cm-diameter mobile submandibular mass containing thrombi, fibrous tissue and necrotic debris. Multiple dark haemorrhagic nodules up to 4 cm in diameter were found in the lungs, and a multilobular mass was attached to the right atrium of the heart. In the abdomen, the distal small intestine was found to have a thickened and oedematous wall with marked enlargement of the regional mesenteric lymph nodes. Histology of the mass lesions in the submandibular area, lung and heart revealed disseminated **haemangiosarcoma**, with an additional diagnosis of **granulomatous enteritis and lymphadenitis** consistent with **Johne's disease**. It is suspected that the right atrial neoplasm was the primary tumour, with subsequent metastasis to other sites. Vasoproliferative lesions are occasionally reported in goats, but these are usually subcutaneous in origin.

Avian

Three peafowl from Waikato presented with weight loss and inappetence, followed by death. Post-mortem examination of one revealed severe necrotising and haemorrhagic typhlitis accompanied by multifocal hepatic necrosis. The gross lesions were typical of **histomoniasis (blackhead)**. Peafowl are particularly susceptible to histomoniasis, which is caused by the protozoan ***Histomonas meleagridis***. This parasite is transmitted by the caecal nematode *Heterakis gallinarum*, although earthworms can also act as accessory hosts.

A single captive adult female kea presented with a binding suspected to be secondary to metritis. At the time of surgical removal of the egg, an abdominal swab was collected for bacterial culture. ***Escherichia coli*** was isolated. *E. coli* infection of the reproductive tract in layer hens is associated with "egg peritonitis", a combination of salpingitis and peritonitis that is most commonly diagnosed post-mortem. It was presumed that a similar process was present in this case.

An aviary in Auckland had two of 18 domestic pigeons suddenly die, with evidence of regurgitation on the perches and green droppings noted in the loft. Post-mortem examination of one bird revealed enlargement of the liver and on histology the tissue was found to be heavily infiltrated by sheets of mononuclear cells most consistent with **lymphosarcoma**. This neoplasm is occasionally reported in pigeons, often involving multiple organs. It is suspected that the other bird died from unrelated causes.

Canine

A 6-year-old male Blue Heeler from Waipa began vomiting after access to, and possible ingestion of, lead-based paint. Biochemistry was generally unremarkable but examination of the blood smear revealed 2+ erythrocyte stippling. The differential cell count included a nucleated RBC count of 98 per 100 WBC (reference level 0). Subsequent toxicology provided a whole-blood lead concentration of 0.7 mg/L (normal level 0.2 or less), confirming **lead toxicity**. Lead interferes with multiple enzyme systems, causing abnormalities in haeme synthesis, RNA degradation (resulting in basophilic stippling) and excessive numbers of circulating nucleated RBCs (erythroblastosis).

References

Ball BA, Almeida J, Conley AJ (2013). Determination of serum anti-Mullerian hormone for the diagnosis of granulosa-cell tumours in mares. *Equine Veterinary Journal* 45, 199–203.

McCue PM, Wilson WD (1989). Equine mastitis – a review of 28 cases. *Equine Veterinary Journal* 21(5), 351–353

Fenner MF, Verwilghen D, Townsend N, Simhofer H, Schwarzer J, Zani DD, Bienert-Zeit A (2018). Paranasal sinus cysts in the horse: Complications related to their presence and surgical treatment in 37 cases. *Equine Veterinary Journal* 51(1), 57–63.

McFadden AMJ, Christensen H, Fairley RA, Hill FI, Gill JM, Keeling SE, Spence RP (2011). Outbreaks of pleuritis and peritonitis in calves associated with *Pasteurella multocida* capsular type B strain. *New Zealand Veterinary Journal* 59(1), 40–45.

Munday JS, Fairley RA, Mills H, Kuipel M, Vaatstra BL (2015). Oral papillomas associated with *Felis catus* papillomavirus type 1 in two domestic cats. *Veterinary Pathology* 52, 1187–1190.

Stokol T, Parry BW (1993). Canine von Willebrand Disease: A Review. *Australian Veterinary Practitioner* 23(2), 94–103.

Quarterly report of investigations of suspected exotic diseases: January to March 2019

Exotic disease investigations are managed and reported by the Ministry for Primary Industries (MPI) Diagnostic and Surveillance Services Directorate, Wallaceville. The following is a summary of investigations of suspected exotic disease during the period from January to March 2019.

Enzootic bovine leukosis excluded: two cases

A Gribbles veterinary pathologist notified MPI via the exotic pest and disease hotline after confirming lymphoma in an 8-year-old male sheep with multiple firm nodes in the neck area. A biopsy of the lesions had been submitted by a private veterinarian concerned about *Corynebacterium pseudotuberculosis* (caseous lymphadenitis). The pathologist also notified MPI because of the potential for bovine leukaemia virus (BLV) to infect sheep – although this has only been achieved under experimental conditions (Djilali & Parodi 1989) – and because enzootic bovine leukosis (EBL) is thought to be absent from New Zealand's dairy herd. Histopathology showed diffuse dermal expansion by neoplastic lymphoid cells, consistent with a diagnosis of lymphoma. Fresh tissue was submitted to the Animal Health Laboratory (AHL) (Wallaceville), and nucleic acid was extracted and tested at the Livestock Improvement Corporation (LIC) using molecular assays for BLV (RNA) and "BLV-provirus" (DNA), which were negative. Antibody ELISA testing was not done as this test is validated for cattle only. Bovine leukaemia virus was excluded and the investigation closed.

In the second case, a veterinarian called the MPI exotic pest and disease hotline to report a suspect case of EBL in a 4-year-old dairy cow that had shown milk drop and weight loss over the preceding 2 months. The animal presented with severely enlarged prescapular and prefemoral lymph nodes and small (1–2-cm) subcutaneous nodules over the chest and flank. Histology of lymph node biopsies showed a large proportion of the normal lymph node architecture replaced by a diffuse, uniform proliferation of round cells that resembled large lymphocytes. Although BLV, the cause of EBL, is thought to be absent from New Zealand's dairy herd, there is a sporadic, non-contagious form of lymphoma that cannot be histologically differentiated. EBL is highly unlikely to occur in cows less than 2–3 years of age, but becomes more likely in older BLV-infected animals, typically 5–6 years of age or older. ELISA testing by Gribbles Veterinary Laboratories returned a negative BLV result. Nucleic acid extracted from fresh tissue submitted to the AHL was tested by molecular assay for BLV (RNA) and "BLV-provirus" (DNA), with negative results. BLV was excluded as the cause of the lymphoma and the investigation was closed.

Exotic *Salmonella* excluded

A veterinary pathologist called the MPI exotic pest and disease hotline to report finding an unusual strain of *Salmonella*, *Salmonella* Give, which was isolated from the faeces of two adult cows with foetid diarrhoea from a Waikato dairy farm. This strain is not often isolated in New Zealand, but it is thought to be worldwide in distribution and was isolated from clinically ill calves in Canterbury in 2005 (Varney, 2005). As this agent has been previously reported, the investigation was closed.

Exotic pig viruses excluded

A veterinary pathologist called the exotic disease and pest hotline to discuss a case of sow and weaner pig mortality in which the investigating pig veterinarian had concerns regarding anthrax as a potential differential diagnosis. Other exotic diseases that can cause similar signs include African swine fever or ASF (Ministry for Primary Industries, 2019), classical swine fever (CSF) and porcine reproductive and respiratory syndrome (PRRS). The farm ran the sow herd outdoors, with weaners and growers reared in open barns. The disease began in one of the sow paddocks, with sows and piglets affected by a polyserositis, and about half of them died over about 4 weeks. Other paddocks containing sows and weaner groups were subsequently affected, but to a lesser extent. Three affected weaners and a sow were euthanased for postmortem and sample collection. Samples were submitted to the AHL, where anthrax was excluded by blood-smear microscopy and PCR. Molecular assays for the exotic viral diseases (ASF, CSF, PRRS) all gave negative results. Bacterial culture of tissues and swabs identified a mixed growth including *Escherichia coli, Staphylococcus chromogens* and a range of streptococci with Lancefield Group C predominant in all pigs. The Lancefield Group C *Streptococcus* was confirmed as as *S. equi* subspecies *zooepidemicus. Streptococcus* Porcine circovirus type 2 (an endemic species) was detected by PCR. Histology identified a variety of lesions containing large numbers of small Gram-positive cocci in chains, consistent with streptococcal infection. Lesions varied from localised changes such as peritonitis, hepatitis and lymphadenitis in some, to septicaemia and disseminated intravascular coagulation in others. These findings were consistent with a bacterial septicaemia that was most likely due to *S. zooepidemicus*, a recognised but uncommon cause of bacteraemia in pigs. *S. zooepidemicus* is typically carried subclinically in the nasopharynx, and is regularly cultured from horse respiratory and uterine swabs, although it may also be found in other species including cattle, dogs, pigs, monkeys, birds and guinea pigs. It is also recognised as a potential zoonosis in humans who eat unpasteurised dairy products or are afflicted by underlying health conditions (Abbott et al., 2010; Acke et al., 2015; Gruszynski et al., 2015). Given that the herd was closed yet free-range, it is considered likely that *S. zooepidemicus* may have been introduced by wild birds (or potentially feral pig contact), particularly since the timing of the initial

cases coincided with significant wild bird mortalities on some of the farm ponds. Following antibiotic sensitivity testing, herd medication through drinking water was undertaken, along with implementation of an *S. zooepidemicus* (formalin-killed bacterin) vaccination programme, which effectively controlled morbidity and mortality. Exotic disease was excluded and the investigation stood down.

Porcine teschovirus confirmed

A veterinary pathologist contacted MPI after diagnosing encephalomyelitis and myocarditis in a group of experimental pigs. Initially, three out of 30 pigs in a university trial developed clinical signs that included increased body temperature, sneezing, shifting lameness and seizures. A fourth pig later was euthanased with similar clinical signs. The pigs were about 15 weeks old (about 25–35 kg liveweight) and were all housed separately, but they shared the same two rooms with circulating air, and technicians freely moved between them. All the pigs were sourced from the same commercial farm and had been in the study for 4–6 weeks. Gross morphology and histopathology were performed for all four pigs. Histologically, the major changes included lymphocytic encephalitis with neuronal degeneration and mononuclear myocarditis with multifocal myocardial necrosis. These changes are consistent with a viral aetiology, and exotic differentials included classical swine fever (CSF), and differentials that are not OIE-listed but have not been well defined in New Zealand pigs, such as encephalitis and myocarditis virus (ECMV) and the porcine teschoviruses (including what used to be called teschen and talfan diseases). PCR was positive for teschovirus in one sample of combined lymph node and tonsil, but negative for ECMV and CSF.

In New Zealand, Sutherland *et al.* (1977) reported a viral encephalomyelitis that caused severe illness and deaths in pigs under 4 months old, and which was isolated and re-inoculated into mice, where it also caused disease. In another report around the same time 11 enteroviruses were found in a litter of healthy piglets in New Zealand (Burgess, 1977). Molecular methods to detect enteroviruses (e.g. PCR) had not yet been developed but at least three were noted to be cytopathic (Burgess, 1977) and in 1982 an enterovirus was isolated from the brain of a pig with neurological signs (Anon., 1982). Neurological disease is not commonly reported in the NZ pig industry (Fairley, 1997), and since the development of modern PCR and reclassification there has not been a diagnosed case of teschovirus-associated disease within New Zealand. However, there is good evidence that viral pathogens causing encephalitis and myocarditis in pigs have been circulating for at least 40 years.

Teschovirus is no longer an OIE-listed disease and previous recommendations regarding international trade have been withdrawn. The decision was made because the disease is poorly defined: talfan and teschen viruses serologically cross-react and are indistinguishable from the other type 1 enteroviruses that circulate commonly in the pig population. Furthermore, disease caused by teschovirus has been rarely observed worldwide over the past 30 years, and the risk of removing controls was considered to be negligible. With the agreement of the Director General and the OIE Scientific Commission for Animal Diseases, all references to teschovirus encephalomyelitis were deleted from the OIE Terrestrial Animal Health Code (OIE, 2009). This report constitutes the first molecular confirmation of teschovirus-associated disease within New Zealand.

Exotic equine diseases excluded

A veterinary pathologist contacted MPI via the exotic pest and disease hotline to discuss two horses that had sudden-onset neurological signs proceeding within 12 hours to recumbency. The horses were both euthanased within 18 hours of onset. Neurological signs in horses can be caused by a variety of exotic agents, including exotic alphaviruses and flaviviruses and endemic agents such as equine herpesviruses and various toxins. While the clinical progression pointed to a toxicity event, blood samples (EDTA and serum) were submitted to the AHL and tested for a number of exotic disease agents. Testing was negative on specific and/or generic PCR tests for alphaviruses and flaviviruses, while virus-isolation techniques were negative for arboviruses. Virus isolation and PCR tests for endemic herpesviruses were also negative. Although the available samples were not optimal for excluding viral involvement, findings along with the clinical presentation and epidemiological findings supported the case against an infectious cause. The exotic disease investigation was closed.

Exotic equine diseases excluded

A veterinarian notified MPI after examining a 1-year-old Standardbred colt recently imported from Australia that presented with pyrexia (39.8°C), a bilateral serous-to-mucopurulent nasal discharge and mild cough. The horse had arrived 3–4 weeks earlier from Victoria by air along with six others that were unaffected. A deep nasal swab and acute and convalescent serum samples were submitted to the AHL, where the exotic differentials equine influenza, equine viral arteritis and equine infectious anaemia were excluded after negative PCR, VNT and AGID tests, respectively. Bacterial culture of the nasal swab identified a mixed growth, predominantly *Streptococcus equi* ssp. *zooepidemicus*. A generic herpesvirus PCR suitable for detecting all equine herpesviruses gave negative results. At this locality respiratory disease had been associated with *S. zooepidemicus* in the past and this was considered the likely cause of disease. The colt recovered uneventfully, with a rapid response to antibiotic treatment. Exotic disease was excluded and the investigation was stood down.

Avian paramyxovirus type 1 excluded

A specialist poultry veterinarian contacted MPI via the exotic pest and disease hotline to discuss a disease outbreak in a layer flock with up to 20 percent mortality in an 8-week period. Post-mortem investigation had identified peritonitis and lesions in the reproductive tract. The lesions were consistent with pasteurellosis in mature layer hens, and a heavy growth of *Pasteurella multocida* was isolated. Strains of *P. multocida* have been differentiated into Heddleston serotypes based on surface lipopolysaccharide (LPS) molecules. Bacterins based on these types are used for protective vaccination, and the locally

available vaccine captures Heddleston types 1, 3 and 4. The isolated strains were sent to an overseas laboratory and typed to LPS group 3, corresponding to Heddleston types 3 and 4.

In an attempt to look for a predisposing cause of the infection, the veterinarian had serological testing (Bio Check ELISA) carried out for avian paramyxovirus 1 (APMV-1) at a poultry industry laboratory. Two of three affected layer birds were seropositive on the ELISA and two of five unaffected birds were also positive. Several different pathotypes of APMV-1 are recognised. Pathogenic APMV-1 is exotic to New Zealand while non-pathogenic APMV-1 is present in New Zealand (Dunowska et al., 2013). There were no lesions consistent with pathogenic APMV-1 and there was no intestinal pathology that can sometimes be found with very low pathogenic APMV-1 viruses. For further investigation of this seropositivity, serum samples from 20 sick and 10 healthy birds were submitted to the AHL for APMV-1 haemagglutination inhibition testing. Six of the sick birds (30 percent) had positive titres of 1:8 (3 birds) and 1:16 (3 birds). One of the healthy birds had a titre of 1:16. These titres support exposure to a non-pathogenic APMV-1 at some point in the flock's life. Oropharyngeal and cloacal swabs along with caecal tonsil, liver and spleen from up to 30 birds were also submitted to AHL and were found to be negative for APMV-1 by real-time PCR. The presence of an exotic APMV-1 pathotype or a new emerging *Pasteurella multocida* strain type was ruled out and the investigation closed.

Infectious bursal disease virus serotype 2 (IBDV-2) confirmed

A poultry industry veterinarian reported that as part of monitoring undertaken at processing, mild bursal mucosal haemorrhage had been identified in about half of a sample of 50 bursae routinely cut open and examined. Samples were submitted for histology and to the AHL for serological and molecular assays. Serological screening using the IDEXX infectious bursal disease virus (IBDV) ELISA identified reactors in five of 10 birds sampled, with the VNT returning a range of low-positive titres (1 x 1:4; 1 x 1:6; 2 x 1:8; 1 x 1:16). Molecular assays for IBDV confirmed IBDV-2 (apathogenic: Rawdon et al., 2019), which can cross-react with assays for IBDV-1 (Ashraf et al., 2006). Histological findings confirmed haemorrhage (limited to beneath the superficial epithelium) and identified individual necrotic lymphoid cells (consistent with mild follicular degeneration) within about 10 percent of the bursal follicles. The remainder of the bursal follicles had cellularity that was normal for the age of the birds. The haemorrhage was likely an agonal change that occurred during slaughter, with the lymphoid degeneration consistent with changes seen as a result of infection with endemic viruses such as adeno- or circoviruses. Exotic strains of IBDV were excluded and the investigation was stood down.

Infectious bursal disease virus (IBDV) excluded

A poultry veterinarian called to report cases of bursal haemorrhage seen in 2–6-day-old broiler chicks. The chicks underwent postmortem because a number of flocks showed raised 7-day mortality figures of 1–3 percent, above the industry target of < 1 percent. Grossly, birds often had enlarged spleens, with occasional liver enlargement and frequent presence of a fibrinopurulent serositis. Bursal changes included gross haemorrhage and oedema. Based on these lesions, infectious bursal disease (IBD), caused by the exotic agent IBD virus type 1 (IBDV-1), could not be excluded. A range of tissues were collected for histology and bacteriology, and bursal tissues were submitted to the AHL for IBDV molecular assays. Histological changes included splenitis and haemorrhage (surrounding follicles), oedema and variable lymphocyte atrophy within the bursa of Fabricius. Bacterial culture identified a heavy growth of *Escherichia coli*. IBDV was excluded by PCR from all 10 bursal tissue samples submitted. The increased mortality was considered the result of colibacillosis/egg yolk sacculitis. Once hatchery hygiene measures were reviewed and improved, 7-day mortality figures for subsequent chick placements dropped to target levels. Exotic disease was excluded and the investigation was stood down.

Avian mortalities investigated

A bird rehabilitator called the exotic pest and disease hotline to report hearing from a volunteer of ongoing multiple bird deaths in multiple species, including waterfowl, at an Auckland Regional Council park in mid-winter 2018. Mortality events are not unusual in wild water birds, but occur mostly in summer (when they are due to botulism), with winter mortality events being uncommon. The duty incursion investigator spoke to the notifier, who was unable to provide any information on clinical presentations, dates or numbers and species of birds affected. One goose was submitted for postmortem at a commercial laboratory and found to have died from a traumatic injury. It was unclear whether this bird was representative of the other mortalities, but no further dead birds were presented or reported, and the council responsible for the park advised that they were not made aware of any further bird deaths. The mortality event appeared to be self-limiting, and the investigation was closed.

Proventricular dilatation disease excluded in macaw parrot

A veterinarian called the exotic pest and disease hotline to report suspect proventricular dilatation disease (PDD) in two macaw chicks from a parrot breeder. The chicks had been ill-thrifty, and on autopsy the vet had discovered that the proventriculus (glandular stomach) of both chicks was dilated and floppy. PDD is a condition associated with infection by avian bornavirus. This agent is thought to be exotic to New Zealand, and if present might be a risk to native parrots. Histopathology of the chicks showed the presence of coccoid bacteria within blood vessels of multiple organs, with fibrin thrombi in some sections. This is suggestive of sepsis with disseminated intravascular coagulopathy and a fatal sequelae. No sign of neuronal degeneration was seen that would be expected if avian bornavirus was the cause of the PDD. The investigation was closed.

Avian influenza excluded in red-billed gulls

A Kaikoura Department of Conservation

(DOC) ranger called the exotic pest and disease hotline to report mortality in up to 50 red-billed gulls on the Kaikoura Peninsula. The mortalities had occurred over the previous 3 weeks and were notified by various members of the public. The total number of gulls in the area is not known, and no other species were reportedly affected. A DOC ranger collected the only fresh carcass that was available, and noted that most of the carcasses were old. The dead bird was autopsied at the AHL and was noted to be very thin. Unfortunately it was too autolysed for any other meaningful post-mortem results to be obtained. Swabs from the oral cavity, cloaca, lung, kidney, spleen, liver, and brain were tested for presence of avian influenza by PCR, with negative results. Fresh carcasses were requested if more deaths occurred, but no further dead birds were reported and the investigation was closed.

Hepatozoon disease identified in albatross

A veterinary pathologist called the exotic pest and disease hotline about an unusual blood parasite in a mollymawk (*Thalassarche* sp.). Not much is known about diseases of New Zealand's subantarctic birds. However, the birds have wide ranges and migrate around the Southern Ocean, including South American and Australian waters. The blood smear contained a haemoparasite resembling a hepatozoon. Molecular amplification and sequencing was done by a Massey parasitologist, and the genetic sequence was found to be 89 percent similar to *Hepatozoon* spp., but was not able to be typed further. A *Hepatozoon*-type parasite has been recorded in the blood of a NZ-based royal albatross (Harvey & Alley, 2008), and researchers overseas have detailed infection with *H. albatrossi* in other members of the *Thalassarche* genus, including the grey-headed albatross (*T. chrysostoma*) and black-browed albatross (*T. melanophrys*). This investigation adds to what is known about *Hepatozoon* parasites in mollymawks. A publication is planned to follow.

Tracheal mite (*Acarapis woodi*) excluded

An AsureQuality Apiculture Technical Adviser contacted MPI via the exotic pest and disease hotline regarding an apiary where three out of six hives suffered a mass mortality event. The presentation was suggestive of a poisoning event, but an infestation of the exotic tracheal mite (*Acarapis woodi*) could present similar to a poisoned hive. A sample of bees was submitted to the AHL (Tamaki) for examination by an entomologist. There were no tracheal mites identified and the exotic disease component of the investigation was closed. Residue testing was conducted on another sample of dead bees for up to 60 commonly used pesticides, but no pesticide was identified. However, a poisoning event remained the most likely explanation for the bee mortalities seen.

European foulbrood excluded

An AsureQuality Apiary Officer reported to MPI that larvae in a diseased Canterbury hive had signs consistent with European foulbrood (EFB), the disease caused by the exotic bacterium *Melissococcus plutonius*. Samples of affected larvae were collected and submitted to the AHL for testing. *M. plutonius*, the causative agent for EFB, was excluded by molecular assay.

Heartworm excluded

A veterinarian called the exotic pest and disease hotline to report a cat that had arrived from Argentina 15 days earlier, spent 10 days in quarantine, and then had been vomiting since its release. The main exotic disease concern was heartworm (*Dirofilaria immitis*) but the veterinarian thought the vomiting was most likely due to a dietary problem. The incursion investigator requested that radiographs be taken to look for signs of heartworm parasites or gastrointestinal blockages, and these showed no abnormalities. The animal was treated with antibiotic and antiemetic medications, and subcutaneous fluids, and within a few days was fully recovered. The investigation was closed.

Exotic ticks excluded

A member of the public contacted MPI via the exotic pest and disease hotline to report finding a tick on his leg just hours after returning from a holiday in New Caledonia. The tick was submitted to the MPI Plant Health and Environment Laboratory (PHEL) in Auckland (**Figures 1 and 2**), where an entomologist identified it as an ixodid tick of the *Amblyomma* genus. The un-engorged nymph could not be identified to the species level. However, molecular investigation found it to have 85 percent match to *A. testudinarium*, *A. nuttali*, *A. personatum*, *A. geoemydae* *A. sparsum*, and *A. nodosum,* among others of the *Amblyomma* genus. The notifier was advised to contact human health professionals if he became unwell, owing to the known activity of this genus as a vector for disease. The investigation was closed.

Figure 1: Dorsal view of submitted tick: *Amblyomma* sp. (Acari: Ixodidae), an unengorged nymph (Credit: MPI PHEL Tamaki)

Figure 2: Ventral view of submitted tick: *Amblyomma* sp. (Acari: Ixodidae), an unengorged nymph (Credit: MPI PHEL Tamaki)

Brown dog tick exclusions: five cases

There were five cases of suspect brown dog tick (*Rhipicephalus sanguineus*) incursions during this quarter. In the first case, a member of the public from Wellington city called the exotic pest and disease hotline to report having found a tick on the family dog. Two days previously the family had returned from a holiday in the upper North Island, making the endemic New Zealand cattle tick (*Haemaphysalis longicornis*) the most likely diagnosis as it is well

established in that region. It is not known to be established in Wellington city. However the brown dog tick is an exotic differential (Pleydell et al., 2015). The tick was submitted to an entomologist who identified it as a practically fully engorged adult female *H. longicornis*. That stage can take around 7 days to fully feed, consistent with its having been picked up in the upper North Island. An exotic tick incursion was ruled out and the investigation closed.

An Auckland dog owner called the exotic pest and disease hotline to report finding over 50 ticks on his Japanese Spitz while holidaying in rural Northland. Again, this travel history suggested that these were most likely *H. longicornis* (the New Zealand cattle tick) rather than the exotic brown dog tick. However, visual examination alone cannot definitively distinguish these two species. Furthermore, if it was routinely assumed that all ticks seen within the known range of *H. longicornis* range were that species, then an incursion of *R. sanguineus* could be missed. Eleven ticks were submitted to the PHEL (Tamaki) for identification. These were identified as one adult female and 10 nymph stages of *H. longicornis*. An exotic tick incursion was ruled out and the investigation was closed.

A North Canterbury veterinarian used the exotic pest and disease hotline to report finding a tick on a Huntaway dog. This was unexpected given that the mostly likely tick, *H. longicornis* (NZ cattle tick) had not previously been identified in this area. A less likely exotic differential was the brown dog tick. The tick was identified as an adult female *H. longicornis*, partly engorged, suggesting it had been attached for about 4–5 days. During that time the dog had worked on a farm in the Conway area but had also been to a farm in Cheviot. It had not been further afield in 7 weeks. The current South Island east coast distribution records confirmed for *H. longicornis* include Seddon, Kaikoura and Christchurch (Allen Heath, pers. comm.). This report closes the South Island east coast distribution gap for *H. longicornis*. An exotic tick incursion was ruled out and the investigation was closed.

A member of the public contacted MPI to report finding a single partially engorged tick on the head of her dog. The dog lived on a Northland lifestyle block that had recently had the addition of four sheep. The tick was submitted to PHEL (Tamaki) and identified as the New Zealand cattle tick, *H. longicornis*. Exotic tick species were excluded and the investigation was stood down.

A member of the public from Napier called the exotic pest and disease hotline to report having found a tick on the family dog. Five days previously the family had returned from a picnic at Waipatiki Beach, making the endemic New Zealand cattle tick the most likely diagnosis as it is well established in that region. It is not known to be established in Napier city. An entomologist identified it as a nearly fully engorged adult female NZ cattle tick (*H. longicornis*). The investigation was closed.

Brucella canis excluded

A veterinary pathologist called the exotic pest and disease hotline to report severe orchitis and epididymitis in tissues submitted from a 10-year-old Huntaway dog in Taranaki. The dog was New Zealand-born and had reportedly minimal or no contact with other dogs or wild pigs, but *Brucella* spp. involvement could not be ruled out on histopathology. *B. canis* and *B. suis* are exotic to New Zealand. Fresh tissue had not been saved from the dog to expedite PCR testing, but DNA was extracted from fixed testicular tissue at the AHL (Wallaceville) and this was negative on generic *Brucella* PCR testing. However, sensitivity can be reduced where DNA is extracted from fixed tissue, so at the same time serum from the dog was tested for *B. canis* using a card test, which was negative. *B. suis* testing was subcontracted to an overseas laboratory, where it was ruled out using a cytoplasmic AGID test. Exotic disease was ruled out and the investigation was closed.

Blastomycosis excluded in imported dog

A companion animal veterinarian called the exotic pest and disease hotline to discuss a clinical presentation in a 7-year-old neutered male dog that had been imported from the United States 5 months prior. Clinical signs included lethargy, fever, soft tissue swelling, joint swelling and lameness in a forelimb. The dog had previously been diagnosed and treated for the exotic fungal infection blastomycosis, a multifocal fungal infection caused by the dimorphic fungus *Blastomyces dermatitidis*. The current presenting signs meant that a recurrence of blastomycosis was a differential diagnosis. A synovial fluid fungal culture at the AHL was negative. A urine sample submitted to a US laboratory for the enzyme immunoassay test for blastomyces was also negative. Concurrent with the exotic disease rule-out, parallel diagnostic work arrived at a diagnosis of septic arthritis (*Staphylococcus aureus* was cultured). The dog recovered ofter antibiotic treatment and the investigation was closed.

References

Abbott Y, Acke E, Khan S, Muldoon EG, Markey BK, Pinilla M, Leonard FC, Steward K, Waller A (2010). Zoonotic transmission of *Streptococcus equi* subsp. *zooepidemicus* from a dog to a handler. *Journal of Medical Microbiology* 59, 120–123. DOI: 10.1099/jmm.0.012930-0

Acke E, Midwinter AC, Lawrence K, Gordon SJG, Moor S, Rasiah I, Steward K, French N, Waller A (2015). Prevalence of *Streptococcus dysgalactiae* subsp. *equisimilis* and *S. equi* subsp. *zooepidemicus* in a sample of healthy dogs, cats and horses. *New Zealand Veterinary Journal* 63(5), 265–271. DOI: 10.1080/00480169.2015.1016133
Anonymous (1982). Porcine poliomyelitis. *Surveillance* 9(3), 16.

Ashraf S, Abdel-Alim G, Saif YM (2006). Detection of antibodies against serotypes 1 and2 infectious bursal disease virus by commercial ELISA kits. *Avian Diseases* 50(1), 104–109.

Burgess GW (1977) The isolation and characterisation of porcine enteroviruses. *New Zealand Veterinary Journal* 25(7), 176–178.

Djilali S, Parodi AL (1989). The BLV-induced leukemia–lymphosarcoma complex in sheep. *Veterinary Immunology and Immunopathology* 22, 233–244.

Dunowska M, Zheng T, Perrott MR, Christensen N (2013). A survey of avian paramyxovirus type 1 infections among backyard poultry in New Zealand, *New Zealand Veterinary Journal* 61(6), 316–322.

Fairley R (1997). Infectious diseases of pigs in New Zealand. *Surveillance* 24 (2), 5–7.

Gruszynski K, Young A, Levine SJ, Garvin JP, Brown S, Turner L, Fritzinger A, Gertz RE, Murphy JM, Vogt M, Beall B (2015). *Streptococcus equi* subsp. *zooepidemicus* Infections Associated with Guinea Pigs. *Emerging Infectious Diseases* 21(1), 156-158. DOI: 10.3201/eid2101.140640

Harvey C, Alley, M (2008). Current Veterinary Laboratory Surveillance of Avian Haemoparasitic Diseases in New Zealand. Kokako 15, 15–19.

Ministry for Primary Industries (2019) African Swine Fever. Available at: https://www.mpi.govt.nz/protection-and-response/readiness/african-swine-fever/

Pleydell E, O'Connell J (2015). Exotic ticks identified in Canterbury. *VetScript* 28 (4), 19–20.

Rawdon T, Stanislawek W, Soubies S, Eterradossi N, Buckle K, Jones B (2019). Infectious bursal disease virus serotype 2 (IBDV-2) in New Zealand poultry and waterfowl. *Surveillance* 46(1), 4–7.

Sutherland RJ, Horner GW, Hunter R, Fyfe BH (1977). An outbreak of viral encephalomyocarditis in pigs. *New Zealand Veterinary Journal* 25(8), 225. DOI: 10.1080/00480169.1977.34412

Uhart, M, Gallo, L, Quintana F (2018). Review of diseases (pathogen isolation, direct recovery and antibodies) in albatrosses and large petrels worldwide. *Bird Conservation International* 28(2), 169–196. DOI:10.1017/S0959270916000629

Varney K (2005). Quarterly review of diagnostic cases: July to Sept 2005, *Surveillance*, 32(4), 14–19.

Webb K, Jolley KA, Mitchell Z, Robinson C, Newton JR, Maiden MCJ, Waller A (2008). Development of an unambiguous and discriminatory multilocus sequence typing scheme for the *Streptococcus zooepidemicus* group. *Microbiology-Sgm* (154), 3016–3024.

Thomas Rawdon
Manager
Biosecurity Surveillance and Incursion Investigation (Animal Health)
Diagnostic and Surveillance Services Directorate
Biosecurity New Zealand,
Ministry for Primary Industries
Thomas.Rawdon@mpi.govt.nz

Quarterly report of investigations of suspected exotic marine and freshwater pests and diseases: January to March 2019

Exotic marine and freshwater pest and aquatic disease investigations are managed and reported by MPI Diagnostics & Surveillance Directorate, Wallaceville. The following is a summary of investigations of suspected exotic marine and freshwater diseases and pests during the period from January to March 2019.

Mantis shrimp range extension, Auckland

MPI was notified by NIWA that a suspect *Oratosquilla oratoria* (Japanese mantis shrimp) had been collected by fishermen in the Manukau Harbour during a research project. *O. oratoria* is considered an established pest, but had not previously been found this far south. A sample was submitted to the Marine Invasives Taxonomic Service (MITS) at NIWA, and confirmed to be *O. oratoria*. This represents a significant range extension for the species. Auckland Council was made aware of the range extension and the investigation was stood down.

Pipi mortality investigated, Whangarei

Northland Regional Council staff contacted MPI to report mortality in pipi (*Paphies australis*) at Munro Bay, Whangarei Harbour. Samples were collected and submitted to MPI's Animal Health Laboratory (AHL) to rule out exotic disease and add to the wider work being carried out on shellfish health. Results of disease testing showed no significant abnormalities in the shellfish. *Rickettsia*-like organisms (RLOs) were present in the gill epithelium and digestive tubules but were not associated with any haemocyte infiltrate. RLOs are commonly associated with shellfish mortalities but their significance is unknown. As no exotic disease was detected and the mortality event appeared to have finished, the investigation was closed.

Fanworm investigated, Russell

Northland Regional Council contacted MPI to report that a vessel recently hauled out from Matauwhi Bay, Bay of Islands, was suspected of carrying *Sabella spallanzanii* (Mediterranean fanworm). This established pest is only present in some parts of New Zealand. Steps are being taken by regional councils and MPI to try and prevent its spread, which largely occurs via biofouling and vessel movements. A sample submitted to MITS was identified as a native fanworm (*Branchiomma* sp.). As this did not represent a biosecurity risk, the investigation was closed.

Green-lipped mussel mortality investigated

An aquaculture facility notified MPI of mortality in green-lipped mussel (*Perna canaliculus*) broodstock. Cumulative mortality over several days was recorded to be around 30–35 percent. The broodstock mussels were held in a secure room, isolated from other operations, with dedicated equipment. The broodstock received water and food from earthen seawater ponds that could get very warm and showed wide fluctuations in temperature, food, pH and oxygen levels caused by diurnal cycles and algal growth. Warm summer conditions can be challenging for broodstock and some mortality is expected. However, this summer very high mortality occurred rapidly, raising concerns that there might be other causal factors.

Ten animals were selected for gross and histological examination. Samples were taken for bacteriology, culture and molecular testing for *Perkinsus* spp. Bacteriology showed mild to moderate growth and common isolates of *Vibrio* and *Photobacterium* spp. Histology revealed *Perkinsus* cells in only one animal. Bacteria were seen within inflammatory cells and areas of tissue inflammation were seen in one animal. Culture for *Perkinsus* showed light to moderate infection in nine of the 10 samples. Quantitative PCR was positive for *P. olseni* (endemic) and negative for *P. marinus* (exotic). There was no obvious pathology associated with *Perkinsus* and it was not considered to be the cause of this mortality event.

The mortality rate dropped off over the 2 weeks after notification, quickly returning to a baseline of nearly zero. The mortality was deemed to have been caused by a combination of elevated pond temperatures, opportunistic bacteria and perhaps the presence of *P. olseni*. No exotic disease was identified and the investigation was closed.

Goby species investigated, Coromandel Peninsula

An ecologist undertaking a survey of an estuary in Bay of Plenty found an unfamiliar fish in a fyke net. The ecologist notified MPI to determine whether this was a new to New Zealand species. The Incursion Investigator obtained photographs of the specimen and sent these to a Te Papa fish taxonomist for species determination. The fish was identified as *Parioglossus marginalis*, commonly known as the dart goby. This species is typically found in shallow estuarine and coastal marine environments in association with sand and rocky substrata. It is known from southeastern Australia and there are two records from New Zealand, at Great Barrier Island and in Northland. The dart goby is likely to have been introduced by a vessel visiting from Australia. The larvae could not cross the Tasman Sea in currents, so they were probably sheltering in niche areas of the ship, such as the sea chest. As this is not a new to New Zealand species, the investigation was closed.

Mussel species investigated, Auckland

A diver notified MPI of a suspected Asian green mussel (*Perna viridis*) after undertaking a pre-voyage biofouling survey of a vessel moored in Auckland.

The vessel had returned from an overseas voyage in October 2018. A single specimen of the mussel sent to MITS was identified as *Perna canaliculus*, the New Zealand green-lipped mussel. As this is an endemic species there was no biosecurity risk and the investigation was closed.

Goby species investigated, Tauranga

A community group monitoring and restoring the Te Rereatukahia Estuary, near Katikati, found an unfamiliar fish in the sediment and notified MPI, concerned that it could be a new to New Zealand species. They had released the fish but taken photographs. The Incursion Investigator requested that a fish taxonomist examine the photographs and attempt to identify the species. The taxonomist narrowed it down to two possibilities: *Arenigobius bifrenatus* (the Australian bridled goby) or *Acentrogobius pflaumii* (the Asian goby), but could definitively identify it from the photos alone.

Arenigobius bifrenatus was first discovered in the Waitemata and Whangateau Harbours on the northeast coast of North Island in 1998. It is thought to have been introduced when juveniles or larvae were transported in ships' ballast water released in ports of call. This species is endemic to southern Australia, from Moreton Bay (Queensland) to the Perth region of Western Australia and around Tasmania. It inhabits burrows in the muddy areas of shallow bays and estuaries in 0–10 m. *Acentrogobius pflaumii* was first reported in New Zealand in about 2001 when it was collected from the upper reaches of the Waitemata and Whangapoua Harbours. It is likely this species was also introduced in ships' ballast water. It may have arrived directly from its native range in the northwest Pacific Ocean (where it is native to Japan, China and Korea), or indirectly via Australia, which it invaded before 1996. Both gobies have been found only on the east coast of the North Island. As they are already established in New Zealand the investigation was closed.

Paua mortality investigated, Marlborough

Commercial divers noticed unusual paua mortality in the Marlborough Sounds and notified MPI. The divers saw around 100 dead shells and a small number of moribund black-foot paua (*Haliotis iris*) and yellow-foot paua (*H. australis*). Specimens of both species were collected and submitted to the AHL to test for causal pathogens. Ten animals of each species were selected for gross and histological examination. Samples were taken for bacteriology, fungal culture, *Perkinsus* culture and molecular testing for abalone viral ganglioneuritis virus (AVGV).

Vibrio splendidus was identified biochemically and confirmed by DNA sequencing. *Vibrio* spp. are common marine bacteria, but because this species was isolated from only one of the 20 specimens it was probably not significant. Results were negative for *Perkinsus* and AVGV.

None of the black-foot paua showed any significant abnormalities on macroscopic examination and after removal of shell. Six of the yellow-foot paua had macroscopic abnormalities of the shell and epithelial surface. All yellow-foot paua showed evidence of helminths present in their connective tissues. These would present an opportunity for the entry of bacteria (e.g. *Vibrio* spp.) or fungi that could cause a secondary infection. Further, the helminth infestation could predispose them to a weakening of the foot, resulting in poor attachment to the substrate (Bower, 2001).

It is possible that infection of the shell can predispose the animals to morbidity, although there is no evidence that this causes mortality in paua species. However, with severe infections there may be development of systemic disease (especially where *Vibrio* spp. are present) that can cause mortalities (Bower, 2017). As no exotic disease agents were found the investigation was closed.

Rash on trout investigated

Fish & Game Otago contacted MPI about a single brown trout (*Salmo trutta)* caught in the lower Taieri River, which had a rash on the underside of the stomach. The fish was otherwise in good health. Up to 10 other brown trout in the area had presented similarly.
A sample was collected but was not able to be sent to the AHL before it deteriorated. Fish & Game were asked to collect another fish for testing but a period of bad weather made for poor fishing conditions. No other affected fish were caught and after two months there were no more reports to MPI or Fish & Game. The investigation was closed at this point.

Marine slime investigated, Nelson

Staff at Nelson Marina contacted MPI about a peculiar-looking slime forming clear structures on the bottom of a yacht. The boat had been lifted and cleaned 3 weeks previously and had been used regularly. A sample was collected, frozen and submitted to NIWA for identification. Getting species confirmation was made difficult by freezing, which can degrade samples. However, NIWA was able to determine that it was most likely ordinary boat slime made up of microalgae and diatoms bound in sediment and mucus. The notifier was advised of the result and as there was no identified biosecurity risk, the investigation was closed.

Crab mortality investigated, Tauranga

A member of the public contacted MPI to report a large number of crabs washed up on the mudflats in Welcome Bay, Tauranga Harbour. The crabs were in varied states of degradation, from moribund to rotten. They were white and 30 mm in length. The caller was unable to collect samples. MPI fishery officers in Tauranga were contacted and visited the site next day but did not report seeing any crabs washed up on the beach. As no samples were available for testing the investigation was stood down but the member of the public was asked to notify MPI and collect samples if he sees the event again.

Fish mortality investigated, Taupo

Members of the public at Oruatua Bay, Lake Taupo, notified MPI after noticing a mass mortality of what they said were small trout, just a couple of metres from shore. The Incursion Investigator contacted the Taupo District Council to organise sample collection but by the time the field officer arrived the only fish remaining already appeared to be decomposing and were unsuitable for analysis. Also, the field officer ascertained that these were a native species of bully

(family Eleotridae), not small trout. The field officer referred to a similar case in the past year where common bullies were found dead at Taupo. The fish had been heavily infested with parasites, and the situation was aggravated by localised stressful post-spawning conditions, so it was considered that they had died of natural causes.

Events like this are common and are thought to be due to local weather effects such as elevated water temperatures. It is also thought that natural post-spawning attrition may be common and possibly exacerbated by heavy parasite loads in the fish. Given the very large numbers of bullies in these lakes, living mainly on the margins, the scientists considered this to be a natural event with no general threat of actual population decline.

Lacking fresh samples for analysis, this investigation was closed as it was likely to be a similar natural event to those that had been described before.

References

Bower SM (2001). Synopsis of infectious disease and parasites of commercially exploited shellfish: Nematode Parasitism of Abalone. http://www.dfo-mpo.gc.ca/science/aah-saa/diseases-maladies/nemparab-eng.html. Accessed 8 March 2019.

Bower SM (2017). Synopsis of infectious disease and parasites of commercially exploited shellfish: Bacterial diseases of abalone. http://www.dfo-mpo.gc.ca/science/aah-saa/diseases-maladies/vibrioab-eng.html. Accessed 8 March 2019.

Francis MP, Walsh C, Morrison MA, Middleton C (2003). Invasion of the Asian goby, *Acentrogobius pflaumii,* into New Zealand, with new locality records of the introduced bridled goby, *Arenigobius bifrenatus. New Zealand Journal of Marine and Freshwater Research* 37(1), 105–112. DOI: 10.1080/00288330.2003.9517150

Roberts CD, Stewart AL, Struthers CD, eds. The Fishes of New Zealand. Wellington: Te Papa Press. Vol. 4, p. 1575.

Michael Taylor
ManagerBiosecurity Surveillance and Incursion Investigation (Aquatic and Environment Health)
Diagnostic and Surveillance Directorate
Biosecurity New Zealand, Ministry for Primary Industries
Michael.taylor@mpi.govt.nz

Plant health surveillance and incursion investigation report: January to March 2019

The Ministry for Primary Industries (MPI) Incursion Investigation team and Plant Health and Environment Laboratory (PHEL) investigate and diagnose suspect exotic pests and diseases in the plant and environment sectors. Investigators and scientists are based in Auckland, Wellington, Rotorua and Christchurch. These teams provide field investigation, diagnostic testing and technical expertise to detect and report new pests and diseases affecting plants and the environment. They support surveillance and response functions, including carrying out research and development.

The MPI Incursion Investigators received 489 plant and environment notifications during the 3-month period January to March 2019 (**Figure 1**), a 10 percent increase compared with the same quarter in 2018 (444). Investigators immediately stood down 100 notifications where the presence of biological risk was ruled out. Compared to the same period in 2018, 114 more cases were further investigated to mitigate the biological risk. The complexity and biosecurity risk associated with some notifications meant that some responses were transferred to MPI's Response Group which, with the assistance of the IIs and PHEL, conducts responses to eliminate, reduce or contain the threats and potential impacts of biosecurity incidents.

Investigations transferred to Response Group

Fruit-fly interceptions

The early detection of exotic pests such as fruit fly minimises costs associated with managing an established population through to eradication. The value of MPI's targeted surveillance programmes was evidenced by the three fruit-fly detections described here.

A single male Queensland fruit fly (QFF), *Bactrocera tryoni*, (Diptera: Tephritidae) was found in a fruit-fly surveillance trap in a feijoa tree in Devonport, Auckland. The cuelure-baited trap has a phenome attractive to male fruit flies. The fly was identified by a PHEL entomologist and validated by PCR test. A response was initiated to establish whether the fly was part of a breeding population. Investigations involving fruit flies of economic significance are immediately transferred to the Response Group and managed by MPI's response management process.

A single QFF was found in a surveillance trap at a residential property in Northcote, Auckland. Management of this incident was combined with the response activated for the *B. tryoni* caught in Devonport.

In a third case, the duty Incursion Investigator was notified by a PHEL entomologist that a single male tephritid had been found in a cuelure-baited surveillance trap in a citrus tree in Otara, Auckland. This was thought to be a species not present in New Zealand and different to QFF. PHEL identified the fly as *B. facialis* (Diptera: Tephritidae), a fruit-fly species not previously detected in New Zealand and with no English common name. The investigator prepared a rapid risk assessment and the investigation was also incorporated into the QFF response.

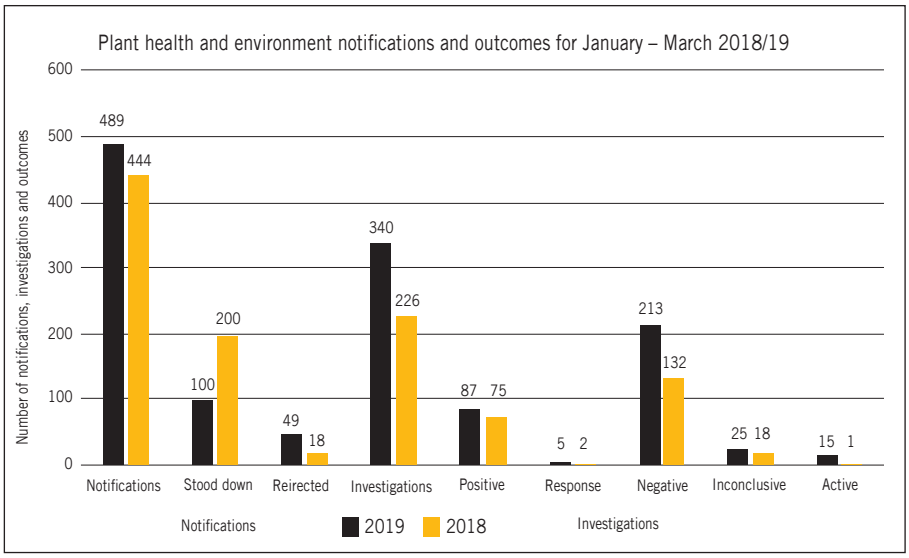

Figure 1: Plant health notifications and investigations and outcomes managed by Incursion Investigators, January to March, 2018 and 2019

Great willowherb in wetlands, Christchurch

A post on the iNaturalist website described great willowherb (*Epilobium hirsutum*) growing in the Travis wetlands reserve, in the northern suburbs of Christchurch. Great willowherb was first recorded in New Zealand in 2018 when the invasive weed was found growing in Waimakariri District, North Canterbury. This notification was referred to the Response Group to be managed with the earlier detection by MPI's response management process.

Low-level GM sweetcorn seed contamination, Gisborne

A large-scale producer of corn products for human consumption contacted MPI following a positive test for genetically modified (GM) constructs in powder manufactured from sweetcorn grown in Gisborne from seed imported from the US. Although further testing indicated a very low level of contamination, below the maximum level of 0.1 percent stipulated in MPI import requirements, the investigation was referred to the Response Group to manage any public communication. A response was not initiated because the biological issue was determined to be negligible to low risk as the level of the contamination detected was < 0.1 percent. The seed had been certified as GM-free by the supplier and had undergone the relevant testing before it was imported. New Zealand has zero tolerance for genetically modified organisms (GMOs) outside containment without Environmental Protection Authority (EPA) approval.

Unwanted organisms and regulated pests

Low-level GM soybean seed contamination, Hawke's Bay

Another case of low-level GM seed contamination (again below permissible levels) was reported in soybeans grown in Hawke's Bay. Unlike the previous GM case, this incident was managed by the Incursion Investigation team. It was reported during the Christmas break, when many MPI staff were on leave. An Incursion Investigator is on duty every day from 8.30 am to 9.00 pm to manage the exotic pest and disease hotline (0800 80 99 66). In this instance, the II with the co-operation of the grower, an MPI Quarantine Officer (QO) and PHEL enabled the biosecurity issue to be promptly mitigated.

In this case a contract grower for a large frozen vegetable company planted a 10-hectare block of edible soybeans/edamame (*Glycine max*) at his Hastings property. The crop had inconsistent growth and before flowering was sprayed off with glyphosate (Roundup). Some plants survived the herbicide application, causing the grower and the company's field manager to suspect GM Roundup-resistant seed. Samples of healthy and dead plants and seeds were provided for diagnostic tests to determine whether the seeds were GM. The suspected plants in the field were removed mechanically and about 50 kg of plant material was deeply buried on the property by the field manager under the guidance of an II. Samples of the plant DNA and unused seeds were sent to an accredited offshore lab for testing. The live plant material and seeds tested positive for the 34S promoter, the 35S promoter and the EPSPS GM event, indicating that some of the seeds were genetically modified for herbicide resistance.

The website of the exporting company stated that it does not grow GM seed. The New Zealand company had imported 2,040 kg of soybean seed in September 2018. The import documentation said that the seed had been tested before arrival and was negative for GM constructs. About 1,200 kg of seeds from the original consignment remained unplanted. On the recommendation of MPI, and in agreement with the importing company, the seed was destroyed and costs were recovered by the company from the seed exporter. The seed was collected by Interwaste (an approved MPI contractor) and securely transported to the Interwaste treatment plant in Wellington for destruction by steam sterilisation, followed by deep burial. The process was supervised by an MPI QO to certify that no spillage took place and the seed was handled securely. The MPI Plant Imports team was notified for awareness and possible auditing of the import process. Based on the numbers provided by the importer, the contamination level of GM found was below the maximum of 0.1 percent stipulated in MPI import requirements.

New to New Zealand sawfly, Dunedin

A sawfly larva was found in a gypsy moth surveillance trap placed on a poplar tree in Abbotsford, Dunedin. Using molecular methods the larva was identified by PHEL as the poplar sawfly, *Cladius grandis* (Hymenoptera: Tenthredinidae), a species widely distributed in Europe, Asia and North America. It is not known to cause significant damage every year but sporadic population booms have been reported that result in significant defoliation in the US and Canada. A site inspection was conducted by the II, an SPS Biosecurity contractor and the gypsy moth trap inspector. Larvae were found on two poplar trees at the original detection site and a delimitation survey was initiated the same day. In total, 11 sites were visited up to about 20 km inland from the detection site. At almost all sites larvae were found on leaves (**Figure 2**) or there was chewing damage consistent with the poplar sawfly. Damage on the worst affected trees was patchy and restricted to the end branches, presumably because the younger leaves were more palatable. Defoliation damage was not obvious from a distance and was more noticeable when standing under the tree and looking up into the canopy. The survey did not find any adult sawflies. However, larvae collected were sent to PHEL (Christchurch), where the team successfully reared the first and only adult sawfly (**Figure 3**) seen by those working on this investigation. The specimen was euthanased and placed in the PHEL entomological collection.

Government Industry Agreement (GIA) partners who might be impacted by the new to New Zealand sawfly were notified.

Figure 2: Poplar sawfly (*Cladius grandis*) larvae feeding on a poplar tree leaf, Dunedin (Photo: SIIPH)

Figure 3: Adult poplar sawfly reared at PHEL, Christchurch (Photo: PHEL)

When a risk assessment of the sawfly's impact was completed it was agreed by all that it was a low-impact pest and unlikely to be a significant biosecurity concern to New Zealand. Following an MPI media release about the new sawfly a resident of Mosgiel contacted MPI and provided photos taken in December 2017 of poplar sawfly larvae feeding on poplar leaves at her property. This indicated that the species had already been in the country for at least a year without reports of significant damage. MPI has now produced a fact sheet on the sawfly that is available on its website, and will continue to monitor the sawfly's distribution through the High Risk Site Surveillance programme. Detections outside the Dunedin and Mosgiel area should be reported to MPI via the exotic pest and disease hotline.

New to New Zealand ambrosia beetle

During the High Risk Site Surveillance programme inspections this quarter, biosecurity contractors SPS Biosecurity reported finding unusual small (~2 mm) live beetles (**Figure 4**) in an oak tree at Blockhouse Bay Reserve, Auckland. The beetles were identified as

the granulated ambrosia beetle (GAB), *Xylosandrus crassiusculus* (Coleoptera: Curculionidae). This species is native to tropical and subtropical east Asia and has been introduced to most warm and humid areas in the world including Africa, the US, Central America, Europe, Christmas Island, Queensland, Papua New Guinea, Palau, New Caledonia and Samoa. GAB is a tree generalist recorded on more than 100 species in 40 plant families. It can become abundant in urban, agricultural and forested areas and is potentially a serious pest of ornamentals and fruit trees. MPI instigated a delimiting survey in which first all potential host trees were inspected within 500 m of the initial detection site, then up to 3 km further out. With the assistance of SPS and SCION, bark beetle traps were also deployed in the nearby suburbs of Titirangi and Glen Eden. From five different sites GAB was recorded on 19 trees from 13 hosts (including four native species). At the Blockhouse Bay Reserve, five trees were felled including two infested with this beetle and three suspect trees with dieback symptoms. The trees were quarantined for destruction and the uprooted ground repaired. MPI is continuing surveillance to establish the extent of GAB distribution and still considering management options. However, investment in research into GAB and its impacts may be the only feasible action in the absence of any control tools.

Figure 4. Granulated ambrosia beetle or GAB (*Xylosandrus crassiusculus*) on *Coprosma robusta* (karamu), Auckland (Photo: PHEL)

Investigation positive; establishment prevented through urgent measures

These investigations found organisms that were not known to be present in New Zealand, and in circumstances that enabled treatments to be applied and biosecurity mitigation confirmed. They typically involved imported goods and containers.

Brown marmorated stink bug (BMSB) cases

There were 11 confirmed records of BMSB (*Halyomorpha halys*) (Heteroptera: Pentatomidae) during this quarter. Five were associated with the luggage of international passengers.

A single live BMSB was discovered at a Christchurch transport company's warehouse, on top of a 20-litre chemical container, one of 12 such containers on a partially shrinkwrapped pallet received from a Hamilton manufacturing company. An II visited the site that day and collected the insect, which PHEL confirmed was an unmated non-reproductive adult female. A site inspection was carried out and no further bugs were found. The notifier advised that the only imported container dealt with that day had originated from Australia, and the insect could not be directly linked to any imported goods. Traceback by the II revealed that two Hamilton companies had been involved in transporting the goods to Christchurch. Both companies were contacted and staff interviewed, and it was discovered that one of those companies receives large volumes of goods from overseas. The II considered that the BMSB most likely originated from the Hamilton depot that imported containerised raw materials from the US. In the absence of any further finds at the three sites, the BMSB was considered to be a solitary hitchhiker, likely from the US.

One live BMSB was found by a passenger at the Auckland International Airport domestic terminal. The passenger took a photo, caught the insect and gave it to an Air New Zealand staff member, who passed it on to an MPI quarantine officer. The specimen was identified at PHEL as an adult unmated non-reproductive female BMSB. The single insect could not be associated with any particular flight and was considered a solitary hitchhiker from the luggage of an international traveller.

MPI was notified that a single live suspect BMSB had been found by a traveller from Ontario, Canada, where this species is a nuisance pest. On arrival the passenger had been informed by the airline that her checked-in luggage was delayed. The suitcase was delivered by courier the following day, to her friend's house in Katikati. Upon opening the suitcase a suspect BMSB was found inside the extender section that had been zipped closed for the flight. The traveller's friend, an insect enthusiast, recognised the insect as a BMSB and submitted photos to the iNaturalist website. Others on the website suggested calling MPI and the Incursion Investigator was notified the following morning. A PHEL entomologist provisionally identified BMSB from the iNaturalist images. The BMSB had been placed in the freezer overnight and after searching the traveller's clothing, suitcase and the room, the suitcase was opened and no more BMSB were found. A Tauranga QO collected the insect and also inspected the area and luggage, and again no more BMSB were found. PHEL confirmed that the insect was an unmated, non-reproductive female. It is believed the insect was an isolated hitchhiker in the traveller's suitcase.

A live suspect BMSB was found inside the plastic lining of a carton that contained plastic caps airfreighted from the US. Notifying staff from the business had caught and killed the bug, and cling-wrapped the carton pending further examination. A photo suggested BMSB and the specimen was submitted to PHEL, where an entomologist confirmed a female BMSB. On instruction from the Incursion Investigator, company staff unpacked the carton in an enclosed room and inspected all the contents and packaging, and no further bugs were found. The carton and packing material were burnt as a precaution.

MPI was notified that a member of the public had found a suspect BMSB inside his Glenfield house after it flew through an open door on a warm Auckland evening. From the photos provided to PHEL, an entomologist identified the insect as a suspect BMSB and notified the duty Incursion Investigator. The insect was collected and after interviewing the property owner, a site inspection was conducted but no further BMSB were found. The insect could not to be linked to any recently imported goods, which heightened the significance of the notification since the pathway and origin of the insect could not be established. There are many Transitional Facilities such as car importers' premises located near the Auckland property. A BMSB

detector dog and handler inspected the site and the Transitional Facilities closest to the Glenfield property and no BMSB were detected. Because the origin of this BMSB was unknown, additional surveillance was organised by the investigator. Ten BMSB surveillance traps were deployed for 12 weeks and inspected weekly and again no BMSB were trapped. It was concluded that the single BMSB found might be a hitchhiker coming from one of the nearby businesses that import goods from countries where it is established. During this investigation MPI worked closely with allied GIA partners and stakeholders, who were reassured by the additional surveillance undertaken that this was an isolated find.

A live suspect BMSB was found inside a residential property after visitors arrived from Seattle, US. The insect was immediately captured and placed in the freezer. Photos provided to PHEL indicated BMSB. An Incursion Investigator and a PHEL entomologist visited the property and inspected the luggage. Five live BMSB (two male, three female) were found inside a suitcase with clothing. The US visitors advised that the suitcase had been opened twice since arrival to rearrange clothes and remove two sealed boxes. The boxes had already been opened and no BMSB were found. PHEL confirmed that the original BMSB sample was a male. A BMSB detector dog and handler inspected the property and no further BMSB were found. The handler observed that the dog reacted to the visitor's handbag, but when the investigator inspected the contents no BMSB were found. Nevertheless, the handbag was sealed in a plastic bag and placed in the freezer for 48 hours as a precaution. All clothing inside the suitcase was thoroughly inspected, removed, sealed in plastic bags and frozen for 48 hours. The Investigator inspected the empty suitcase and thoroughly sprayed all compartments with residual insecticide. The car associated with the BMSB find and the property of the friend who loaned the car were also inspected and no further BMSB were found.

BMSB was reported, confirmed and dealt with by investigators in five other instances: female BMSB in the luggage of a US traveller; male BMSB on the wall of a Christchurch transport company facility; two cases of male BMSBs in goods from Italy and a dead BMSB in a car from Japan. Typically, with BMSB investigations, notifiers and staff are provided with BMSB fact sheets and posters for their education and awareness.

During the summer months Incursion Investigators also receive many notifications of suspect BMSB that are identified as stink bugs (Hemiptera: Pentatomidae) already established in New Zealand. Species commonly reported include *Cermatulus nasalis, Dictyotus caenosus, Monteithiella humeralis* and *Nezara viridula.*

Yellow-spotted stink bug cases

The yellow-spotted stink bug, *Erthesina fullo* (Hemiptera: Pentatomidae) (YSBB), is a regulated pest and is polyphagous, meaning that it could impact many plant species of economic importance if it became established in New Zealand. It is often mistaken for BMSB and both are significant pests that are managed by Incursion Investigators in a similar way. YSSB are often reported in cars imported from Japan and during this quarter there were two cases of live and one of dead YSSB from Japan, plus a dead YSSB was found in a Hamilton warehouse. Where fumigation is possible methyl bromide is the standard treatment for vehicles or goods associated with live YSSB and BMSB.

Exotic ants in a vehicle imported from Japan

Live ants were found inside a car recently imported from Japan, while it was undergoing a compliance inspection. Specimens were collected by a local QO and submitted to Christchurch PHEL entomologists, who identified them as *Camponotus vitiosus* (Hymenoptera: Formicidae), an exotic carpenter ant. All *Camponotus* species are Unwanted Organisms under the Biosecurity Act 1993 because they pose a biosecurity risk to New Zealand's primary industries, particularly the forestry industry. The car was contained and transported to a local treatment provider and fumigated with methyl bromide and the colony was exterminated.

Glow-in-the-dark mushrooms for sale on Trademe

An MPI Compliance Investigator reported a Trademe listing selling *Panellus stipticus* (Agaricales: Mycenaceae), an Unwanted Organism under the Biosecurity Act 1993. Commonly known as the bitter oyster or luminescent panellus, this is a bioluminescent fungus found in Asia, Australia, Europe and North America. As it is popular in terraria, the spores of *P. stipticus* are sold as a part of a "mushroom growing kit" on some ecommerce platforms. The Incursion Investigator reported the listing to Trademe, who immediately removed it. The Trademe seller, a large UK-based business, was contacted and advised not to re-list the product as it could place New Zealand buyers at risk of breaching the Biosecurity Act. The seller agreed not to list *P. stipticus* on Trademe again. No mushroom growing kits had been sold in New Zealand from the site before the auction was removed.

Insects in chickpeas from Turkey

Staff at a kindergarten in Tauranga notified MPI after finding live insects in chickpeas imported from Turkey. A local distributor had sent the chickpeas to the kindergarten for use as food. The Incursion Investigator sent a specimen to PHEL, where it was identified as the cowpea weevil, *Callosobruchus maculatus*) (Coleoptera: Chrysomelidae), an Unwanted Organism under the Biosecurity Act 1993. The Incursion Investigator traced the chickpeas back to their source and facilitated a nationwide withdrawal of the affected batch. The chickpeas were consolidated at the importer's warehouse and frozen for 7 days at -18°C in accordance with the MPI Biosecurity Treatments Standard. No weevils were found after this treatment. Freezing was used because the chickpeas were organic and required chemical-free treatment to maintain their organic status. This investigation was referred to the MPI Intelligence Team for their awareness, as there have been several other investigations involving the same product, same importer and the same pest.

Borer in wooden chopping boards from India

A Dunedin resident purchased a small chopping board made of mango wood from a retail chain store and gave it to a friend for Christmas. A few weeks later the friend noticed larvae emerging from

the board. The friend returned the board to the retailer and notified MPI. Photos of the emerged insects were provided to the Incursion Investigator and the specimen submitted to MPI. The infested board was taken from the store for destructive sampling by PHEL Christchurch. An entomologist extracted 13 larvae that were identified by molecular sequencing as *Heterobostrychus aequalis* (Coleoptera: Bostrichidae), also known as the oriental wood borer or lesser auger beetle. This is a regulated pest under the Biosecurity Act 1993 and not recorded as present in New Zealand. All the remaining stock was withdrawn from sale and destroyed by the retailer under guidance of the Incursion Investigator. A positive outcome of this investigation resulted in the retailer seeking assistance from MPI to find an approved offshore treatment provider to ensure imported wooden goods are properly treated to protect the consumer and New Zealand's biosecurity.

Investigation positive; urgent measures limit harm

These investigations resulted in detection of organisms that were not known to be present in New Zealand and in circumstances where treatments could be applied to all retrievable items, usually recent imports. There may be some residual risk associated with items that cannot be retrieved.

Live insects on gherkin jar lid

Live insect pupae were found under the lid of a jar containing gherkins imported from India. The pupae were under the lip but not inside the jar. Photos were shown to a PHEL entomologist, who identified them as pupae of a phorid fly (Diptera: Phoridae), commonly known as scuttle flies. New Zealand has both native and introduced scuttle fly species. The maggots feed on a wide range of decaying organic matter and are a common contaminant of imported goods. These pupae were suspected to be *Megaselia scalaris*, a species established in New Zealand and commonly intercepted on imported goods. The investigator described a likely scenario to explain the presence of the pupae. The jar had been stored near something that the maggots of *M. scalaris* were feeding on, and when ready to pupate, they crawled up into the lid of the jar. This species does not pose a biosecurity threat to New Zealand and no further action was considered necessary.

Seeds in wool packaging material from the UK

"Eco-friendly" packaging material with goods imported from the UK by Victoria University of Wellington was found to contain viable seeds. The material, which had been designed and marketed in the UK as an alternative to polystyrene, consisted of sheep's wool enclosed in compostable plastic film. It was intended to be composted after use, which would increase the risk of seed germination and plant establishment in New Zealand. Testing by PHEL showed some seeds were viable. MPI's Border Intelligence team was advised of this pathway risk, resulting in a determination that the packaging was an unauthorised good under the Biosecurity Act 1993, as it contravened MPI's Animal Fibre Import Health Standard. In addition to viable plant seeds, the wool was uncarded, presenting additional biosecurity risks. Carding is a mechanical process that disentangles, cleans and intermixes fibres for subsequent processing, at the same time removing foreign objects such as seeds. This case highlighted a risk pathway and resulted in the Animal Imports team working constructively with the importer/brokers to obtain compliance with the IHS for imported natural fibre.

Seed contamination in imported brushwood from China

The notifier found a single seed inside a packet of brushwood (*Baeckea frutescens*) imported from China. Imported brushwood is required to be clean and free of seeds in accordance with MPI's Dried and Preserved Import Health Standard. The Incursion Investigator contacted the importer, who provided paperwork confirming that the brushwood had been heat-treated to MPI standards prior to arrival in New Zealand. The heat treatment manages any residual risk of seed presence by rendering it non-viable. When the seed was sent to PHEL for quarantine destruction a botanist identified the seed as being from a fruit belonging to the family Ericaceae (heaths). The fruits may be berries, capsules or drupes, depending on the species. The Ericaceae include azaleas, rhododendrons, blueberries and ericas, and are distributed worldwide.

Live wood borer in toy from $2 shop

Live borer were found feeding on bamboo parts of a small toy purchased from an Auckland $2 shop. The investigation found no sign of borer when similar items were examined at five other shops owned by the importer. It was therefore concluded that the borer damage was restricted to one particular product. All the risk stock was returned to the distribution warehouse. The total volume of returned stock was not great, and treatment by freezing was arranged. Specimens of adult borer sent to MPI were identified as *Dinoderus minutus* (Coleoptera: Bostrichidae), an exotic but low-risk bamboo borer that has previously been intercepted on similar items. The item was imported as a "low-risk wood product" that did not require inspection by MPI. Notification of such detections by the public via the exotic pest and disease hotline demonstrates the value of New Zealand's multi-layered biosecurity system.

Borer in bamboo handle of butterfly net from China

The notifier noticed holes in the bamboo handle of a butterfly net purchased from a budget retailer and phoned MPI. The item was frozen for 24 hours and photos were provided of suspected borer beetles and the damaged handle. Specimens were sent to PHEL, who identified a *Dinoderus* species not recorded in New Zealand. The owner of the shop asked for the items to be destroyed and this was carried out by an MPI-approved treatment provider, who autoclaved the risk goods. The retailer had purchased the items from a website based in New Zealand. Through the site, the Incursion Investigator was able to contact the importer, who advised that the last import of the product was more than 11 months ago and that they no longer stocked the item. Once again, notification by a member of the public enabled the issue to be managed by the Incursion Investigator.

Live borer in wooden sculpture from Bali

Live borer beetles were observed emerging from a wooden sculpture purchased in Bali during an overseas holiday. The notifier advised the sculpture had little value to them and

the product was burnt to mitigate the risk. This was an isolated incident and no further action was considered necessary.

Robust crazy ants in yacht from the Pacific Islands

Several months after returning from a sailing trip to the Pacific Islands, a solo yachtsman noticed small, unusual ants inside his yacht. He had visited Rarotonga last before returning to New Zealand. The ants were collected by a local MPI Quarantine Officer and delivered to PHEL, where an entomologist identified an exotic and regulated ant species, the robust crazy ant *Nylanderia bourbonica* (Hymenoptera: Formicidae). This species is one of the most common tramp ants in the tropics and subtropics and has been reported in Rarotonga. Thought to originate from Southeast Asia, the species has been spread by commerce throughout the Indo-Pacific region and other tropical areas.

The yacht had berthed at Opua for MPI and Customs clearance in December 2018, then travelled to Marsden Cove. In late February 2019 the yacht was taken out into a dry dock for maintenance work and while it was there the ants were discovered. Since arriving in New Zealand, the yachtsman had taken personal effects between the yacht and his nearby home, and could have inadvertently transported the exotic ants. He had noticed many ants at his property but was uncertain whether they were local or exotic species. A local pest control company was contracted to treat the yacht and the property to ensure eradication of the robust crazy ants. No more exotic ants were trapped. A follow-up treatment of the yacht in May 2019 was undertaken to ensure eradication, and the dry dock has been added to the National Invasive Ant Surveillance (NIAS) programme for 2020.

Other biosecurity pests

During this period Incursion Investigators dealt with many other organisms that posed a biological risk. These included redback and other live spiders from Australia; bees from China; an exotic beetle in Christmas decorations from China; an oriental cockroach, *Blatta orientalis* (Blattodea: Blattidae) from Sydney; and booklice in noodles from China. Pests of stored products reported included the sawtoothed grain beetle, *Oryzaephilus surinamensis* (Coleoptera: Silvanidae) and flat grain beetle, *Cryptolestes pusillus* (Coleoptera: Laemophloeidae) in rice from Thailand. Many of the stored-product pests (also known as pantry pests) reported are cosmopolitan and found on a number of hosts. They can breed in virtually any edible stored product including seeds, nuts, grains, flour and dried herbs. People usually unwittingly purchase the infested stored products with the pests in the egg stage, which are invisible in the product until they emerge as adults and can infest other food products.

Seeds entering New Zealand through ecommerce

Non-compliant seeds from England

The e-commerce pathway is a concern and continues to create work for Incursion Investigators. For example *Heptacodium jasminoides* (seven-sons tree) seeds were purchased online by a customer who thought they were from a New Zealand distributor. When the seeds arrived the customer realised they had come from England and had not been inspected. The customer contacted MPI to ask about the legal documentation required to import seeds, and was shown the relevant section from the Import Health Standard – 155.02.05 Seeds for Sowing. The same information was sent to the exporter to explain the correct procedure. The seeds were submitted to MPI for inspection and were destroyed as non-compliant. MPI's Intelligence & Targeting Team was notified and has placed the exporter on its watch-list.

MPI is often contacted by concerned Facebook users who believe other users may be trying to illegally import seeds and plants. All notifications are investigated and the user is advised that they may be in breach of the Biosecurity Act 1993 and MPI's import health standards (IHSs). Where possible, a letter is sent to the exporter explaining the IHS requirements for importing seeds to New Zealand and the MPI Intelligence & Targeting Team is notified for awareness and auditing purposes.

MPI is concerned by the increasing numbers of notifications that involve buying, intending to buy and planting seeds purchased through e-commerce platforms. Cases this quarter involving purchases from countries such as China, the US, Spain and Canada included "blue strawberry" seeds that grew red strawberries; seeds that were declared as tools and a small phone case (presumably to thwart the international mail inspection process); aquatic plants of the family Nelumbonaceae; floating aquatic plants, and "moss seeds" (unlikely, since mosses reproduce using spores, not seeds); the seed of a cashew plant; roses, potted vegetable seeds and lotus plants; unknown seeds declared as toys and kitchenware; palm seeds that had been planted into pots; fennel seeds; corn kernels, soya beans, tomato seeds and *Austromyrtus dulcis* (Midgen berry); marimo moss balls; cacti seeds and poppy seeds. This list is not exhaustive and demonstrates the magnitude of the problem. In cases where non-compliant plants were being grown, they were removed and destroyed as quarantine waste.

Cases transferred from MPI responsibility

In these cases, notifications are redirected to agencies that have management responsibility for the particular pest concerned. They include pest plants listed in the National Plant Pest Accord (NPPA) that are Unwanted Organisms and banned from sale, propagation and distribution throughout New Zealand.

Suspect *Hydrilla* weed, Wairarapa

A case of the highly invasive aquatic weed *Hydrilla verticillata* (Hydrocharitaceae) found under a bridge near Gladstone, in Wairarapa, was reported by an MPI Quarantine Officer. *Hydrilla* is one of nine species currently managed as part of the National Interest Pest Responses, an MPI programme that responds to organisms presenting significant risks to New Zealand's biodiversity. An employee of the National Institute of Water and Atmospheric Research (NIWA) identified the plant from photos provided by the QO as *Egeria densa* (Brazilian waterweed) and not *H. verticillata* (although from the same family). *Egeria densa* is listed in the NPPA and the case was referred to the local council for follow-up.

Investigation positive; no action taken

These investigations resulted in detections of organisms that were not previously known to be present in New Zealand, but no action was taken. Typically, they include cases where a risk assessment indicates that a new to New Zealand organism (or a newly described indigenous organism) has become well established and is considered unlikely to damage economic, environmental, social and cultural values. Alternatively, the organism may already be established and under management by MPI and/or local authorities.

Many of the investigations dealt with in this category involve pests that were already dead or could be frozen to mitigate any biological risk. Examples are insects arriving in imported goods and stored food products such as moths, cockroaches, beetles, scorpions and grasshoppers.

New to New Zealand mite found on a beetle from Australia

Acarophenax rackae (Acariformes: Acarophenacidae), a new to New Zealand mite, was found on a beetle, *Tribolium confusum* (Coleoptera: Tenebrionidae) presumably imported from Australia in wheat for milling. The mite is not a plant pest, but a parasite of *T. confusum* and therefore deemed not to be a biological risk. The beetle is a common stored-product pest found in New Zealand. The mite likely came from Australia, where other species from the same genus have been reported. Although *A. rackae* is not actually known from Australia, this family of mites is little studied and no species have been reported from New Zealand.

New to New Zealand bacteria on tomato, Waikanae

Tomato-pith necrosis is a disease of minor significance that was first recorded in NZ during 1981 and is caused by *Pseudomonas corrugata*. This determination was based on then current biochemical and pathogenicity tests, and was consistent with the known cause of this disease overseas. However, in 2002 the taxonomic status of *P. corrugata* was revised and a new species, *P. mediterranea*, was proposed for some of the isolates found to cause pith necrosis on tomato and peppers in southern Europe. A recent home-garden submission to PHEL of a tomato sample with pith necrosis has been confirmed as an undescribed species closely related to another *Pseudomonas* species recently reported from Japan. *Pseudomonas corrugata* isolates in the International Collection of Microorganisms from Plants (ICMP) collection held by Manaaki Whenua Landcare Research, were sequenced to determine whether they represented *P. corrugata* or if some of them could be either of the abovementioned two species. The sequences were consistent with *P. corrugata*. It is important to note there is no evidence suggesting that a new disease-causing organism has recently arrived or that there has been a change of disease status (incidence, severity) of tomato-pith necrosis in New Zealand. Rather, PHEL's diagnostic work clarifies the taxonomic status of the *Pseudomonas* species that causes this disease.

Investigation for high-impact pests: negative

Of the 340 notifications investigated this quarter, in 213 cases (**Figure 1, page 24**) high-impact pests or diseases were proven not to be present or the pest was already recorded as present in New Zealand. While these investigations are negative for a biological risk they still require the same work as investigations where significant organisms are found.

Live borer in wooden table from Vietnam

Live wood-boring beetles were found emerging from a large dining table originating from Vietnam. The table had been partly disassembled and shrinkwrapped at the time of notification. The investigation determined that the table had been purchased about 10 months earlier and imported 12 months before that. As the table was in a small residential apartment accessible only by lift, the importer permitted the table to be cut into smaller pieces to facilitate rapid removal and treatment. Specimens of emerged beetles received following treatment were identified as *Lyctus brunneus* (Coleoptera: Bostrichidae), a species already established in New Zealand. A review of import documentation for the consignment that included the table showed the goods had been imported in accordance with MPI requirements and included a methyl bromide fumigation certificate from a reputable contractor. The consignment included 27 tables and other wooden goods. All stock from the implicated consignment had been sold but MPI has not received any reports of borer infestation relating to those goods.

Suspect live borer in wooden shovel handles from China

Borer holes, frass and other material thought possibly to be dead adult borers was found in and associated with a wooden shovel handle imported from China and purchased from a hardware store. Although no live beetles were found, the presence of live borer larvae was suspected. The manager of the national hardware chain was contacted and confirmed that the goods had been distributed to 13 stores nationally. At the request of the Incursion Investigator, store managers supervised examination of their stock of wooden shovel handles and no further signs of borer were found. The investigation determined that there was a low risk of live borer. Examination of import documentation for the relevant consignment showed the importation had been in accordance with MPI requirements that included treatment certificates for the wooden goods. No further action was considered necessary.

Other borer cases

Three other investigations were dealt with by Incursion Investigators where exotic borer, all from the same family (Coleoptera: Bostrichidae), were confirmed by PHEL. They were: furniture from India (African powder post beetle, *Lyctus africanus*); furniture from Vietnam (lesser auger beetle, *Heterobostrychus aequalis*) and wooden parasols from China (bamboo borer, *Dinoderus minutus*).

Suspect potato wart, Dunedin

A Dunedin gardener reported suspected potato wart (*Synchytrium endobioticum*) on home-grown Jersey Benne and Agria potatoes. The potatoes had been grown from certified seed purchased from a garden retail store in Dunedin. Potato samples with unusual, wart-like symptoms (**Figure 5**) were submitted to PHEL for examination and diagnostic testing. PHEL ruled out potato wart and concluded the swellings were caused by powdery scab, *Spongospora subterranea*. This was confirmed by

morphological examinations and a real-time PCR test for potato wart and potato scab. The notifier was advised of the diagnostic result and advised to retire the potato plot owing to the persistence of *S. subterranea* in soil and its high and rapid reproductive potential, which makes powdery scab difficult to manage and eliminate. This investigation was one of three involving suspected potato wart symptoms during this quarter, all of which were negative.

Figure 5: Unusual wart-like symptoms on potato caused by powdery scab, *Spongospora subterranea*

Suspect exotic termites at a residential property

A member of the public contacted MPI because he suspected his home was infested with exotic termites. The house had been constructed in the 1980s with cedar cladding and the notifier had recently noticed large amounts of frass near wooden framing and shingles. The frass was provided to PHEL for examination. An Incursion Investigator visited the site to look for termite evidence, specifically live termites and mud-like earthen packing on the surface produced by termites inside the woodwork, but neither was found. Specimens that were collected were identified by PHEL as big-headed ants, *Pheidole megacephala* (Hymenoptera: Formicidae). This species is established in New Zealand, and colonies are noted for excavating large amounts of sand and soil from underneath paving. The ants are a nuisance but do not pose a biosecurity risk.

Suspect exotic freshwater jellyfish in a Christchurch lake

Small freshwater jellyfish were found in Lake Roto Kohatu, Christchurch, and considered a potential biosecurity issue. NIWA confirmed the jellyfish were medusae of *Craspedacusta sowerbyi* (Coelenterata: Limnomedusae) a freshwater jellyfish known in New Zealand since the 1950s. It is harmless to humans and large animals and feeds only on small zooplankton species. Studies have concluded its ecological impact is minor. *Craspedacusta sowerbyi* was first discovered at Kew Gardens, London, in 1880 and later shown to have originated from China. It now has a worldwide distribution and is sporadically collected from mainland New Zealand.

Suspect fruit-fly maggots on clothing after a flight to Melbourne

An aircraft passenger arriving in Melbourne from Auckland discovered suspect fruit-fly maggots on clothing that had been stowed in the overhead locker. Although the flight and seat details were provided, the notification was received by email without the notifier's name or contact details. MPI border staff were advised and the plane was inspected and sprayed with insecticide following its return to Auckland. The seats and lockers were checked and there was no sign of fruit fly or a host. In the absence of a specimen and the notifier's details no further action could be taken.

Caterpillar in mandarin from the US

A live caterpillar was found inside a mandarin imported from the United States. The notifier had squashed the caterpillar, stating that enough remained intact for identification but when the sample was sent to PHEL it could not be identified morphologically. Molecular sequencing identified the caterpillar as the orange fruit borer, *Isotenes miserana* (Lepidoptera: Tortricidae). This species is established in New Zealand and may have been a local contaminant.

Dead fruit-fly larva in mango from Peru

MPI was sent photos of a dead suspect tephritid (fruit fly) larva inside a mango purchased from a fruit shop in Glen Innes, Auckland. Images indicated that the larva was long dead. An Incursion Investigator collected the larva and a pupa and submitted them to PHEL, where an entomologist used molecular sequencing to identify them as *Anastrepha* sp., although the exact species could not be determined. The Incursion Investigator visited the fruit shop and purchased several more mangoes, which were dissected and contained no pests. The Incursion Investigator then traced the mango consignment back to the supplier and double-checked all import documents and treatment certificates. The mangoes had been hot-water treated and undergone containerised cold disinfestation during transit from Peru to New Zealand, meeting all border-clearance requirements. The fact that the larva was dead would seem to indicate that this treatment had been effective, and no further action was recommended.

Live insect found in suitcase from Australia

A single live insect was found in a suitcase at a Wellington home after flights from Sydney and Auckland. A photo provided to MPI was determined to most likely be the burnt pine longhorn beetle, *Arhopalus tristis* (Coleoptera: Cerambycidae). The specimen was destroyed, mitigating the possibility that it might be an exotic *Arhopalus* species. *Arhopalus tristis* is a wood-boring beetle present in New Zealand and the adults exhibit dispersal flights during autumn, which coincided with the detection.

Unusual insect from Japan

A live, unusual-looking orange insect with numerous black spots was found in a vehicle compliance workshop in Auckland. The workshop deals with vehicles imported from Japan and staff suspected the insect might be an exotic species. However, a photo of the insect was identified by a PHEL entomologist as the Hadda beetle or 28-spotted ladybird, *Henosepilachna vigintioctopunctata* (Coleoptera: Coccinellidae), a species present in New Zealand. As standard practice, the notifier was asked to euthanase the specimen by freezing and to notify MPI of any other unusual insect finds.

Radiata pine dieback on golf course

Auckland Council notified PHEL of suspect radiata pine (Monterey pine) dieback reported by a greenkeeper on the Waiheke Golf Course. Three *Phytophthora* spp. were isolated from the soil, wood and root samples collected. They were *P. cinnamomi* and two species in the *P. cryptogea* species complex. *Phytophthora cinnamomi* and *P. cryptogea* have been reported as causal organisms

of pine tree decline in New Zealand. *Sphaeropsis sapinea* (formerly *Diplodia sapinea*) was isolated from the wood sample. *Sphaeropsis sapinea* is a known pathogen of pine trees worldwide and is present in New Zealand, where it causes tip blight of pines, typically in trees that are under stress. All the pathogens isolated from the samples have been recorded in New Zealand.

Suspect fruit fly, Auckland

A live suspect fruit fly was collected from the windowsill of an Auckland residence. However, from a photo provided to MPI it was identified as a member of the family Pallopteridae (flutter-wing flies), which are present in New Zealand. Fortunately New Zealand is free of economically significant fruit-fly species and for that reason all notifications of suspected fruit flies are treated as important.

New to New Zealand fungi found on rushes

Stagonospora pseudoperfecta, a new to New Zealand fungus was found on *Juncus* sp. (rush). The sample was collected during an HRSS inspection in Auckland and *S. pseudoperfecta* was isolated by PHEL. This fungus was described in 2015 from Japan but very little is known about its biology. It is saprophytic, not pathogenic, so the biological risk was considered low and no further action was warranted.

New to New Zealand fungus on *Agonis flexuosa*

Pseudosydowia eucalypti, a new to New Zealand fungus, was found on *Agonis flexuosa* (peppermint myrtle) during a HRSS inspection at the Tauranga seaport. This fungus is a weak pathogen that may cause leaf spots on *Eucalyptus* spp. and other members of the family Myrtaceae. It is not considered a biological risk and no further action was warranted.

New to New Zealand moth found on river peppermint

Macarostola ida (Lepidoptera: Gracillariidae), a new to New Zealand leaf-mining moth, was found on river peppermint (*Eucalyptus elata*) trees in Cornwall Park, Auckland. PHEL and Manaaki Whenua Landcare Research entomologists visited the site and collected more specimens. Later that month the PHEL entomologist visited Waiatarua Reserve, some distance from the original detection and an area where a number of *Eucalyptus* species are grown. Adult moths, larvae and pupae were collected from three different *Eucalyptus* species, indicating that the moth was not host-specific and that it was established outside the original detection site. Similar leaf-mining damage was seen on four tree species that were provisionally identified as *E. youmanii*, two other *Eucalyptus* species and Sydney red gum (*Angophora costata*). A scientist from Scion advised MPI that insect larvae and damaged leaves with leaf-mining similar to that caused by *M. ida*, had been collected from a forestry block at Waiomio, Northland. The larvae were contained in Scion's secure facilities and one adult *M. ida* emerged. This species is native to Australia, where it is the most widely distributed species of the genus, occurring from the Atherton Tablelands in Queensland to Victoria and also in southwestern Australia. *Macarostola* spp. are known to spend their first two instars in the mines, where they are sap-feeders. They then leave the mine and form a shelter by rolling the tip of a narrow leaf. The MPI Risk Assessment Team concluded that *M. ida* was unlikely to be a pest of New Zealand native plants, considering the moth was not recorded as an economic forestry pest and was recorded from two sites about 170 km apart. The Department of Conservation and GIA signatories were notified and no further action was recommended.

Pohutukawa decline in Parliament grounds

MPI was notified about possible dieback disease of pohutukawa trees (*Metrosideros excelsa*) in front of Parliament Buildings, Wellington. The disease was patchy and spread over a small group of trees. SPS Biosecurity was contracted to collect samples for diagnostics. PHEL mycologists detected only one fungus-like organism in the soil, *Pythium anandrum* (Oomycetes). Species of *Pythium* and related genera are commonly found in soil and water samples and can be weak root pathogens of a number of woody hosts. *Pythium anandrum* has previously been found in New Zealand from *Lupinus* sp., *Rhododendron indicum*, *Sequoia* sp. and *Viburnum* sp. but there is no information available about the pathogenicity of *Pythium* on *Metrosideros* spp. Overseas it has been associated with a wide range of hosts, including oak and pine trees, on which they may cause disease. No new to New Zealand organisms were found, and since *Pythium* is a weak pathogen it was unlikely to have caused the dieback. The investigation supported by the site inspection and diagnostics concluded that the dieback likely resulted from abiotic causes. MPI's Ministerial representative was advised of the outcome.

Fungus on feijoa trees

A Northland feijoa grower noticed that his newer feijoa cultivars were affected more badly by anthracnose compared with older feijoa cultivars. Anthracnose is a disease caused by the fungus *Colletotrichum theobromicola*, which has been present on feijoa trees in New Zealand since at least 2004. The notifier asked if any feijoa plant material had been recently imported, but aside from the importation of feijoas from their native habitat in Brazil 30–40 years ago there have been no such imports. There is an MPI-funded Sustainable Farming Fund project underway that aims to develop a protective programme to manage and control the disease, and Plant and Food Research Ltd is providing research support. The project, in collaboration with the New Zealand Feijoa Growers Association, involves identifying existing disease-tolerant cultivars, developing a protective fungicide spray programme and developing best orchard cultural practices to prevent inoculum build-up and reduce infection.

Suspected new to New Zealand mite found on poroporo

A PHEL entomologist identified *Brevipalpus papayensis* (Acariformes: Tenuipalpidae), thought to be a new to New Zealand mite, on poroporo (*Solanum laciniatum*). The mite was originally described from papaya (*Carica papaya*) in Hawai'i and previously also recorded from *Camellia sinensis* (tea), *Citrus sinensis* (sweet orange) and *Citrus x latifolia* (Persian lime) in Australia, Costa Rica, Hawai'i and Indonesia. Three old specimens deposited in the PHEL Tamaki entomology collection (PANZ) and labelled "*Brevipalpus phoenicis*" were found to be *B. papayensis*, demonstrating

that this species has been in New Zealand since 1966. It was collected from a grass in Levin, from *Plumeria* sp. (frangipani) in Whangarei and *Galium aparine* (cleavers) in Auckland. This is the first formal record of this mite from New Zealand, and a new host record on poroporo. The biology of this mite has not been investigated but it is unlikely to be a significant pest of New Zealand native plants and crops since it has been in the country for at least 50 years and is obviously well established.

Suspect chestnut bleeding canker disease

A possible chestnut blight disease was reported by an arborist from the Waipa District Council. Photos were sent to PHEL mycologists, who were able to rule out chestnut blight. SPS Biosecurity was contracted to collect samples for diagnostics at PHEL, since the bleeding symptoms could be caused by a range of pathogens including *Phytophthora* spp. (some of which are present in NZ), the honey fungus *Armillaria* and the bacterium *Pseudomonas syringae* pv. *aesculi* (the cause of chestnut bleeding canker, which is not present in New Zealand). The samples tested had signs of bacterial infection and SPS staff noted a foam exuding from the affected area, with a smell of fermentation. However, *Pseudomonas syringae* pv. *aesculi* was not found and tests were also negative for *Phytophthora* and *Armillaria*. While seven bacterial species were isolated from the wood samples, none of them were plant pathogens and the bleeding was likely caused by a secondary invasion of non-pathogenic bacteria. Two pathogenic fungi known to be present in New Zealand, *Fusarium solani* and *Diaporthe amygdali*, were isolated from soil and root samples, but were not likely to be associated with the symptoms seen on the chestnut tree.

Live insects in Californian raisins

Live insects were found in a box of Californian raisins purchased from a Wellington supermarket. The MPI Food Compliance team received the initial report and arranged a review of imported stock and the import pathway for the supermarket chain. Photos of the insects causing the infestation were identified by a PHEL entomologist as an *Oryzaephilus* sp. that is commonly intercepted on imported products. Two species of this genus are present in New Zealand: the saw-toothed grain beetle (*O. surinamensis*) and the merchant grain beetle (*O. mercator*). The notifier was informed of the identification and advised to destroy the goods.

Insects in Italian pasta

Live insects were found in pasta imported from Italy. An experienced food industry worker familiar with stored product pests thought the insects were unusual and notified MPI. The insects were identified as *Sitophilus oryzae* (Coleoptera: Curculionidae), a common widespread stored product pest established in New Zealand. This was one of many cases investigated in this quarter that involved pests of stored products, including moths, beetles, weevils, meal moths, mealworms and flour beetles.

Other insect reports

Apart from the three fruit-fly interceptions already discussed, there were 24 reports of suspect fruit fly this quarter. These fruit fly look-alikes, once examined by an entomologist, turned out to be local hover flies, vinegar flies, soldier flies, flesh flies and parasitoid and potter wasps. Other insect cases investigated this quarter also turned out to be species already established in New Zealand, including moths, ants, bees, tobacco beetle, drug store beetle, longhorn beetle, the native mason wasp, millipedes and dry-wood termites.

Inconclusive investigations

Of the 340 cases investigated, 73 percent had clear outcomes and 25 were inconclusive (**Figure 1**) with no further investigation warranted. Fifteen investigations were still in progress at the end of this reporting period.

Suspect new to New Zealand jewel bug

An iNaturalist post (https://inaturalist.nz/observations/19141902) regarding the sighting of a potentially new to New Zealand jewel bug in Albert Park, Auckland, was reported to MPI. The observer who posted the sighting was only able to take a photo, as the specimen flew away. He tentatively identified the beetle as *Melobasis fulgurans* (Coleoptera: Buprestidae) and PHEL has been working to confirm that identification. In 2006 a dead specimen of *M. fulgurans* was found on a footpath in Balmoral, Auckland. PHEL and an Incursion Investigator have done site visits but have been unsuccessful in obtaining a specimen. However, HRSS inspectors will continue to survey the area. Without a specimen, the investigation was inconclusive but MPI will reconsider that outcome should a specimen be found and submitted to PHEL for identification.

Spiders inside an air-conditioning unit from Malaysia

Painters found spiders coming out of an air-conditioning unit at a commercial work site. The unit had been imported from Malaysia and stored in unsealed cardboard boxes in an Auckland warehouse before being unpacked and taken to the commercial site for installation. The spiders were only discovered 3 weeks after it arrived at the site. Upon closer inspection spiders were also found inside the unit's drain pump. Altogether 27 spiders were found, but half of them were dead. It is likely that when the unit was assembled the spiders were disturbed and started emerging. The photos showed orbweb spiders (Araneidae), which are harmless to humans. Given the number of spiders in the small area, the fact that half of them were dead and there was a likelihood of local infestation, no further action was warranted. Specimens were not received and the photos provided were of immature spiders, hence the inconclusive outcome.

Carolyn Bleach
Manager
Surveillance & Incursion Investigation
Plant Health
Diagnostic & Surveillance Directorate
Biosecurity New Zealand – Tiakitanga Pūtaiao Aotearoa
Carolyn.Bleach@mpi.govt.nz

PEST WATCH: 2 February to 3 May 2019

Biosecurity is about managing risks: protecting New Zealand from exotic pests and diseases that could harm our natural resources and primary industries. MPI's Diagnostics and Surveillance Directorate (DSD) devotes much of its time to ensuring that new organism records come to its attention, and to following up as appropriate.

This information was collected from 2 February to 3 May 2019. The plant information is held in the MPI Plant Pest Information Network (PPIN) database. Wherever possible, common names have been included. Records in this format were previously published in the now discontinued magazine *Biosecurity.*

To report suspect new pests and diseases to MPI phone 0800 80 99 66.

Validated new to New Zealand reports

Type	Organism	Host	Location	Submitted by	Comments
mite	*Brevipalpus papayensis* no common name	*Solanum laciniatum* poroporo	Auckland	General Surveillance (PHEL)	Examination of old material indicates that *B. papayensis* has been in NZ since at least 1966.

If you have any enquiries regarding this information please contact surveillance@mpi.govt.nz

VETERINARY DIAGNOSTIC LABORATORY

Gribbles Veterinary Pathology

- AUCKLAND
  Courier: 37–41 Carbine Road, Mount Wellington, Auckland 1060
  Postal: PO Box 12049, Penrose, Auckland 1642
  Tel: 09 574 4701 Fax: 09 574 5304

- HAMILTON
  Courier: 57 Sunshine Ave, Hamilton 3240
  Postal: PO Box 195, Hamilton 3240
  Tel: 07 850 0777 Fax: 07 850 0770

- PALMERSTON NORTH
  Courier: 840 Tremaine Avenue, Palmerston North 4440
  Postal: PO Box 536, Palmerston North 4440
  Tel: 06 356 7100 Fax: 06 357 1904

- CHRISTCHURCH
  Courier: 7 Halkett Street, Christchurch 8140
  Postal: PO Box 3866, Christchurch 8140
  Tel: 03 379 9484 Fax: 03 379 9485

- DUNEDIN
  Courier: Invermay Research Centre, Block A, Puddle Alley, Mosgiel, Dunedin 9053
  Postal: PO Box 371, Dunedin 9053
  Tel: 03 489 4600 Fax: 03 489 8576

NEW ZEALAND VETERINARY PATHOLOGY

- HAMILTON
  Courier: Cnr Anglesea and Knox Streets, Hamilton
  Postal: PO Box 944, Hamilton
  Tel: 07 839 1470 Fax: 07 839 1471

- PALMERSTON NORTH
  Courier: IVABS Building, 1st Floor, Massey University, Tennant Drive, Palmerston North
  Postal: PO Box 325, Palmerston North
  Tel: 06 353 3983 Fax: 06 353 3986

SVS LABORATORIES

- HAMILTON
  PO Box 10304
  Hamilton 3241
  Ph: 0800 SVS LABS (0800 787 522) or 07 444 5101
  Fax: 07 444 5102
  Email: info@svslabs.nz

To report suspected exotic land, freshwater and marine pests, or exotic diseases in plants or animals, call:

0800 80 99 66

Investigation and Diagnostic Centre – Wallaceville
66 Ward Street
Upper Hutt
Tel: 04 526 5600

Investigation and Diagnostic Centre – Tamaki
231 Morrin Road
St Johns
Auckland
Tel: 09 909 3568

Investigation and Diagnostic Centre – Christchurch
14 Sir William Pickering Drive
Christchurch
Tel: 03 943 3209

New Zealand Government

Biosecurity New Zealand
Ministry for Primary Industries
Manatū Ahu Matua