Terrestrial invertebrate biosystematics research and events at the New Zealand Arthropod Collection (NZAC), Auckland

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Welcome to issue 3 of *NZAC News*. This electronic newsletter will appear 3 times a year, with the purpose of highlighting recent biosystematics research and publications on terrestrial invertebrates at NZAC, and NZAC activities.

What was the large beetle collected in 1931 on Big South Cape Island?

Colin Miskelly, a Conservation Analyst with the Department of Conservation (DOC) has been transcribing the November–December 1931 diary of Major Robert A. Wilson. Wilson accompanied Edgar F. Stead to Big South Cape Island (Taukihepa), a 939 ha island off the southern coast of Stewart Island. They were based on nearby Solomon Island, but visited the larger Big South Cape Island (BSCI) on several occasions. Both islands were free of introduced predators at that time. Ship rats (*Rattus rattus*) colonised BSCI about 1962, irrupted in 1964 to exterminate two bird species, one bat, and an unknown number of invertebrate species (Bell 1978, *Lands and Survey Information Series No. 4*), and were eradicated in 2006.

Wilson and Stead visited BSCI on 10 December 1931, and Wilson wrote in his diary "we also found a large beetle that was new to me & that I brought home." This is the only reference they made to collecting insects during five weeks in the field. Colin emailed **Trevor Crosby** to see if NZAC could help identify what beetle species Wilson may have collected on BSCI.

A search of the NZAC digitised specimen records quickly showed the only beetle record for Wilson as a collector in the 1930s was a record for 1932 (unknown day or month) for three male specimens of Helms's stag beetle, *Geodorcus helmsi* (Sharp) (Coleoptera: Lucanidae), collected at Murderer's Cove, BSCI. Beverley Holloway (2007) in her *Fauna of N.Z. 61* monograph stated that Murderer's Cove, BSCI was the southernmost record for the species in New Zealand. In her earlier 1961 revision (*Dominion Museum Bulletin 20)*, she provided the collection details for the specimens that had been collected by Wilson, and said they were deposited in the Dominion Museum (now Museum of New Zealand Te Papa Tongarewa). On being given this information, Colin confirmed that the diary note indeed referred to Murderer's Cove on BSCI.

Te Papa Tongarewa entomologists **Phil Sirvid** and **Ricardo Palma** were contacted, and they confirmed they had the three male specimens of *Geodorcus helmsi* collected by Wilson. They were pleased to have the assistance of historical records be able to label these specimens with a precise collecting date nearly 78 years after collection. And DOC now had a confirmed identification for the beetles mentioned in the historical records.

Trevor Crosby

The three male stag beetle specimens collected by Major Wilson on BSCI, 1931, and mentioned in his diary as a species new to him. They are deposited in the Museum of New Zealand (MONZ). Photograph: copyright Phil Sirvid, Te Papa Tongarewa.

The nematode genus *Tripylina* : recent discoveries result in Order placement change

Nematodes of the genus *Tripylina* Brzeski, 1963 are found in soil and aquatic habitats. They are predacious, as shown by the presence in the intestine of some specimens of prey debris such as nematodes or rotifers.

Until recently six species were recognised globally: one species from New Zealand which was described by Gregor Yeates in 1972, with the remaining five species being recorded from Europe, Asia, North America, South America, and Africa. All these taxa were described solely on morphological characters, and were placed in the family Tripylidae de Man, 1876 (order Triplonchida).

Since March 2007 **Zeng-Qi Zhao** has been sampling nematodes in the family Tripylidae from various areas in New Zealand. Over 200 soil and litter samples from native forests and conservation parks have been examined. His studies revealed the presence of five new species of the genus *Tripylina* from New Zealand, and these new species could be characterised by both morphological and molecular characters. Now just over half the known world species of *Tripylina* are found in New Zealand.

When **Zeng-Qi Zhao** and **Thomas Buckley** undertook phylogenetic analyses of the 18S rDNA sequences from these nematodes, they were surprised by unexpected results. The

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analyses showed that the genus *Tripylina* was not closely related to the genus *Tripyla* Bastian, 1865 (the type genus of the family Tripylidae) as had been expected. Instead, *Tripylina* was found to be more closely related to genera in the order Enoplida. Therefore the transfer of *Tripylina* from the order Triplonchida to the order Enoplida was justified. Currently there is uncertainty as to the family placement of *Tripylina* within the order Enoplida, but ongoing studies are in progress in an attempt to resolve this question.

Funding: Foundation for Research, Science and Technology.

Zhao, Z. Q. 2009. A review of the genus *Tripylina* Brzeski, 1963 (Nematoda: Triplonchida), with descriptions of five new species from New Zealand. *Zootaxa 2238*: 1–24.

Zhao, Z. Q.; Buckley, T. R. 2009. Phylogenetic analysis of nematode nuclear 18S rDNA sequences indicates the genus *Tripylina* Brzeski, 1963 (Nematoda: Tripylidae de Man, 1876) should be placed in Enoplida. *Zootaxa 2238*: 25–32.

Change in Head Curator, NZAC

On 30 June **Trevor Crosby** stepped down as curator of NZAC after 34 years, but continued as section curator for Diptera. **Robert Hoare** accepted the appointment as his replacement.

Robert has spent over 10 years as section curator for Lepidoptera at NZAC, and has played a leading role in the modernisation of NZAC's policies and procedures as well as in the priority setting process associated with the Biosystematics OBI review of 2008.

Alongside his research and curatorial commitments, Robert has a passion for communication and actively promotes the study of invertebrates to a wide range of end-users in a variety of forums — for example, he has been a regular participant at the Auckland BioBlitz events, and his after-dark moth 'hunting' always attracts a large number of enthusiastic participants.

Robert Hoare's trip to Netherlands and Denmark, August–September 2009

1. Leiden, Netherlands Robert Hoare travelled to Leiden, Netherlands on 16th August to take up a 4-week Temminck Fellowship at Naturalis (Nationaal Natuurhistorisch Museum), working with **Erik van Nieukerken**, the world expert on Nepticulidae. Robert lived sustainably during his stay, cycling to and from work (eventually took 25 minutes, but up to 1.5 hours when still getting lost on the way).

Nepticulidae are tiny moths with leaf-mining larvae, and probably one of the most poorly documented moth families worldwide, with undescribed species hugely outnumbering described species. Robert did his PhD in Canberra (Australian National University) on the Australian fauna of this group in 1995–1998, publishing two papers from this, including a description of a significant new genus (*Roscidotoga* Hoare, 2000). Most of the phylogenetic work from the thesis remained unpublished, as did a subgeneric classification of the predominantly Australian genus *Pectinivalva*. The purpose of the visit and Fellowship was to write up two further major papers based on the Australian work, updating as appropriate with new findings and taking account of interim publications. The papers will be joint publications (Hoare & van Nieukerken). One paper deals exclusively with Pectinivalvinae, containing descriptions of new subgenera and species of *Pectinivalva*, a computer-based phylogeny of the subfamily, and evolution of host-plant relationships. This paper was nearly completed during the visit, with just some illustrations to be provided by Robert. A second paper revisits the phylogeny of the family worldwide (based again on computerised cladistic analysis); new species were added to Robert's data matrix from material recently collected by Erik, and many missing characters could now be scored for others. Preliminary analysis of the updated matrix using PAUP indicated that the phylogenetic tree will be substantially different from that presented in Robert's thesis, and the changes need writing up to complete the paper.

2. Sorø, Denmark Robert stayed for one week (September 13-20) with **Michael Fibiger** and family, 45 minutes by train west of Copenhagen. Despite being ill, and needing to go into hospital every night to be fed through a drip, Michael was the soul of kindness. He is one of the world experts on Noctuidae, the largest family of Lepidoptera with over 30,000 species. (The fewer than 200 species in New Zealand should be an easy task to revise...!) The purpose of the visit was for Robert to learn dissection techniques, basics of world classification of Noctuidae, and important characters for identification and description. The dissection of Noctuidae involves careful cleaning of the often very fatty and greasy abdomens, followed by inflation of the genitalia by means of isopropanol administered with a syringe and a strong thumb action. In the case of the males, the spinose and coiled internal sac (vesica) of the penis must usually be picked out micrometre by micrometre as far as possible before full eversion by syringe, a painstaking and often aggravating process, which usually results in breakage and the need for a cup of tea, followed by a journey into damage limitation mode. Michael passed on a vast amount of knowledge and technical trickery in the time available, and the dissections Robert made revealed that at least one subfamily can now be crossed off the New Zealand list: our 'Cuculliinae' are in fact Xyleninae. The true Cuculliinae are known in English as the 'Sharks', so we can now thrash around in the water, safe in the knowledge that there are no Sharks in New Zealand.

Funding: Temminck Fellowship; Foundation for Research, Science and Technology.

Rich Leschen – on excursion to help with biocontrol of a hemlock tree pest in North America

Rich Leschen has been in Europe and North America for several weeks on a U.S. Department of Agriculture (USDA) contract seeking a potential biocontrol agent for a hemlock tree pest. The hemlock in the Northeastern United States is being wiped out by an introduced adelgid which, according to the USDA dudes, basically sucks the plants dry. Rich is collaborating with senior researcher **Mike Montgomery** and scientist **Nathan Havill** at the USDA, Hamden, Connecticut. They will produce a taxonomic guide to the species of *Laricobius* (Coleoptera: Derodontidae) that are predators of adelgids (Homoptera: Adelgidae) which feed on Pinaceae. The Holarctic genus is related to the Gondawanan genus *Nothoderodontus*, also distributed in New Zealand. Rich was in Europe to study type specimens and new material of the 20+ species that are found in North America, Europe, and Asia.

Funding: USDA.

Science Excellence Award 2009 to Trevor Crosby

On 29 September **Trevor Crosby** was presented with a Landcare Research Science Excellence Award for 2009 for "outstanding contributions to invertebrate science, editorial services in biosystematics, collection management and international capacity building."

Trevor joined the DSIR as a research scientist in 1974 and transitioned to Landcare Research on its establishment. He was curator of NZAC for 34 years, which included the major

upgrade and transfer from the Mt Albert to the Tamaki site. He was a research leader for invertebrate systematics from 1997–2007 and has been Editor of the *Fauna of New Zealand* Series since 1998 having completed 21 volumes to date. His research specialisation includes flies (Diptera) with contributions to forensic work for the New Zealand Police. Trevor has been a strong advocate of bilingual science outputs which led to the inclusion of a Maori summary for *Fauna of New Zealand* volumes and several entomology web pages. He has made an extensive contribution to technology transfer and capacity building in the South Pacific and Asia and is the lead author of Crosby's Districts of the biogeographical regions of New Zealand. Outside of work Trevor has made a significant community contribution through long-standing roles on school boards of trustees and with the Dyslexia Parent Support Group, which he started 10 years ago with his wife Bev.

Book "Eriophyoid mites (Acari: Prostigmata) in Southeast Asia" published

This book was initiated when **Zhi-Qiang Zhang** was invited by the SPS Capacity Building Program of the Department of Agriculture, Fisheries and Forestry (Australia) to run a "Phytophagous Mites (Acari) Diagnostics Workshop" for participants from Southeast Asian countries. The main aim of the project was to help build mite taxonomic capacity in the region (http://www.acarology.org/asean/).

For the eriophyoid part of the workshop, a checklist of eriophyoid mites of Southeast Asia was drafted. With **Xiao-Feng Xue** (a visiting researcher to NZAC from China) the list was expanded by adding taxonomic references, host information, habits/plant relationships, and geographic distribution for each species. An illustrated key to the genera of the Eriophyoidea in Southeast Asia along with diagnoses of genera was provided to assist identification. In total, 325 species of Eriophyoidea are reported in Southeast Asia. It is hoped that this book will help to stimulate and facilitate the taxonomic research of this important group of mites in this region of super-biodiversity.

Xue X.-F., Zhang Z.-Q. 2009. Eriophyoid mites (Acari: Prostigmata) in Southeast Asia: a synopsis of 104 genera, with an illustrated key to genera and checklist of species (*Zootaxa 2257*). Magnolia Press, Auckland, 128 pp.

Butterflies of Samoa imaged

In August **Birgit Rhode** produced 73 publication-standard images for the 30 species of butterflies found in Samoa. These images are being used to produce an identification poster and a leaflet as a means of raising awareness about invertebrates in Samoa.This work was funded by JICA (Japan International Cooperation Agency) as part of a project for enhancing management capacity for National Parks and National Reserves of Samoa.

Funding: JICA.

Thomas Buckley awarded The Research Medal 2009

On 12 November **Thomas Buckley** was awarded The Research Medal 2009 by the New Zealand Association of Scientists for "outstanding fundamental or applied research in the physical, natural or social sciences published by a scientist under the age of 40, during the year of the award or the preceding three calendar years".

Thomas's research covers the systematics, biogeography, speciation, molecular evolution and evolutionary relationships of many organisms including stick insects, cicadas, fungus-feeding beetles, tortricid moths, earthworms, weta, onychophorans, and terrestrial molluscs. He is particularly interested in the biogeographic origins of the New Zealand biota and evolutionary processes within New Zealand. Thomas is revising the New Zealand stick insect fauna using morphology and genetics, and is also involved in a range of conservation genetics projects on highly threatened invertebrates including terrestrial molluscs, tusked and giant weta.

Recent and Coming Events

Andrey Khalaim from the Zoological Institute in St Petersburg, Russia is visiting NZAC for November to study the Tersilochinae (Hymenoptera: Ichneumonidae) of New Zealand. Tersilochinae are parasitoids of wood-boring beetles (cerambycids, weevils), and there are 40+ species in about 5 genera, all undescribed.

Darren Ward was invited by The Nature Conservancy to a workshop held in October on Santa Cruz Island (one of the Channel Islands off the coast of Los Angeles) to discuss management options, and to determine if eradication is feasible, for Argentine ants. Although these ants have been present on the Island for about 15 years they are still very range restricted, principally because of the semi-arid conditions. Santa Cruz Island is akin to Tiritiri Matangi in the Hauraki Gulf, which is a valued conservation sanctuary with a number of endemic and endangered species, and undergoing a range of restoration projects.

In mid-August **Trevor Crosby** ran a 1-week Diagnostic Clinic in Hanoi for 10 entomologists from Cambodia, Lao PDR, Myanmar, and Vietnam (CLMV) as part of the NZAID Mekong Phytosanitary project. He also worked with Vietnamese participants afterwards, especially in regards to mango pest records and fruit fly identifications. Some remote microscopy sessions took place, so that specimens held in the Australian National Insect Collection (ANIC), Canberra could be viewed on computer monitors in real-time in Hanoi. Earlier, at the end of May, he was in Vientiane for a planning workshop for an ASEAN Regional Diagnostic Network (ARDN) followed by a Senior Officials Meeting for the NZAID project. Afterwards there were mentoring visits with staff at Vientiane, Phnom Pehn, and Yangon.

Zhi-Qiang Zhang joined Trevor in Vientiane at the beginning of June. Zhi-Qiang provided mentoring and training on phytophagous mites to staff in Vientiane, Phnom Penh, Yangon, and Bangkok. His visit was a follow-up to the workshop he ran in Kuala Lumpur in May 2008. AusAID funded this project as part of an SPS Capacity Building project through the Department of Agriculture, Fisheries and Forestry.

Zhi-Qiang Zhang is presenting the keynote address at the plenary session of the 9th National Congress of Acarology of China, being held 27–29 November at Nanjing Agricultural University, Nanjing, China. The meeting will cover all aspects of acarology, including taxonomy, phylogeny, ecology, IPM, and natural enemies.

Marie-Claude Larivière and **Daniel Burckhardt** (Naturhistorisches Museum, Basel, Switzerland) have reactivated their project to co-author a *Fauna of New Zealand* volume on moss bugs (Hemiptera: Peloridiidae). These minute, cryptically coloured bugs with areolate body live in wet moss in temperate and subantarctic rainforests of the Southern Hemisphere (New Caledonia, New Zealand, southeastern Australia, southern South America). They are considered relics of a presumed richer and more widely distributed Upper Permian to Upper Cretaceous fauna. Marie-Claude and Daniel initiated their collaboration in 1999. Daniel's recently published paper on the taxonomy and phylogeny of the world fauna provides the appropriate context to complete a more regional treatment on this group. Marie-Claude is hard at work checking Daniel's results against material in New Zealand collections (not seen for the world paper) and drafting keys and descriptions that more directly address the N.Z. taxa. Three genera and nine species are currently known from New Zealand. All taxa are endemic and account for 17% of the world fauna at the generic level and close to 30% at the species level.

At the end of November **Sylvie Cazeres** from the Institut Agronomique néo-Calédonien will be visiting NZAC for a 1-week training session with **Rosa Henderson** on slide-mounting and scale insect identification.

Also at the end of November **Kerrie Davies** from the University of Adelaide will be in Auckland for a week working with **Zeng-Qi Zhao** on describing a probable new genus of nematode found on *Coprosma repens*. Kerrie has worked on various aspects of nematode physiology and ecology, and while here will give a seminar on host specificity, speciation, and coevolution in some plant parasitic nematodes with insect associates.

Publications

This section includes recent publications by staff associated with NZAC, or publications by other researchers using NZAC specimens or expertise of NZAC staff.

Buckley, T. R.; Marske, K.; Attanayake, D. 2009. Identifying glacial refugia in a geographic parthenogen using palaeoclimate modeling and phylogeography: the New Zealand stick insect *Argosarchus horridus* (White). *Molecular Ecology 18*: 4650–4663.

Burckhardt, D. 2009. Taxonomy and phylogeny of the Gondwanan moss bugs or Peloridiidae (Hemiptera, Coleorrhyncha). *Deutsche Entomologische Zeitschrift 56(2)*: 173–235.

Crosby, T. K. 2009. TFBIS funded specimen information – NZAC louse specimens. http://www.landcareresearch.co.nz/research/biosystematics/invertebrates/nzac/tfbis/lousespecimens.asp [Access the Museum of New Zealand Te Papa Tongarewa louse specimen data at Collections Online http://collections.tepapa.govt.nz/search.aspx?advanced=colOrder%3A%22Phthiraptera%22]

Crosby, T. K. 2009. Online version of the technical publication of Maddison (1993) "UNDP/FAO-SPEC Survey of Agricultural Pests and Diseases in the South Pacific Technical Report Volume 3. Pests and other Fauna associated with Plants". http://www.landcareresearch.co.nz/research/biosystematics/invertebrates/nzac/Maddison1993ReportVolume3.asp

Gibbs, G. W. 2009. The end of an 80-million year experiment: a review of evidence describing the impact of introduced rodents on New Zealand's 'mammal-free' invertebrate fauna. *Biological Invasions 11*: 1587–1593.

Jaschhof, M.; Kallweit, U. 2009. The *Cycloneura* Marshall group of genera in New Zealand (Diptera: Mycetophilidae: Leiini). *Zootaxa 2090*: 1–39.

Maddison, P. A.; Crosby, T. K. 2009. Summary of plant–animal associations from the technical publication of Maddison (1993) "UNDP/FAO-SPEC Survey of Agricultural Pests and Diseases in the South Pacific Technical Report Volume 3. Pests and other Fauna associated with Plants". http://www.landcareresearch.co.nz/research/biosystematics/invertebrates/nzac/SummaryPDFsoftechnicalpublicationvolume3.asp

O'Neill, S. B.; Buckley, T. R.; Jewell, T. R.; Ritchie, P. A. 2009. Phylogeographic history of the New Zealand stick insect *Niveaphasma annulata* (Phasmatodea) estimated from mitochondrial and nuclear loci. *Molecular Phylogenetics and Evolution 5*: 523–536.

Overton, J. M.; Barker, G. M.; Price, R. 2009: Estimating and conserving patterns of invertebrate diversity: a test case of New Zealand land snails. *Diversity and Distributions 15*: 731–741.

Slipinski, A.; Tomaszewska, W.; Lawrence, J. F. 2009. Phylogeny and classification of Corylophidae (Coleoptera: Cucujoidea) with descriptions of new genera and larvae. *Systematic Entomology 34*: 409–433.

Zhao, Z. Q. 2009.New Zealand species of the genus *Tripyla* Bastian, 1865 (Nematoda: Triplonchida: Tripylidae). I : A new species, a new record and key to long-tailed species. *Zootaxa 2291*: 35–50

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