Stowaways

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Manaaki Whenua
Landcare Research

Haere ra Jacqueline

As we go to press, a key member of the invasive invertebrate team and editor of *Stowaways* — Jacqueline Beggs — is leaving. The rest of the team want to take this opportunity to acknowledge all Jacqueline has achieved while working for Landcare Research and to wish her well in her new role as a lecturer at the University of Auckland.

Jacqueline's first research was on the native parrot, kaka, for DSIR Division in 1984. This evolved into research on the ecology and control of introduced wasps. She has led the "Invasive Invertebrates in Natural Ecosystems" research programme since 1992. Under her leadership the programme has flourished. We have measured the impacts of wasps in native beech forest (especially on invertebrates and birds); developed management strategies for introduced wasps and ants; and developed BIOSECURE, a web-based decision tool for managing biosecurity risks to New Zealand's indigenous ecosystems.

As a skilled science communicator, Jacqueline has actively spread the word that invasive species are a major threat to native ecosystems. As she says, "We desperately need answers on how to prevent more species arriving, and how to

Brian Karl

Jacqueline Beggs collecting honeydew from a wasp exclosure eradicate or control those that are already here."

Jacqueline also contributes significantly to the wider ecological community. She is a member of the Invasive Species Specialist Group of the IUCN (an international agency), the Rotoiti Nature Recovery Project Technical Advisory Group, and the Kakapo Scientific and Technical Advisory Committee. She has a strong commitment to encouraging women and Maori in science and assisting young people to get involved in ecology. As a member of the New Zealand Ecological Society, Jacqueline has been involved in developing *TuiTime* — a web-based resource to encourage students to learn about New Zealand's unique ecology.

Jacqueline gained her PhD in zoology from the University of Otago in 1999, while juggling her job with Landcare Research and raising two young boys. She has been quoted as saying "Fieldwork with a baby in a front pack added a new dimension to science!"

Jacqueline will continue to work on invasive invertebrates in Auckland and looks forward to ongoing collaboration with Landcare Research. Already she has a queue of postgraduate students keen to work on the Invasive Invertebrate Programme.

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At The Warehouse, The Warehouse...

The Warehouse aims to bring us international products at affordable prices, but it is also concerned that it does not bring us unwelcome exotic stowaways along with the bargains.

The Warehouse imports about 7000 containers of goods per annum, with the largest proportion (>80%) of these being processed at their North Island distribution centre at Wiri, Auckland. The giant "red shed" at the distribution centre is the largest facility of its kind in New Zealand. It is 14.3 m high and has a floor area of 65 000 m^2, equivalent to 8 rugby fields! Six thousand containers (9000 of 20 ft equivalent units) are emptied at the site per annum. With this quantity of overseas material being processed, the site is a potential establishment point for new exotic species. Aware of this potential biosecurity issue, the Warehouse was keen for Landcare Research to conduct some exotic-insect surveillance trials around the perimeter of the site.

The research at the Warehouse distribution centre is part of a Landcare Research project looking at the prevalence of exotic invertebrates in urban environments and seeking to develop general surveillance techniques to detect the presence of new populations of foreign species. A range of trap types were deployed in 12 groups around the site and operated for 6 weeks over the summer. Analysis of samples is far from complete, but the presence of a previously unrecorded exotic species of fungus gnat (*Sciophila* sp.) has been confirmed, although we are still unclear about its origin. Nearly half (46.4%) the moth species collected, and all ten of the ant species collected, are introduced, but none are new to New Zealand.

Identification of the samples continues. We also plan to trial some additional trap types in other areas over the coming summer. We hope there won't be many nasty surprises in the form of new exotic stowaways.

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This research was funded by the Foundation for Research, Science and Technology.


Joanna Rees

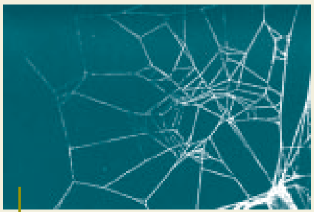
Malaise Trap - collects a wide variety of flying insects

That caffeine "buzz"

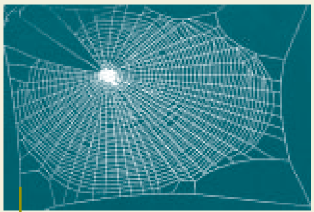
Most adults have experienced the caffeine "buzz" – the slight jitters and sleeplessness that comes with caffeine overload. Caffeine acts as a toxin on a range of species, from humans and mice, spiders to slugs and snails. It is readily available, cheap, and already widespread in the environment (imagine all those trampers needing a mid-morning pit-stop). So, when we were thinking of potential toxins to disrupt the cleaning behaviour of *Vespula* wasps, a double espresso seemed worth a try.

Earlier laboratory work showed that the pathogenic fungus *Beauveria bassiana* was effective at killing wasps. However, when added to an active nest in the field, the cleaning behaviour of wasps prevented the fungus from spreading and killing the colony. If we could disrupt the cleaning behaviour of the wasps, then we might be able to develop *Beauveria* as an environmentally friendly wasp control tool. Researchers have solved a similar problem with ants by adding a neurotoxin, but the neurotoxin they used had no effect on wasps.

We tried three different concentrations (0.001%, 0.01% and 0.1%) of caffeine mixed with our standard bait (sardines in aspic jelly) and *Beauveria* spores. In other studies, snails treated with similar levels of caffeine showed measurable changes in behaviour and physiology, although a topical treatment with 0.5% caffeine resulted in their death after 4 days. Our objective was to disrupt the behaviour of the wasps, rather than kill the bait carriers with caffeine.



Web of a spider on caffeine



Web of a drug-naive spider

From: Spider Communication: Mechanisms and Ecological Significance. Edited by Peter N.Witt & Jerome S. Rovner, Princeton University Press, 1982

The bait was placed at the entrance to wasp nests (6 nests per treatment), and we went back five times over the next month to monitor the colonies. The nests were then dug up for inspection. There was no effect at all! Nothing. Ah well, back to the drawing boards (and a good strong latte to help the thought process).

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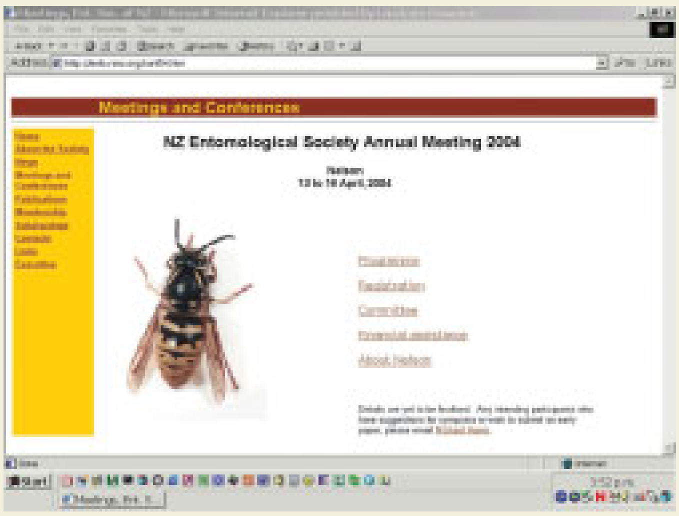
This research was funded by the Foundation for Research, Science and Technology

Annual meeting of Entomological Society

The annual general meeting of the New Zealand Entomological Society for 2004 will be held in Nelson from 13 to 16 April. For more information contact Richard Harris, email:harrisr@landcareresearch.co.nz or visit the Society's webpage at http://ento.rsnz.org/conf04.htm.



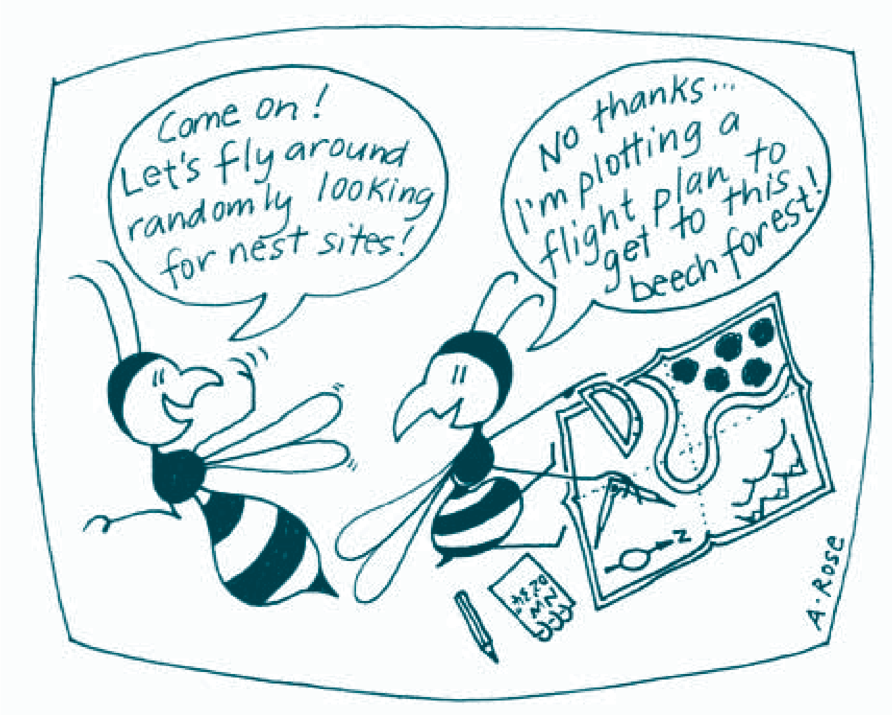
Invasiveness is promoted by good habitat and plenty of it

Successful invaders need the ability to disperse, either through their own effort or on the back of others, but a new mathematical model suggests even the best dispersers need to strike it lucky.

Most species disperse, and some species devote a large part of their reproductive potential to dispersal. For example, *Sphecophaga vesparum vesparum*, the parasitoid introduced to control social wasps in New Zealand, uses about half its reproductive potential for dispersal and, as a result, has slowly spread outwards from its release point at Pelorus Bridge. Dispersal, however, is a risky business. Finding the right habitat may be a more or less random event. Consequently, dispersal is often associated with a high mortality, and is therefore a drain on the population as a whole.

The cost of dispersal depends partly on the proportion of the population that regularly disperses, and the amount of suitable habitat across the landscape. The more suitable habitat in total, or the more clumped the habitat patches, the greater the chance that a dispersing individual will find such habitat and survive. Because of this, local densities within each habitat patch increase with the proportion of habitat in the landscape. This is the outcome from a fairly simple mathematical model that mimics the population growth of invading species.

The implication for invaders is that they will profit from abundant resources at a local scale. An example of this is the abundant



honeydew in New Zealand beech forests, which leads to the world's highest wasp populations. Significantly, our model also suggests the threat from invaders will increase with increasing habitat size. Therefore, in the case of wasps in honeydew beech forests, the extent of the forests (about 1 million ha in total) is part of the reason wasp densities are so high. Estimating the extent to which the scale of contiguous honeydew beech forest contributes to wasp density is harder to assess. In theory this could be tested by comparing wasp densities in small, remote stands, with those in large, continuous areas of forest. Unfortunately, even if true, it does not help manage the wasp menace since the cure in this case would be fragmentation of the beech forests.

Three other examples used to test the model come from agriculture, where invading pests are often particularly well studied. One is the blue-green Lucerne aphid, which established in 1975, reached a huge peak in numbers over the next 2 years, and then declined to low levels in lucerne crops. Why was this?

The initial response to the plague of aphids was that less lucerne was grown and, over time, resistant varieties began to replace many of the susceptible crops. This led to a decrease in the total area of suitable habitat and, consistent with our model's predictions, the local densities of aphids within susceptible crops also declined, even though these crops were as favourable as they had always been.

Another invader to attack lucerne was the weevil *Sitona discoideus*. This has an obligatory dispersal phase each year. All the adults

Honeydew beech forest

leave the lucerne crops and undergo a quiescent state during summer, hiding in hedgerows and other sheltered sites. In autumn they return to the crops, but because lucerne represents only a small proportion of the landscape (e.g., about 0.3% in Canterbury) the weevils suffer a huge mortality (~ 97%). The model suggests that an increase in lucerne across the landscape would significantly increase the weevil's abundance and pest potential within any one paddock.

The third example is the clover root weevil. This species is not considered a serious pest in Europe and North America. However, when it arrived in New Zealand it reached densities 10 times higher than in its native range. The damage to clover caused by this species threatened economic losses of up to $200 million per year. Why was it such a problem here and not overseas? In all likelihood it was simply the greater abundance of the weevil's resource – clover – in terms of both local abundance within each paddock (habitat quality) and global abundance across the landscape (habitat availability).

A key component of invasiveness is the ability of a species to become widespread and abundant in its new environment. While this may depend partly on its competitiveness, it also depends to a large extent on resource or habitat availability. Yet this is a factor largely ignored in invasion theory so far. Our new model is an initial attempt to remedy this, and to help clarify the risk posed by specific alien species that have not yet arrived.

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Have tyre, will travel

Millions of tyres are shipped around the world each year – the United States alone imported 11.6 million used tyres from 58 countries between 1978 and 1985. The trouble is that stacks of tyres are also popular as housing estates for mosquitoes. When you import the tyres, you also run the risk of importing the tenants.

Tyres collect both rainwater and organic matter, and therefore provide excellent breeding sites for mosquitoes – an ideal refuge in fact. Using tyres as their dispersal mechanism, two species of mosquito, *Aedes albopictus* and *Ochlerotatus japonicus*, have spread to new countries, and within those countries. These species are of concern to New Zealand because both have been intercepted here, both would probably survive if they became established, and both are capable of transmitting viruses known to cause human disease.

In New Zealand, *A. albopictus* has been found in a used-tyre importer's yard in 1993; in motor vehicles shipped from Japan in August 1998; and in empty shipping containers offloaded at Port Tauranga in 1999, and again in 2001. This species is native to Bangladesh, Cambodia, Chagos Islands, China, India, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Taiwan, Thailand and Vietnam. Today it is widespread (see Fig. 1).

In the USA, *A. albopictus* was first discovered in Houston, Texas, in August 1985 (arriving in shipments of used tyres from Japan and Korea). It is a non-migratory species with a flight range of less than 1 km. The early pattern of dispersal followed the interstate highway system, and the rapidity of its spread to so many locations in the United States further suggests human-assisted dispersal. By December 1987 it was present in 92 counties across 15 states, and by 1997 had spread to 678 counties across 25 states.

Aedes albopictus is also known as the Asian tiger moth mosquito, after its black and white stripes. Disturbingly, *A. albopictus* is capable of transmitting at least 22 viruses known to cause human disease, including all four serotypes of the dengue fever virus, the yellow fever virus and a range of viruses that cause inflamatory diseases of the brain.

In Britain, a nationwide search has been ordered at ports and used-tyre depots for this species. Specialists suspect it is already there and will be able to survive because of climate change. It is likely to have been introduced in used tyres brought from the Far East for retreading.

The second species, *Ochlerotatus japonicus*, is a native of China, Japan, North Korea, South Korea, and Far Eastern Russia. It is a vector of the potentially fatal West Nile virus, of which there were 4000 cases and nearly 300 deaths in America last year.

Between 1992 and 1998 it became established in the USA. In the last 3 years, larvae have been found in used tyres in both Canada and


Mike Womack

An Asian tiger mosquito feeds on a human

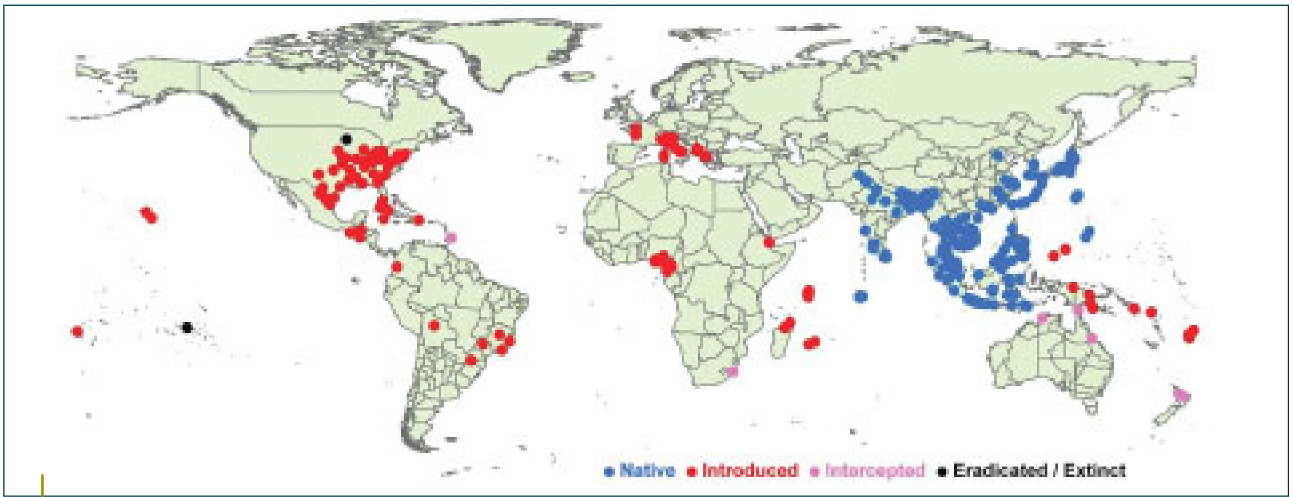

Figure 1. Current distribution of Aedes albopictus

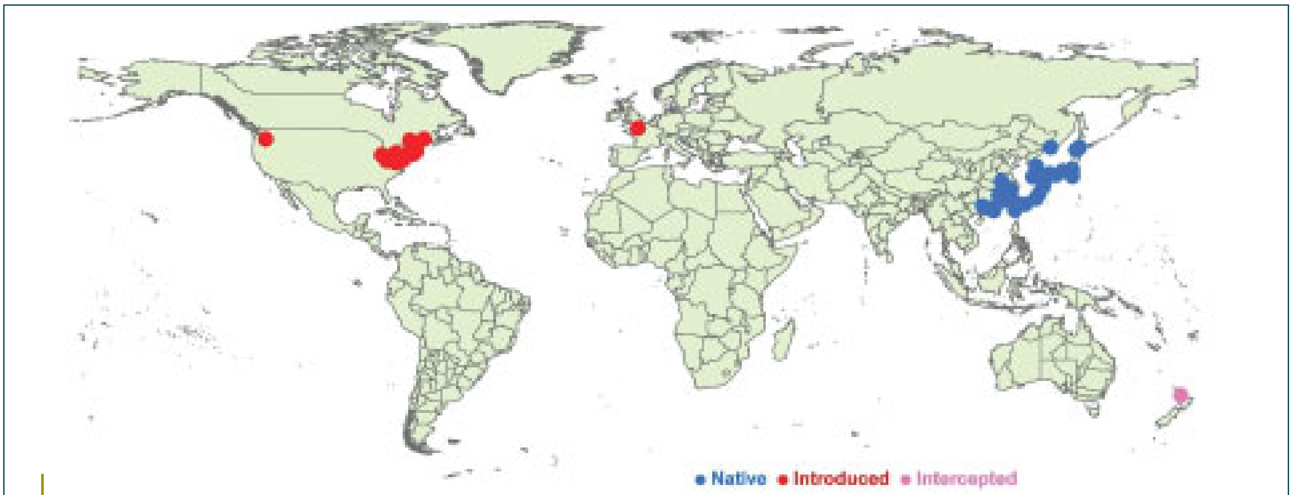

Figure 2. Current distribution of Ochlerotatus japonicus

France (see Fig. 2). In New Zealand, this species has been intercepted in tyre shipments from Japan in 1993, 2001, and 2002. There is no doubt that the spread of *A. albopictus* and *O. japonicus* has been facilitated by the world trade in used tyres. In New Zealand, it is the responsibility of the importer to ensure imported used tyres comply with MAF standards. MAF requires all used tyres to be fumigated on arrival before the containers are unloaded. On unpacking, the tyres are then checked by Quarantine Officers for soil and seed contamination. All facilities that unpack containers of used tyres must have a sealed area on which the containers are placed and decontamination equipment on hand. The continued vigilance of all involved with the used tyre industry is required to keep New Zealand free of these most unwelcome species.

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Did you know...

- Of all the tasty spots available to them on the human body the mosquito *Aedes albopictus* prefers to land on our feet. The second most favoured site was the hand, followed by the face.
- That drinking alcohol stimulates mosquito attraction. A study demonstrated that the number of mosquito landings increased significantly after a group of volunteers drunk 350 ml of beer.

Arboviruses in New Zealand

What are arboviruses?

Arboviruses are arthropod-borne viruses transmitted between susceptible vertebrate hosts (e.g., humans, birds, horses, etc.) by blood-feeding arthropods such as mosquitoes, ticks, sand flies and biting midges. The good news is that at present there are no known arboviruses of public health significance circulating ende mically in New Zealand. Indeed, New Zealand has only four known arboviruses: one transmitted by mosquitoes, and the rest by ticks.

The tick-borne arboviruses found here are Johnston Atoll virus, Saumarez Reef virus and Hughes group virus. They were all isolated from ticks collected on infested seabirds, and do not cause recognizable disease in their vertebrate hosts. While there are a number of medically important tick-borne arboviruses, we can be thankful none of these occur in New Zealand (as yet).

The only known mosquito-borne arbovirus in New Zealand is the Whataroa virus (an *Alphavirus*). This virus was first isolated from mosquitoes in South Westland in 1962 and circulates in a transmission cycle involving both native and exotic birds species and two endemic mosquitoes, *Culiseta tonnoiri* and *Culex pervigilans*.

The potential for arboviral disease entering New Zealand from Australia and other countries is of concern as exotic mosquitoes species are continually intercepted at New

Zealand ports, e.g., *Culex gelidus* (a vector of Japanese encephalitis) was detected in August this year. The recent spread of the Australian southern salt-marsh mosquito (*Ochlerotatus camptorhynchus*) is a major concern, as this mosquito has the capacity to transmit Ross River virus (a *Flavivirus*).

None of New Zealand's native or introduced mosquito species are known to have transmitted human arboviruses (or other mosquito borne diseases) in this country. However, the ability of New Zealand's endemic mosquitoes to act as vectors for arboviruses has barely been investigated.

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Bumbling in the dark

One of the biggest challenges for biosecurity in New Zealand is predicting which stowaways represent the greatest threat to our native ecosystems. This is made all the more difficult by our inadequate knowledge of our native fauna, especially the invertebrates.

Most of our native invertebrates are only found in New Zealand. There are thousands of different species, but it has been estimated only half have been formally named. For the large majority of species, named or unnamed, even the most basic biological information is missing. Therefore, it is very difficult to predict the impact of an invasive species on these native invertebrate communities.

We have some showy (by any standards) insects, like the forest ringlet butterfly (*Dodonidia helmsii*). This is a forest remnant dweller (in North Shore City, even) with caterpillars on species of giant cutty grass (*Gahnia* sp.) and forest snowgrasses (*Chionochloa* sp.). It is attacked by two endemic parasitoids. Its numbers have decreased markedly in recent decades, but we do not know why. Could it be introduced social wasps?

Another illustration of the lack of knowledge problem is the invasion of the cluster fly, *Pollenia pseudorudis*. It appeared in Onehunga in the 1980s to the consternation of the locals who were upset by swarms of flies awaking from hibernation in attics and ceiling spaces and falling into the rooms below. It and a recently arrived relative are now

*The forest ringlet butterfly (*Dodonidia helmsii*).*

widespread in New Zealand. The larvae of cluster flies are earthworm parasites. We have no data on what effect this invasion has had on either our introduced or our native earthworms because there is no regular monitoring of our invertebrate fauna.

Contrast this with Britain where flora and fauna are relatively well known and monitored. After a New Zealand flatworm (*Arthurdendyus triangulatus*) that also eats earthworms got into northern Britain (in the early 1960s) its spread and effect have been documented. The introduced flatworm has reduced earthworm diversity and population densities in some areas of Britain – an important change since earthworms play a crucial role in the soil as nutrient recyclers.

What sort of insect might pose a threat to native flora and fauna? Well, it would have to be a successful competitor for a resource or a generalist predator or parasitoid. It would be able to achieve high population densities very quickly, and have highly dispersible propagules. It might have an established track record of serious invasiveness in other countries. It would be difficult to control or contain. It would need to be cool-adapted, and able to live in rain-forest, if it were to live in New Zealand. It would need to arrive fecund. Sounds like yet another social wasp? Dead right.

If we want to manage the biosecurity threat of introduced invertebrates to our native invertebrates, then it is time we put more resources not only into preventing new pests arriving in New Zealand, but also to discovering and understanding our unique fauna.

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Ant invaders galore!!

The need for a surveillance programme to stop ants getting established in New Zealand has been highlighted by a number of incursions of new high-profile pest ants.

The crazy ant (*Paratrichina longicornis*), the yellow crazy ant (*Anoplolepis gracilipes*), the tropical fire ant (*Solenopsis geminata*), and the ghost ant (*Tapinoma melanocephalum*) were all found during a large-scale surveillance programme set up by the Ministry of Agriculture and Forestry (MAF) to detect Red Imported Fire ant (RIFA). The surveillance was triggered in response to RIFA being detected in March 2001 (see *Stowaways* Issue 2 for more details). We are happy to say no RIFA were found, but colonies of these other four species were discovered near seaports or at facilities receiving imported cargo at Auckland and/or Tauranga.

All four species are common global stowaways and between them have a long rap sheet, including grievous environmental impacts, aggravated stinging, and creating a nuisance in public places. These species are not thought to be established here, and considerable effort is being taken by MAF to make sure they do not become established.

It is very expensive and time consuming for MAF to respond to all these ant incursions, but with the implementation of regular ant-specific surveillance, it is likely even more detections will occur.

It is currently unclear if these species pose a risk of establishment and proliferation in New Zealand. It is possible the colonies that were found surviving while conditions were favourable, but may have died out as winter approached and climatic conditions became less favourable.

We are currently using the risk assessment tool BIOSECURE (see *Stowaways* Issue 2) to determine if these species pose a significant threat to New Zealand environments.

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Richard Toft

The crazy ant (Paratrichina longicornis)

Richard Toft

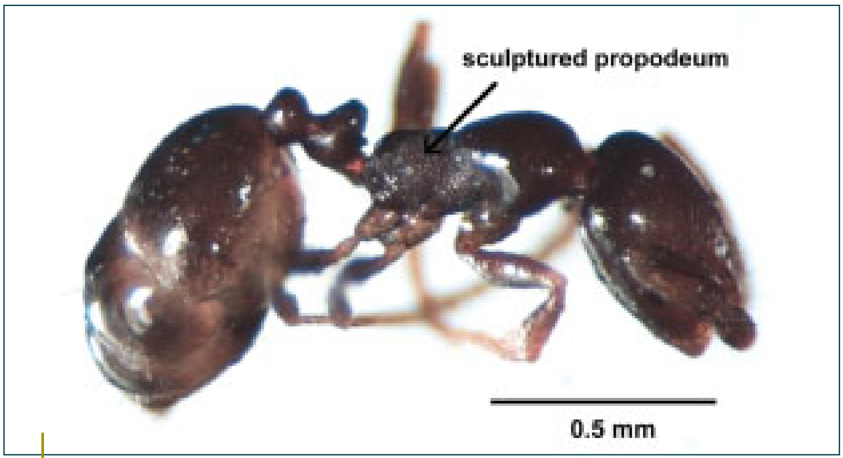
The yellow crazy ant (Anoplolepis gracilipes)

New kids on the block

Yet another foreign ant species has been discovered in New Zealand. The new arrival, *Monomorium sydneyense* Forel, was collected at Tauranga during the Fire Ant surveillance programme earlier this year. It was first identified by Dr Disna Gunawardana from MAF's National Plant Pest Reference Laboratory at Lynfield.

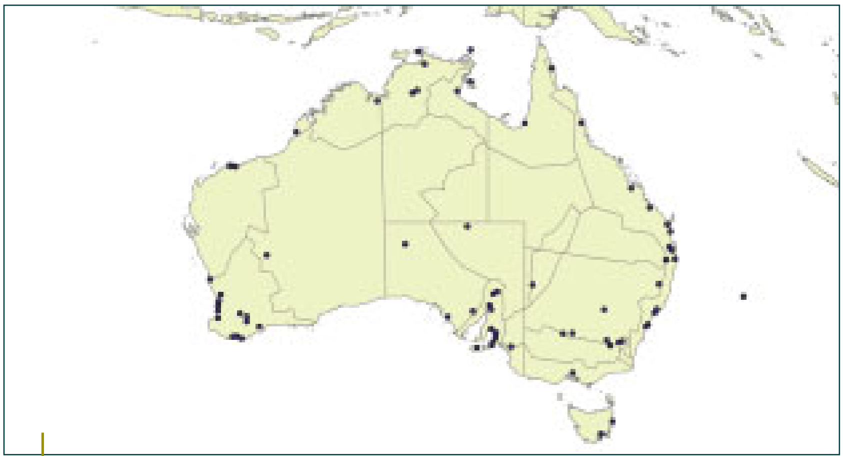
Additional searching indicated the ant was widespread at Sulphur Point. Samples of ants collected during previous Argentine ant surveys at the Port of Tauranga by Environment Bay of Plenty and Landcare Research revealed the ant was also present on the Mt Maunganui side of the Port of Tauranga as early as 2 April 2001.

This ant is only 2 mm in length and very easy to miss. However, under the microscope it is easily distinguished from the other *Monomorium* ants we have here by the appearance of the propodium.



Richard Toft

Monomorium sydneyense *Forel*



Distribution of Monomorium sydneyense *in Australia*

Richard Toft using a digital microscope camera to photograph ants

So where did this new immigrant come from? Well, like so many of our introduced ant fauna it comes from Australia. There is not a lot of information available on this species but a recent review of Monomorium in Australia reveals that is has wide ranging habits and can be quite common in urban areas.

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Argentine ant update

Still on the move

Since arriving here in about 1990, the Argentine ant has been busily extending its range (see distribution maps below). The proliferation of collection records in 2000 corresponds with increased research and management effort in response to the threat this species poses. However, there is no sign of its spread slowing, with recent reports of flourishing infestations in thermal areas of Rotorua and around houses in Taupo, Raglan, and Gisborne.

Unaided, the Argentine ants disperse slowly by budding (queens and a group of workers separate from the parent colony and walk to a new site). However, things progress much faster when the ants make use of human transportation networks. The large gaps in their New Zealand distribution indicate jump-dispersal: colonies catching a ride between urban centres in 'vechiles' as diverse as potted plants, freight, and rubbish.

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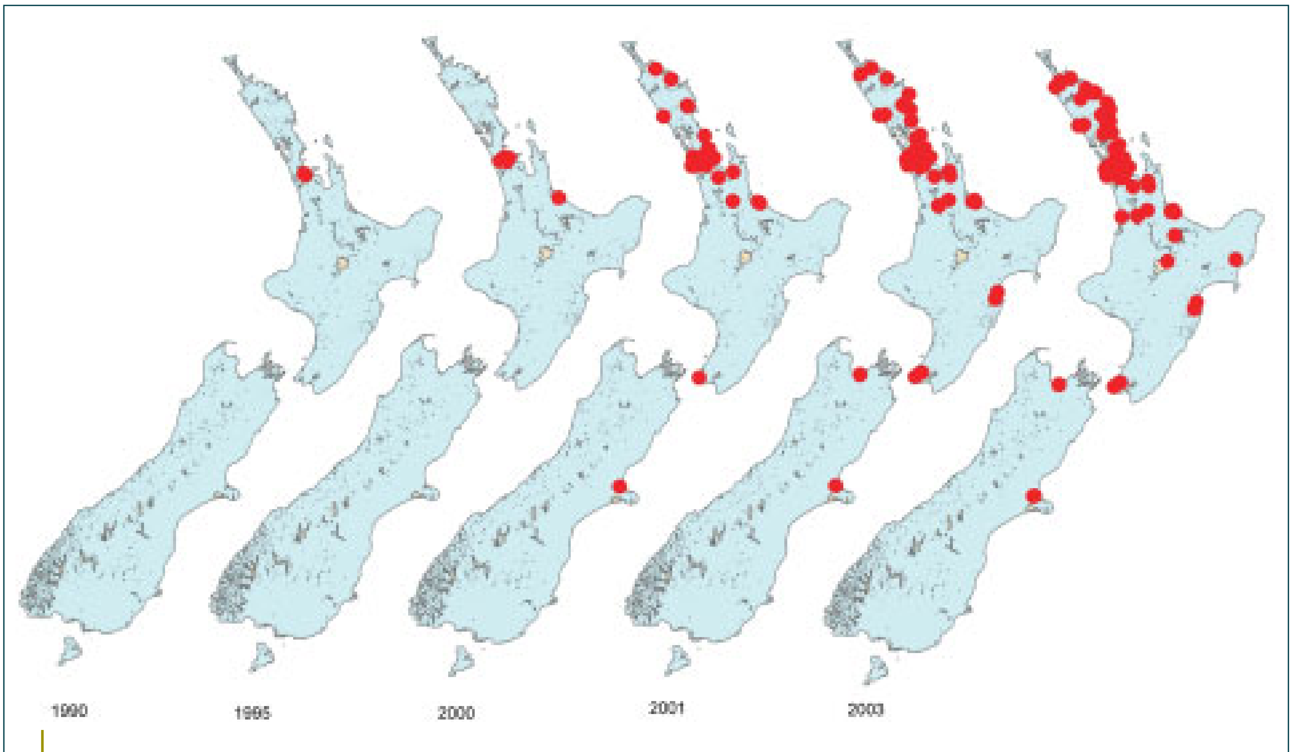
Queen and worker Argentine ant



Distribution records for Argentine ants (1998–2002)

Update on Eradication/ control trials

We have been conducting trials at several sites to develop and test an ant bait that will eradicate entire populations of Argentine ants.

As reported previously (*Stowaways* Issue 2) an initial treatment with the bait kills most Argentine ants in an infested area. On Tiritiri Matangi Island and at Port Nelson, two of the initial trial sites, intensive searching identified areas where Argentine ants remained and these areas have been treated again. The good news is that these remaining infestations were very small compared with the area of the original infestations. The bad news is that when the ants are in such low numbers, they are very hard to find, and it requires intensive search effort over large areas to locate them. To improve both the reliability and efficiency of mop-up operations, our research is now focusing on the best methods to locate Argentine ants when they are present in such low numbers.

Richard Toft

Argentine ant face

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Help on its way (we hope)

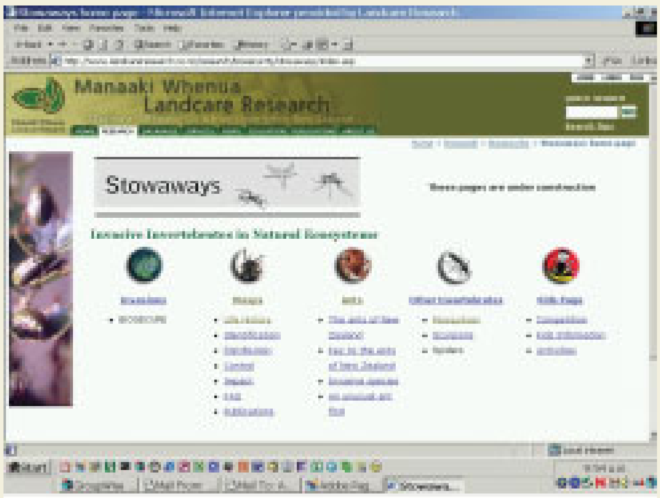
Help may soon be at hand for all those with Argentine ant problems. An application to register the ant bait we have been trialing is being prepared for ERMA (the Environmental Risk Management Authority). Should the application be successful, the ant bait will be widely available this summer.

Have you visited our website lately?

We are committed to keeping the site updated and we are adding new, exciting information all the time.

Check the Stowaways site at:

http://www.landcareresearch.co.nz/research/biosecurity/stowaways/index.asp



Coming soon

A mosquito key that will help officials and keen amateurs identify members of the mosquito family.

Sea containers: Plugging New Zealand's leaky border

Invertebrates are ideal stowaways – they are small and can often survive long periods without food or water. And where better to hide than inside a sea container, with the promise of a free ride to a new location.

There has been a 180% increase in the number of sea-containers entering New Zealand in the last 12 years, and the range of countries from which the containers originate has also increased. In 2001/02, c. 425 000 sea containers were imported from Australia, China, North America, Europe, SE Asia, Africa, the Middle East, and the Pacific islands. About 160 000 of the containers are imported empty.

In a recent review of 11 000 sea containers MAF (www.maf.govt.nz/biosecurity/border/papers/sea-container-review/index.htm) found that about 6% of loaded containers had live regulated organisms inside. This means over 15 000 containers every year are arriving in New Zealand with potential pests inside. Until this year, MAF inspected only 24% of containers, and the review estimates only 4% of live insects or spiders were detected. That leaves many thousands escaping our border security.

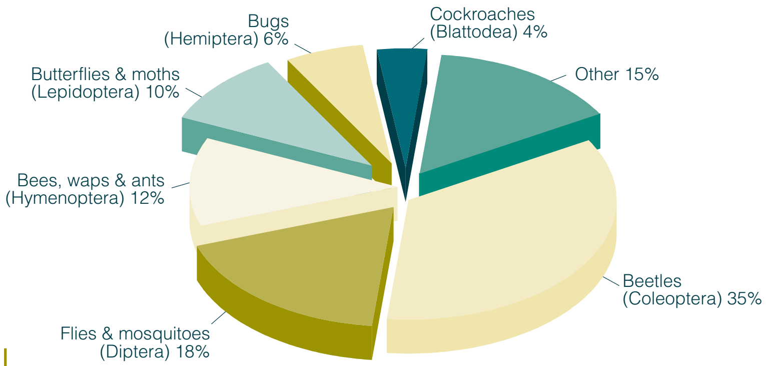
Jacqueline Beggs

Unloading a container ship at Port Tauranga

Following the review, MAF has revised the import health standard relating to sea containers. The new standard requires all containers be inspected internally and externally, certified by the exporter and checked again by a MAF-accredited person, either during discharge or on the wharf at the port of arrival. Any contaminated containers will be separated and inspected by a MAF biosecurity inspector. Inspection and treatment such as washing or fumigation must occur within 8 hours and no container will leave the port until it has MAF approval. The changes mean a massive increase in biosecurity effort, involving up to 10 000 transitional facilities (where containers are unpacked) and up to 15 000 MAF-accredited persons.

In addition, MAF is also developing a new tool to identify high-risk containers, based on historical inspection information. High-risk containers will require checking by an inspector before leaving the port area. They will receive a six-sided external inspection and possible treatment depending upon the risk status.

The new standard is being phased in from September 2003, with final implementation by 31 December 2003.



Insects Found in Containers (223 Species in 16 Orders)

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What else do container ships bring into New Zealand?

Shipping moves over 80% of the world's commodities and transfers approximately 3 to 5 billion tonnes of ballast water internationally each year.

Ballast water is absolutely essential to the safe and efficient operation of modern shipping, providing balance and stability to unladen ships. However, it may also pose a serious ecological, economic and health threat.

The introduction of invasive marine species into new environments in ships' ballast water and attached to ships' hulls has been identified as one of the greatest threats to the world's oceans.

It is estimated that at least 7 000 different species are being carried in ships' ballast tanks around the world. Most species do not survive the trip. However, some species do, and there are many examples of a species establishing in a new environment, displacing native species, and even altering whole ecosystems, e.g., in southern Australia, the Asian kelp *Undaria pinnatifida* is invading new areas rapidly, displacing the native seabed communities.

The International Maritime Organization is responsible for developing measures to address invasive species in ballast water and has several initatives underway including the introduction of the International Convention for the Control and Management of Ships' Ballast Water and Sediments.

From: http://globallast.imo.org

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http://www.landcareresearch.co.nz/research/biosecuritystowaways/index.asp

Obituary: Dr Nigel Barlow

Dr Nigel Barlow died on 4 June 2003 aged 53 after a courageous battle with cancer. Over the last 25 years Nigel made an enormous contribution to New Zealand ecosystem science through the use of mathematically based computer models to understand how and why animal populations fluctuate. In particular, he worked on wasp population dynamics and produced models to predict population fluctuations and effects of introduced control agents. Nigel was also involved in research on a number of other major pest species, such as grass grub and vertebrate pests like possums. His contribution was critical to the development of ecologically acceptable ways of dealing with such problems. That Nigel was exceptionally capable was reflected in his consistent ability to gain funding from the prestigious Marsden Fund. He was also an excellent scientific writer. He was the editor of the New Zealand Journal of Ecology and later, the London-based publication the Journal of Applied Ecology. In 1996 Nigel received the New Zealand

Ecological Society Award for his outstanding contribution to applied ecology.

Nigel completed his PhD at the University of East Anglia in 1977 and in 1979 arrived in New Zealand working initially in Palmerston North and for the last 12 years for AgResearch Limited at Lincoln. That Nigel moved to Canterbury was no coincidence; he had an abiding love of the mountains of which he made meticulously detailed scale models but most of all, he never lost his enthusiasm for climbing the peaks in the Southern Alps and elsewhere. As a true polymath Nigel was enthusiastic about all natural history and geography generally. In particular he developed a detailed knowledge of bird-winged butterflies. He published on these extraordinary butterflies and at the same time produced expert films and videos illustrating their natural history. Nigel was incredibly enthusiastic and had an excellent eye for detail. At work he was resistant to bureaucratic interference and very good at his science. His motivation and diverse interests were contagious and he graciously passed on his abilities and insights to his students and numerous admiring colleagues.

Stephen Goldson

Recent Publications

Barker, G.M.; Stephens, A.; Hunter, C.; Rutledge, D.; Harris, R.J.; Larivière, M.-C.; Gough, J. D. 2003: BIOSECURE : A spatially explicit model for assessing risk association with alien organisms in New Zealand indigenous ecosystems. *In*: Goldson, S.L.; Suckling, D.M. *eds*. Defending the green oasis: New Zealand biosecurity and science. Proceedings of a New Zealand Plant Protection Society Symposium, Centra Hotel, Rotorua, August, 2002. Christchurch, New Zealand Plant Protection Society. Pp. 73–91.

Barlow, N.D.; Beggs, J.R.; Barron, M.C. 2002: Dynamics of common wasps in New Zealand beech forests: A model with density dependence and weather. *Journal of Animal Ecology 71*: 663–671.

Beggs, J.R.; Rees, J.S.; Harris, R.J. 2002: No evidence for establishment of the wasp parasitoid, *Sphecophaga vesparum burra* (Cresson) (Hymenoptera: *Ichneumonidae*) at two sites in New Zealand. *New Zealand Journal of Zoology 29*: 205–211.

Harris, R.J.; Rees, J.S.; Toft, R.J. 2002: Trials to eradicate infestations of the Argentine ant, *Linepithema humile* (Hymenoptera: Formicidae), in New Zealand. *In*: Jones, S.C.; Zhai, J.; Robinson, W.H. *eds*. Proceedings of the 4th International Conference on Urban pests. Blacksburg, Virginia, Pocahonta Press. Pp. 67–74.

Harris, R; Ward, D. Sutherland, M.A. 2002: A survey of the current distribution of Argentine ants, *Linepithema humile*, in native habitats in New Zealand, and assessment of future risk of establishment. Unpublished Landcare Research Contract Report: LC0102/105 to Ministry of Agriculture and Forestry, Biosecurity Authority.

Website

More information on invasive invertebrates is available on our website:http://stowaways.landcareresearch.co.nz

Stowaways is available on this site too.

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