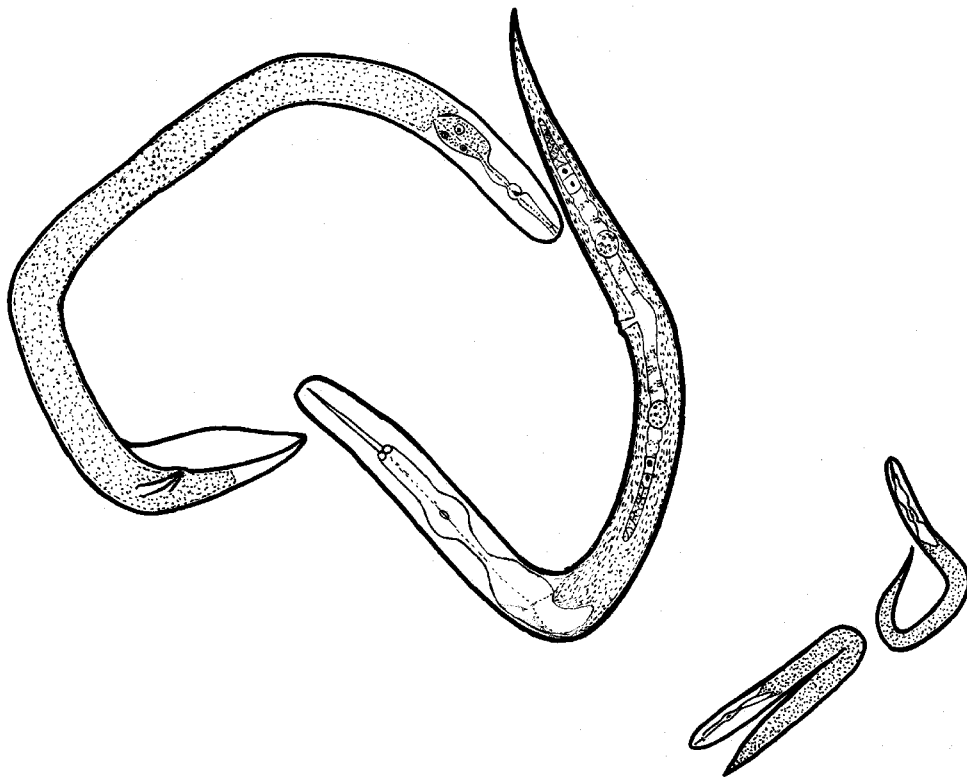


AUSTRALASIAN NEMATODOLOGY NEWSLETTER



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From the Editor

Thank you to all who have made contributions to this newsletter.

With 51CN approaching, I am keen to make the January issue a bumper one, and urge you now to make a special effort for that issue of this Newsletter. I will be in touch again early to request news, and research reports in particular.

January Issue

The deadline for the January issue will be 30 December. I will notify you well in advance, and please have your material ready once again.

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Association News

FROM THE PRESIDENT

Impending retirement and call for a replacement

After many years of service, Ian Riley has decided to retire as secretary of AAN. We need a new secretary. Any community-minded volunteers?

Ian can fill in anyone considering volunteering on the tasks and time involved, but I am sure they are not onerous. I will embarrass Ian with official thanks for all his great work in the next issue.

Ian has indicated that he will continue, for the time being at least, as webmaster.

Nematology Workshop and General Meeting

There is a nematology workshop on the Monday before the APPS meeting in Adelaide at the end of September (see the separate announcement elsewhere in this newsletter). The workshop will be followed by the general meeting of AAN and a dinner at a recommended local restaurant. I encourage people to attend. We have a good list of speakers and there will be ample time for discussion.

Likewise, **if you think you can contribute to the topic "Pasture nematology: research and opportunities", then let me know very soon.**

The AAN was set up 20 years ago because of concern over a decline in support for Nematology. Indeed the Australian Nematologists' Newsletter was started well over 20 years ago for the same reason. (I know because I contributed to it when I first started working on estuarine nematodes many years ago.) It seems to me that we are now in a period where there is a danger of a further decline in support for Nematology. From the discussion on the programme for 5ICN (see below), I know that this is a worldwide phenomenon. In my experience, it is not that policymakers are unaware of nematodes or their impact, but that this does not translate into stable funding. I was hoping to discuss what to do about this at the General Meeting.

Any other items that people would like discussed as agenda items should be forwarded to the Secretary, Ian Riley, before the meeting. There will also be the opportunity to raise items of "other business" from the floor.

5th International Congress of Nematology programme

The 1st draft of the programme for the 5th International Congress appears below. Please let me know any thoughts on it, but please note points 5 and 6 if your favourite does not get the attention you think it should.

Notes:

1. There are 20 symposia slots, 10 colloquia slots, and 4 plenaries. It may be possible to split the slots into 2 shorter symposia/colloquia eg. See Colloquium on Cyst nematodes. I am not clear that there is any great distinction between Colloquia and Symposia, other than that the former are supposed to allow more discussion.
2. The topics suggested in the 1st draft are numbered and in **bold**. The programme will go through at least another draft before being finalised.
3. Current suggestions for plenary sessions (4 allowed):
 - a. Symposium #4. Global commonalities and differences in nematodes management
 - b. Symposium #8. Current trends in nematode phylogeny, evolution and classification
 - c. Symposium #11. Mutualistic and phoretic associations and invertebrate-parasitic nematodes

- d. Symposium #16. Animal parasitic nematodes: management and drug resistance
 - e. Symposium #20. The *C. elegans* inheritance: bioinformatic analysis and nematode genome data-mining
 - f. Symposium #23. RNA interference in plants and nematodes
4. I am suggesting having the opening plenary session on "the past, and future" including training and collaboration (currently Colloquium #8). I am suggesting having some deliberately controversial speakers to get lively discussion going right from the start.
 5. It is important to remember that it is not only nematologists concerned with plant pathology who will be attending 5ICN.
 6. The programme is controlled by a programme committee, consisting of representatives from all the member societies of the International Federation of Nematology Societies. I am now representing AAN on that committee (since John Marshall's retirement) and have attempted to put all the suggestions that I have received to them. I think most appear in the following list somewhere.
 7. We will need convenors for all the sessions, so if you think you have something to contribute, please let me know.

Tenerife	Comments from member societies	Current proposed topics for Brisbane
Symposia		
1. OPENING Plenary Session		1. OPENING Plenary session
2. Epidemiology of Pine Wilt disease	<i>AAN proposed: Pine wilt and forest nematology</i>	2. Forest nematology and Pine Wilt disease
3. Molecular diagnostics		Colloquium no. 9: <i>Molecular applications in nematode diagnostics</i>
4. Precision agriculture and GPS		3. Precision agriculture, information technology and nematode control
5. Global comparative nematode management	<i>AAN : "Commonalities and differences in nematode issues across the globe"</i>	4. Global commonalities and differences in nematodes management
6. Marine and fresh water nematodes		5. Marine and fresh water nematodes
7. Parasitism in Nematoda	<i>AAN suggests: Role and expression of nematode parasitism genes</i> <i>SON asks for a more specific topic,</i> <i>NSI for parasitism genes</i>	Symposium no. 6: <i>Compatible host-parasite interactions</i> Symposium no. 23: <i>RNA interference in plants and nematodes</i>
8. Current trends and future directions in entomopathogenic	<i>AAN proposed: Control of insects and nematodes with</i>	Colloquium 6: <i>Current and future trends for insects control</i>

nematode research	<i>entomopathogenic nematodes</i>	<i>through EPN</i>
9. Nematode management in subsistence farming		Symposium 19: <i>Nematode management in subsistence agriculture</i>
10. Compatible parasitic interactions	<i>AAN: What is included?</i>	6. Compatible host-parasite interactions
11. Resistance breeding against sedentary nematodes		7. Resistance (breeding) against sedentary nematodes
12. Nematode phylogeny, evolution and classification		8. Current trends in nematode phylogeny, evolution and classification
13. Quarantine Nematodes	<i>AAN asks for Nematode issues in quarantine and biosecurity</i> <i>NSI asks for Quarantine and SPS issues in international trade in Agricultural commodities</i>	9. Biosecurity, quarantine and nematode emergencies in international trade
14. Organic amendments for the management of plant parasitic nematodes	<i>AAN asks for Biofumigation, green manures and suppressive soils;</i> <i>SEAN proposed: Organic amendments and cover crops for the management of plant parasitic nematodes</i>	10. Sustainable management through biofumigation, organic amendments and suppressive soils
15. Nematodes as mutualists: where and how did these associations evolve?	<i>AAN proposed: Mutualistic and phoretic associations involving nematodes</i>	11. Mutualistic and phoretic associations and invertebrates parasitic nematodes
16. Incompatible parasitic interactions	<i>AAN = rejects,</i> <i>SON = not sure,</i> <i>NSI proposed: Compatible nematode interactions</i>	Symposium no. 6.: <i>Compatible host-parasite interactions</i> Symposium no.7: <i>Resistance (breeding) against sedentary nematodes</i> Symposium no. 17: <i>Resistance breeding against non sedentary nematodes</i> Symposium no. 23: <i>RNA interference in plants and nematodes</i>
17. Diversity and indicators	<i>AAN suggests splitting into: 1) diversity (number of species,</i>	12. Nematodes barcoding,

	<i>ecology, systematics and theoretical aspects) and 2) biomonitoring, indicators (practicalities)</i>	biodiversity and ecology Symposium no. 13: <i>Climate changes, soil health monitoring and nematode bioindicators</i>
	<i>NSI suggests Global Climate changes, effects on nematodes and their use as bioindicators</i>	13. Climate changes, soil health monitoring and nematode bioindicators
18. Morphology and development		14. Morphology and development
19. Marketable biological control agents for plantparasitic nematodes		15. Industrial production of biological control agents involving nematodes
20. Sensory response and behaviour		Symposium no. 6: <i>Compatible host-parasite interactions</i>
21. Vertebrate parasitic nematodes		16. Animal parasitic nematodes: management and drug resistance
22. New technologies and chemicals for control of plant pathogenic nematodes		Symposium no. 10: <i>Sustainable management through biofumigation, organic amendments and suppressive soils</i> Symposium no. 21: <i>Commercial products and procedures for soil disinfestation and nematodes management and control</i>
23. Resistance breeding against non sedentary nematodes		17. Resistance breeding against non sedentary nematodes
24. Food webs		18. Soil food webs and rhizosphere complexity
	<i>AAN asks for: Nematodes in farming systems</i>	19. Nematodes in farming systems
	<i>AAN proposed: What can Caenorhabditis tell us about other nematodes?</i>	20. The C. elegans inheritance: bioinformatic analysis and nematode genome data-mining

	<p><i>AAN proposed: Commercialising products for nematode control or management;</i></p> <p><i>NSI suggests: Alternative disinfestation procedures (or alternatives to MBr</i></p>	<p>21. Commercial products and procedures for soil disinfestation and nematodes management and control</p>
	<p><i>AAN proposed: Nematode-insect interactions</i></p>	<p>Symposium no.11: <i>Mutualistic and phoretic associations and invertebrates parasitic nematodes</i></p> <p>Colloquium no. 6: <i>Ecology and biogeography of EPN</i></p>
	<p><i>AAN asks for: Nematode survival and environmental tolerance,</i></p> <p><i>NSI proposed: Survival adaptations in nematodes</i></p>	<p>22. Survival adaptations and tolerance in extreme environments</p>
	<p><i>AAN suggests Nematodes in horticulture</i></p>	<p>Colloquium no. 5: <i>Nematode management in industrial crops</i></p> <p>Colloquium no. 7: <i>Nematodes management in protected cropping systems</i></p>
	<p><i>NSI asks for : Nematode Resistant Transgenic Plant Development</i></p>	<p>Symposium no.7: <i>Resistance (breeding) against sedentary nematodes</i></p> <p>Symposium no. 17: <i>Resistance breeding against non sedentary nematodes</i></p> <p>Symposium no. 23: <i>RNA interference in plants and nematodes</i></p>
	<p><i>NSI asks for: Funding for nematological research teaching and extension</i></p> <p><i>NSI also suggests: Education and Training in Nematology</i></p> <p><i>AAN proposes preferable to #23 and should be plenary</i></p>	<p>Colloquium no. 8: <i>Future trends in nematology research and projects</i></p>

	<i>ESN: Education and Training in Nematology</i>	Colloquium no. 8: <i>Future trends in nematology research and projects</i>
	<i>SON, ESN & RSN proposed: Genomics</i>	Symposium no.7: <i>Resistance (breeding) against sedentary nematodes</i> Symposium no. 17: <i>Resistance breeding against non sedentary nematodes</i> Symposium no.20: <i>The C. elegans inheritance: bioinformatic analysis and nematode genome data-mining</i> Symposium no. 23: <i>RNA interference in plants and nematodes</i>
	<i>AAN proposes: reject and place in symposia #7,17,20,23</i>	23. RNA interference in plants and nematodes
	<i>ESN proposes: Biological control and ecology of nematode antagonists</i>	symposium no. 15: <i>Industrial production of biological control agents involving nematodes</i> symposium no. 18: <i>Soil food webs and rhizosphere complexity</i>
	<i>AAN proposes: reject and place in symposia #11,15,18</i>	24. Molecular interactions in nematode-bacteria associations and symbiosis
Colloquia		
1. Lesion nematodes		1. Lesion nematodes
2. Digital nematology		2. Digital applications in nematology & Tree of life updates
3. History of nematology	<i>NSI asks for Future of nematology</i>	Past nematology issues, adopted solutions and future trends (may match with n. 8 ?)
4. Cereal cyst nematodes	<i>RSN asks for potato cyst nematodes</i> <i>AAN suggests: Cyst nematodes</i>	3. Cereal and potato cyst nematodes
5. The need for a focus of a	AAN proposed to reject	

second <i>Meloidogyne</i> project		
6. Nematodes and soil biodiversity	<i>NSI proposed: Role of nematodes in soil biodiversity and soil health</i>	4. Nematodes ecology and soil biodiversity in sustainable soil conservation
7. Nematode management in cotton		5. Nematode management in industrial crops
8. Where now with entomopathogenic nematodes		6. Ecology and biogeography of EPN
9. Terra py	<i>NSI proposed: Nematode management in protected cultivation systems (Polyhouses, glasshouses etc.)</i>	7. Nematodes management in protected cropping systems
10. Biogeography, ecology and nematode management	AAN proposed to reject, added ecology previously	
	<i>AAN proposed: Where does the next generation of nematologists come from?</i> <i>NSI proposed: Education and training (for next generations of nematologists)</i>	8. Future trends in nematology research and projects
	<i>AAN also proposed: Selling nematology to funding agencies and commercial partners</i>	Colloquium no. 8: <i>Future trends in nematology research and projects</i>
	<i>AAN proposes: opportunities for collaboration</i>	Colloquium no. 8: <i>Future trends in nematology research and projects</i>
	<i>RSN asks for Molecular diagnostics</i>	9. Molecular applications in nematode diagnostics
	<i>SON proposed: Accessing new genomic tools</i>	colloquium no. 9: <i>Molecular applications in nematode diagnostics</i>
	<i>SON proposed: Gene knock-down approaches in nematode studies</i>	10. Gene knock-down approaches in nematode studies
Posters		
Detection and diagnostics	<i>NSI asks to separate plant & Soil from Animal parasitic nematodes</i>	1. Detection of plant parasitic nematodes

		2. Diagnostics of animal parasitic
Evolution, phylogeny and classification		3. Evolution, phylogeny and classification
Marine and fresh water nematodes		4. Aquatic nematodes
Entomopathogenic nematodes		5. Advances in EPN research
Physiology	<i>SEAN asks for adding anatomy</i> <i>AAN proposes: Anatomy into Poster category #10</i>	6. Physiological and ultrastructural analysis of nematodes
Pathogenicity		7. Pathogenicity and new host records
Parasitism		8. Parasitism, host reactions and gene expression
Resistance, breeding		9. Resistance, screening and breeding
Morphology, development		10. Morphology and development
Food webs, ecology, biodiversity		11. Food webs, soil ecology and biodiversity
Distribution, population dynamics		12. Epidemiology and population dynamics
Organic amendments		13. Organic amendments and management
Biological control		14. Biological control
Chemical control		15. Chemical and integrated management
Integrated management		Poster no. 15: Chemical and integrated management
Animal parasitic nematodes		16. Animal parasitic nematodes
	<i>AAN proposed: Communication and extension</i>	17. Communication and extension in nematode management
	<i>NSI proposed: Markers for nematode resistance and</i>	18. Host plant resistance and

	<i>transgenic plant development for nematode resistance</i>	genetic markers development
	<i>NSI proposed: Virus vectors and interactions with fungi, bacteria etc.</i>	19. Interactions of nematodes with other microorganisms
	<i>SON suggested: Advances in Anguina research</i>	20. Advances in Anguina research

Short Course – ‘Nematodes in Cropping Systems’

Expressions of interest are being sought for the next "Nematodes in cropping systems: identification & techniques" course. At this stage the timing and location of the course have yet to be decided, but it will be after the International Congress of Nematology. Just how long after is still uncertain, but it will help the organisers greatly if we get some idea of demand as soon as possible. Please let anyone in your acquaintance know.

Pastures, Land Management and Opportunities

Nematology Workshop: APPS Conference Adelaide 24-27 September 2007

8.30 – 4.30

(to fit in with buses)

Monday 24 September 2007, Room no. 1.26, ground floor, Plant Genomics Centre, Hartley Grove, Waite Campus, Urrbrae

This workshop will explore the relationships between beneficial and harmful soil nematodes and pastures: what are the recent developments, management options and opportunities in this area.

Topics include: results of recent studies from NSW, Queensland, SA and WA, breeding, the role of beneficials, and Annual Rye Grass Toxicity.

Speakers invited include: Ian Riley, Ross Ballard, Vivien Vanstone, Nigel Bell and Graham Stirling.

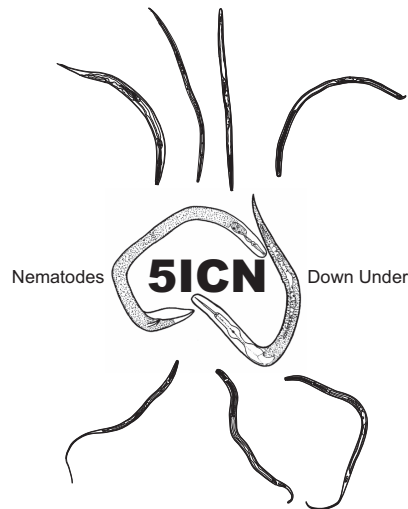
To be followed by the General Meeting of the Australasian Association of Nematologists and a dinner for members.

Enquiries: Mike Hodda, CSIRO Entomology, Canberra. mike.hodda@csiro.au

The conference website is:

<http://www.australasianplantpathologysociety.org.au/>

The organisers are Plevin & Associates: events@plevin.com.au



We invite you to join us at the
5th International Congress on Nematology
to be held in Brisbane, Queensland, Australia

13 – 18 July 2008

Go to www.5icn.org

and complete the "Expression of Interest" to ensure you receive more information and to indicate your interest in attending and presenting at the Congress, or

Email sally.brown@uq.net.au

Join us for a memorable week of nematology in sub-tropical Brisbane. A stimulating programme will be enhanced by the magnificent venue. The Brisbane Convention Centre is set in lush gardens adjacent to the Brisbane River and City centre. Other great natural and cultural attractions are available and will be listed on the website shortly: what more could one want? We look forward to seeing you in sunny Brisbane.

Dr Mike Hodda
Convenor, 5ICN Organising Committee
President Australasian Association of Nematologists

Regional News

NEWS FROM THE A.C.T.

After having school students running around stripping bark and wood off local trees for the past couple of years, I have taken on another two high school students for this year. The students are part of a scheme that takes the top high school students from the final years of school and gives them a chance to do some "real science" (where we don't know the answers in advance). They come in for a few hours one afternoon a week for one term. Over the past couple of years I have managed to build quite a collection of nematodes from the bark and wood of local trees. This should help a lot the next time we get an incursion of an unknown *Bursaphelenchus*-like nematode in wood because we will actually have some idea of what the local fauna looks like!

On a personal note, it is really great to see keen young minds eager to learn. It is also great to see that most of them recognise that science is essential to society and they want to really understand how it is done. It is really depressing, though, to see that many also recognise that the career path has so many "issues" that they will probably do something more lucrative and secure.

After many years of funding, my ABRS grants to work up the local Aphelenchids have run out, so it looks like the current crop of students may be the last to work on this topic. We have found a new genus of Aphelenchida which is somewhere in between *Laimaphelenchus* and *Aphelenchoides*, plenty of *Aphelenchoides* which need a huge amount of time to work out whether they are new or existing species because of the terrible state of the genus, some *Ditylenchus* (ditto previous comment), some *Rhabditis*, and a few unusual Plectids. With a bit of luck, I will have time to work and write these up rather than having to leave them in my personal memory bank.

How to make nematode data available will be one of the topics that I will be discussing at the SON conference at the end of July, where I have been invited to a panel discussion of this, along with Kelley Thomas (University of New Hampshire), who is known to some AAN members. I will report the results of the discussion in the next issue.

Another area of nematode research which seems to continue almost independently of other lines of study is work on *C. elegans*. A contingent from CSIRO's Food Futures Flagship attended the inaugural Australasian *C. elegans* workshop, which was held at the ANU's Kioloa field station, from 26-28th March. This first workshop was organised by the Behm Lab. from the Science Faculty at ANU.

Representatives from a number of Australian *C. elegans* labs spoke at the workshop. These included: Warwick and Kirsten Grant, who recently relocated to La Trobe University from AgResearch in Wellington, NZ ; Peter Hunt from CSIRO Livestock Industries in Brisbane and Armidale; a number of speakers from Carolyn Behm's group at the ANU, including Nicholas Johnson, Julie-Anne Fritz, Timothy Sloan-Gardner and Alison Knight; a delegation from Paul Ebert's lab at UQ, including Nick Valmas, Jujiao Kuang and Steven Zuryn; Daniel Scott, Saul Bert and Hannah Nicholas representing Hannah's lab at the University of Sydney. The topics discussed ranged from population biology of nematodes to investigating fundamental questions in cell and molecular biology.

CSIRO's Food Futures team is working to develop a new type of electronic nose, one that uses olfactory proteins from invertebrates as the sensor elements and, to that end, is investigating odorant receptors and accessory proteins from *C. elegans*. The CSIRO team comprised Chunyan Liao, Guangmei Zhang, Irene Horne, Mira Dumancic and Stephen Trowell. At the workshop, Chunyan Liao gave a presentation describing the behavioural effects of expressing an insect odorant receptor transgene in the AWA sensory neurons of the worm. Guangmei Zhang described his postdoctoral studies of accessory proteins such as the "Receptor Expression Enhancing Proteins", which appear to be required for the proper trafficking of nematode odorant receptors to the ciliary membrane of olfactory sensory neurons.

The consensus among attendees was that the *C. elegans* workshop is a valuable and long-overdue addition to the Australasian conference circuit and that it should be held regularly. The aim is to maintain a friendly and informal atmosphere for Honours and Ph.D. students and postdoctoral scientists to discuss *C. elegans* research.



Photo courtesy Nick Johnson.

Mike Hodda

NEWS FROM SOUTH AUSTRALIA

News from The University of Adelaide

Kerrie Davies recently returned from overseas. She was able to catch up with various nematologists – past and current. In New Zealand, she saw Janine Paynter (nee Lloyd) and her family, and had a day working with Zeng Qi Zhao at Landcare. In Florida, she spent a couple of weeks in Robin Giblin-Davis's lab. at Fort Lauderdale, writing papers. From there she travelled to Germany, and stayed with both Suzanne Charwat at Duren, and Andreas Hensel at Rossdorf. Suzanne is busy with two delightful toddlers, and Andreas continues his

work as project co-ordinator for a couple of drug companies carrying out clinical trials. She also spent some time with Astrid Schmitz, who did her Honours project at the Waite campus with Ian Riley, before she returned to Germany to do a Ph.D. at Bonn with Richard Sikora. Following completion of her degree, Astrid joined her family's business near Aachen. In Turkey, Kerrie caught up with Julie Nicol (CYMMIT) and also saw Halil Toktay and Elif Sahin, PH. D. students of Julie's who have spent some time in Adelaide. Julie was as busy and energetic as ever. The growing season for cereals on the Central Anatolian Plateau had been very dry, and a lot of the planted trials had failed or given poor results – shades of the last season in South Australia. Kerrie gave an impromptu session on identifying trophic groups of soil nematodes to Elif's group in Eskeshir – an interesting experience given her lack of Turkish and their general lack of English. Elif's group is vibrant and buzzing with enthusiasm, and it was great to have been able to visit them.

Congratulations to Zeng Qi Zhao, who has joined Landcare in Auckland, as a nematologist.

Sohbat Bahraminejad has successfully completed his PhD and returned to Iran. His work was on potential defence role of secondary metabolites in oats and included work on compounds that might contribute to CCN resistance (a summary is included in this newsletter). Zahra Mirmoeini, his number one support and valued itinerant member of the SARDI nematode lab, also returned home. Both are missed.

Kerrie Davies

News from SARDI

Ian Riley continues to work with SARDI as part of the MLA pasture soil biology project, which has been extended for another year. This and allied projects are developing quantitative PCR assays for a wide range of soil organisms including pathogens, beneficials and plants (for studying roots). Assays for a growing number of parasitic nematode species are now available including *Ditylenchus dipsaci*, *Heterodera avenae*, *H. trifolii*, *Meloidogyne arenaria/incognita/javanica*, *M. fallax*, *M. hapla*, *Pratylenchus neglectus*, *P. penetrans* and *P. thornei*, with a few others in the queue. The root assays are attracting considerable interest because these provide new ways to directly study the relationship between pathogens and hosts in the soil.

In May, Ian Riley and Julie Nicol (CYMMIT) joined a meeting in Beijing to review research on cereal cyst nematode (CCN) in China and to discuss options for future funding and research. The work of Chinese scientists has demonstrated yield loss in irrigated winter wheat that can be attributed to CCN. Also, potentially damaging populations of CCN have been found in the lower yielding, more marginal spring wheat areas of the western and northern provinces. It is in these areas where the impact of yield losses is likely to be more problematic for growers and their communities.

Greg Walker is planning a trip later this year to visit Dr Larry Duncan and colleagues in Florida under a DAFF scholarship on Spreading Decline (*Radopholus similis*) of citrus. Collaborative work is continuing with Trevor Wicks on a stunting problem in Mallee onions.

Ian Riley & Greg Walker

NEWS FROM WESTERN AUSTRALIA

News from the WA State Agricultural Biotechnology Center (SABC), Murdoch University

The research of the Plant Nematology Group at Murdoch University is focused in four main areas:

- Understanding the molecular basis of the interaction between endoparasitic nematodes (mainly root-knot nematodes) and their host plants
- Developing innovative approaches to make plants resistant to nematodes using synthetic resistance strategies
- Novel nematode diagnostics
- Nematode genomics, using the nematode *C. elegans* as a model to understand genome organisation and function in plant parasitic nematodes.

Members of the Molecular Plant Nematology Group

Prof Mike Jones

Dr Modika Perera

Dr Zhaohui Wang

Dr John Fosu-Nyarko

Ms Shuie Lui

Mr Yong Xian (Tony) Ho

Collaborations

DAFWA (Perth) – Dr Vivien Vanstone

ANU, Canberra – Dr Ule Matthesius

QUT – Professor James Dale, Dr James Dougdale

Institute for Sustainable Agriculture, Cordoba, Spain – Dr Pablo Castillo, Mr Juan Emilio Palomares Ruis

CSL, York, UK – Dr Neil Boonham

NCSU, Raleigh USA – Prof David Bird (Adjunct Professor at Murdoch University)

Professor Mike Jones

Mike has been active in a number of areas, in the last two months these included:

- Participating as one of three invited speakers at the EU Cost Action 872 – Nematode Genomics meeting near Nice, France (there were about 110 participants!) and gave the

invited talk in section WG3: Functional Genomics of Plant Responses on ‘Understanding plant responses to nematodes: INPACT technology, an alternative approach to nematode control’.

- Mike also gave a talk at the COST meeting to advertise the upcoming 5th International Congress of Nematology, Brisbane 2008: this went down well and should help increase the number of registrants from Europe.
- Visited the Nematologists at Rothamsted Experimental Station UK
- Visited the lab of Professor Howard Atkinson and colleagues (eg Dr Peter Urwin), Leeds, UK
- Visited the lab of Prof James Dale, QUT, for discussions on application of new technologies for nematode control
- Member of Australian Biotechnology Advisory Council (ABAC)
- Chaired Biofutures Session in Parliament House, Canberra on Climate Change
- Gave opening Plenary Address at the Asia Pacific Congress on Agricultural Biotechnology (Kuala Lumpur) and an Invited Lecture at the Academy of Sciences Malaysia

Novel nematode diagnostics

Modika Perera is working on an ARC linkage project with Mike Jones and Vivien Vanstone (DAFWA). The focus of the project is to develop tests for different nematode species using immunochemical lateral flow devices for field use to identify nematode species.

Three methods have been developed to extract total soluble proteins from target nematode species for separation of proteins by two-dimensional polyacrylamide gel electrophoresis (2D PAGE), followed by localisation of protein spots by staining gels with Coomassie Blue R 250. The three extraction methods have been optimised using the plant parasitic nematode *Anguina tritici* as a model and then applied to analyse total soluble proteins from *A. funesta* and *M. javanica*. Species-specific diagnostic proteins are being identified following separation of proteins using a proteomics imaging system (PerkinElmer ProXPRESS).

Mike Jones invited Dr Neil Boonham, our overseas collaborator on this project, of the Central Science Laboratories (CSL), York, UK to Perth. We had discussions with him about developing monoclonal antibodies against nematodes, testing, labelling antibodies, printing and assembling test devices on a commercial scale. Work is in progress to produce antigens of *A. tritici*, *A. funesta*, and *M. javanica* to generate monoclonal antibodies.

Biomarkers to differentiate root lesion nematode species and races of stem nematodes

As part of the work on new nematode diagnostics with Mike Jones and Vivien Vanstone, Modika has identified species-specific and/or race-specific protein biomarkers for root lesion and stem nematodes using MALDI-TOF mass spectrometry. The work was based on the following nematode species: *Pratylenchus neglectus*-isolates-Pn 433 – Scaddan, Pn 446 - Wongan Hills, Pn 448 - Wongan Hills, Pn 454 – Williams, Pn 81 - Bordan , Pn 17 - Lake Grace, Pn 99C - Punthari-SA, *P. penetrans*: isolates- Pp 642 – Manjimup RS- Vegetables, PpNarrogin, *P. thornei* - isolate 511B – Northam, *Ditylenchus dipsaci*- oat and lucerne races.

The work involves generating protein profiles by mass spectrometry – very accurate molecular masses of proteins are obtained - and identifying protein peaks that are diagnostic (ie unique) for the different species or races.

In June Modika presented a seminar on “**Molecular diagnostics to identify plant parasitic nematodes**” at DAFWA Plant Pathology Seminar Series.

A Murdoch University final year Biotech/ Chemistry student Yong Xian (Tony) Ho has just joined the Plant Nematology Group for work experience during the winter break. Tony is working with Modika on nematode diagnostics.

Synthetic plant resistance

Zhaohui Wang and Shuie Liu are working on an ARC Linkage Project “A new approach to control of plant parasitic nematodes” with Mike Jones and Professor James Dale at QUT. The aim of this project is to develop an alternative approach to host resistance to nematodes making use of tightly controlled gene expression in giant cells using different nematode-responsive promoters and based on knowledge of plant virus replication. A series of transgenic events have been generated in tobacco. Expression of the GUS reporter in transgenic plants is being studied after root-knot infection on T1 plants germinated from seed. Some transgenic lines have shown specific GUS expression in gall tissue at some level.

A second phase of this project to generate synthetic plant resistance has been supported in a new ARC Linkage Project starting July 2007, also between Mike Jones, James Dale, with our commercial partner Dardin Agriculture Holdings.

Understanding the molecular basis of root-knot nematode-host interaction

John Fosu-Nyarko is working on an ARC discovery project with Mike Jones, Vivien Vanstone (DAFWA) and Adj Professor David Bird (North Carolina State University). The aim of the project is to study the biological processes involved in early development (induction) of root knot nematode feeding sites in tomato host roots. The current focus is on generating gene expression profiles of *Meloidogyne javanica* – induced giant cells from giant cell cytoplasmic contents isolated with laser capture microdissection and catapulting.

We have generated two giant cell-specific EST libraries (i) 4-dpi library with ESTs obtained from mRNA of giant cell and (ii) 7-dpi library with ESTs obtained from mRNA of giant cells. From the 4-dpi library, 87 ESTs have been sequenced and characterised including 70 that match genes involved in a range of biological processes. The functions of the remaining ESTs, most of which are homologues of *Arabidopsis* proteins, are unknown. With the exception of 8 ESTs whose functions are unknown, the 54 ESTs of the 7-dpi library have homologous genes and functions. More unique transcripts were obtained in the 4-dpi library than the 7 – dpi library.

By *in silico* functional characterisation, key biological processes involved in giant cell formation can be identified including genes involved in carbohydrate, lipid, energy, and nucleotide and amino acid metabolisms. Biosynthetic pathways identified include that of lignin of which phenylalanine lyase, cloned from both libraries, plays an important role. Also, genes involved in cell division, a process which characterises the formation of giant cells, were identified in the library. They include a homologue of a cell cycle gene induced by phosphate in tobacco cells and a pectinesterase, the homologue of which is involved in cell wall solubilisation and extension, and border cell development and separation in pea. Other genes in both libraries code for putative transcription factors, components of ubiquitination, signal transduction pathways and cellular proteins including clathrin, part of oligomeric complex of coat proteins that regulates vesicular traffic and protein transport.

Direct involvement of these genes in nematode-host interaction is being studied using quantitative real time RT-PCR, *in situ* hybridisation and RNA interference. The results are expected to provide us with more understanding of how endoparasitic nematodes use the host machinery for their survival and to complete their life cycle.

Mike Jones

NEWS FROM NEW ZEALAND

AgResearch

Nigel Bell travelled to Ghent in Belgium in March as part of a Royal Society of New Zealand International Science and Technology funded project "Identifying New Zealand's root lesion nematodes". He worked with Lieven Waeyenberge at ILVO-Plant-Crop Protection and Wim Bert at Ghent University. The initial impetus for the travel was to assist with collection, morphological examination and DNA analysis of more specimens of a putatively new *Pratylenchus* species in New Zealand. In addition, collections from other New Zealand locations were made which will help clarify the species of lesion nematodes present in New Zealand and their geographical distribution. Nigel learnt many molecular biology techniques from Lieven which have been brought back to his lab and will be invaluable for current and future work. Formalin-fixed specimens of *Pratylenchus* nematodes were deposited with Wim so that the molecular data generated by Lieven and Nigel can be augmented by morphological examinations if description of a new species is warranted. Both Lieven and Wim were excellent hosts for Nigel's two week stay which, although cold, was really interesting. A hint to anyone travelling to Belgium: take chocolates back home as presents - they go down a treat.

Nigel Bell

Landcare Research

In March 2007, Zeng Qi Zhao was employed as a nematologist by Landcare Research in Auckland. His research will mainly be working on two nematode groups: 1) nematodes in the family Tripylidae, Oerley 1880. It will include the genera *Tripyla* Bastian, 1865; *Tobrilus* Andr ssy, 1959 and *Trischistoma* Cobb, 1913. 2) Some nematodes in the family Alaimidae Micoletzky, 1922. The nematodes in Tripylidae and Alaimidae mainly occur in freshwater and soil. There are probably 20 to 40 species in New Zealand (G W Yeates pers. comm. 2007). They are generally relatively large nematodes. Their description would be a significant contribution to the known nematode fauna of New Zealand.

Zeng Qi Zhao

Counting Slides Available

The counting slides used in my laboratory (see photograph below) are made to my specifications by a small company in Brisbane. I have used the slides for the last 20 years for the following reasons:

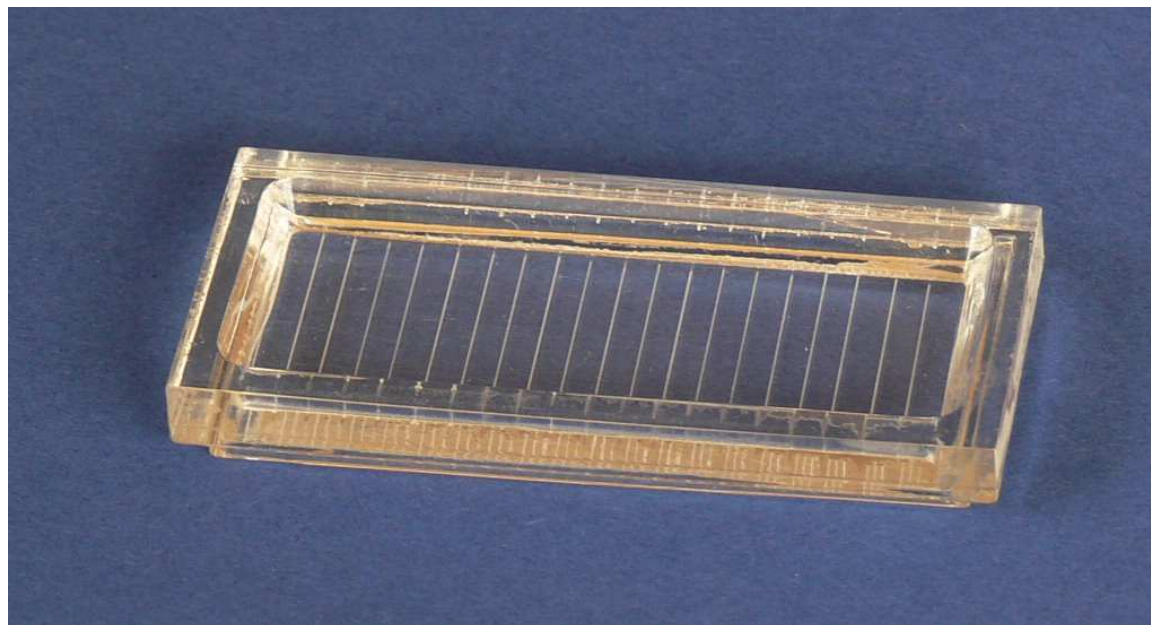
- They are made of plastic and therefore last for years
- The slides hold up to 5 mL of liquid, which means that the whole sample can be scanned when checking for low numbers of nematodes (e.g. pre-plant samples with low numbers of *Meloidogyne*)
- The counting area consists of 20 rectangles, which means that a proportion of the sample can be scanned (e.g. 2, 4, 5 or 10 rectangles) when nematode numbers are high
- The slides are suitable for the 4x and 10x objectives of a standard compound microscope, while 20x objectives can be used with an inverted microscope.

I recently purchased a new batch of slides, and because a minimum order was required, I have extra slides available at a price of \$130 each (GST and postage included).

If you would like to purchase one or more slides, please let me know via email. I will then post them to you and include an invoice.

Graham Stirling

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Thesis Abstract

BIOLOGICAL ACTIVITY OF SECONDARY METABOLITES IN OAT (*AVENA SATIVA*)

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Summary of thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy, The University of Adelaide

2006

Flavone-C-glycosides (FCGs) and saponins are important defence compounds in many species of plants. The concentration of FCGs in 72 oat accessions was determined in a pilot experiment to explore the variation of this trait. Concentration of FCG compounds ranged from 1.32 to 12.83 mg (rutin equiv.)/g dry shoot. This variation was significant in subsequent experiments evaluating 21 and 5 cultivars, respectively.

The effect of methyl jasmonate (MJ) on FCG concentration was studied on 21 accessions in more detail. No significant induction of FCGs was observed in the shoots of MJ treated and untreated plants. The activity of MJ was confirmed by showing the induction of the oat thaumatin-like gene (*PR5*) in the roots but not shoots of oat cv. Quoll.

Crude extracts from the shoots of oat cv. Quoll were tested against four species of bacteria and eight species of fungi. Bacterial growth was not inhibited by the crude methanolic extract. The mycelial growth of all *Pyrenophora* species tested, except *P. avenae* DAR 33699, was inhibited by the methanolic crude extract of oat, whereas the mycelia growth of *Fusarium graminearum*, *Mycosphaerella pinodes* and *Rhizoctonia solani* was not inhibited. Fractions with high concentrations of FCGs had no inhibitory effect against *Pyrenophora teres* f. *teres* or *Pyrenophora teres* f. *maculata*. The highest concentration of antifungal activity was found in fractions containing the saponins, 26-desglucoavenacoside A (26-DGA) and 26-desglucoavenacoside B (26-DGB).

A single seed descent population of oat generated from the cross between Potoroo, a cultivar resistant to cereal cyst nematode (CCN; *Heterodera avenae*), and Mortlock, a susceptible cultivar, was used to identify metabolites correlated with CCN resistance. This population had been assessed for CCN infestation each year from 2000 to 2002 and against stem nematode (*Ditylenchus dipsaci*) in 2001 as part of an unrelated study, and showed segregation for resistance to these nematodes. In this study, 30 SSD extreme lines that showed high and low numbers of white female nematodes were selected. Three compounds were found in the methanolic extract of oat roots that had negatively significant correlation with the CCN female counts. These compounds were partially characterised by ultraviolet-visible (UV-vis) and liquid chromatography-mass spectrometry (LC-MS). No significant correlation was found between previously identified avenacins in oat roots and CCN female counts. There was also no significant correlation found between flavonoids in oat roots and CCN female counts and flavonoids in oat shoot and stem nematodes scores.

In an independent experiment the induction of methyl jasmonate on secondary metabolites in oat roots was examined. Twelve high performance liquid chromatography (HPLC)-identified peaks were induced by exogenous application of MJ. LC-MS analysis identified selected induced peaks similar to avenacoside A and/or 26-desglucoavenacoside B in oat roots. This indicates for the first time that the pathway could be active in roots as well as shoots. Two root avenacins, avenacin A-2 and avenacin B-1 were induced by MJ, one of these, avenacin A-2, negatively correlated with CCN female counts. However, the correlation was not significant based on this analysis of the extreme subset of the SSD population.

The results in this study provides several important areas for further research that in future should allow plant breeders to develop lines with better resistance to nematodes.

Position Available

PH.D SCHOLARSHIP available now

“Development and evaluation of optimum strategies for early detection and recognition of exotic plant parasitic nematodes”

The Cooperative Research Centre for National Plant Biosecurity is seeking a PhD candidate to conduct a study on the risk assessment and identification/diagnostics of exotic plant parasitic nematodes.

To improve Australian biosecurity against new incursions of nematode pathogens, it is essential to assess potential agricultural and horticultural regions at risk from nematode incursions. There is also a need for improved technologies to detect, identify and eliminate exotic plant parasitic nematodes. The student will have the opportunity to develop skills in basic nematode biology, traditional and molecular taxonomy, and risk assessment. The appointee will be based at Murdoch University, but will work closely with the Department of Agriculture and Food (WA), the SA Research and Development Institute (SARDI) and other state agencies and spend time in those labs for training in nematode biology and taxonomy: subsequent development and validation of new methods for nematode diagnostics, including methods based on DNA analysis, and protein profiling using mass spectrometry, will be undertaken at Murdoch. Risk Assessment will be conducted in collaboration with the Australian Centre of Excellence in Risk Analysis in Melbourne.

The outcomes of this project will be directly relevant to the Australian plant biosecurity industry as the information obtained will enable potential new incursions to be predicted, controlled, and a thorough knowledge of nematode issues will also promote Australian trade and market access through high quality evidence-based support of phytosanitary issues and regulations.

The PhD student will be enrolled at Murdoch University and will be part of a large and active research group within the WA State Agricultural Biotechnology Centre. A minimum stipend of \$24,000 pa and a generous operating allowance will apply. In addition there will be regular opportunities for travel, and interaction with other scientists and students within the CRC.

For further information about the project please contact:

Prof. Mike Jones (M.Jones@murdoch.edu.au, 08 9360 2424)

or

Dr Kirsty Bayliss (K.Bayliss@murdoch.edu.au, 08 9360 7537).

It is essential that the student has an interest in plant pathogens threatening Australian plant biosecurity, is an Australian Citizen or Permanent Resident and holds a First Class or Upper 2A Honours degree (or equivalent).

Applicants are requested to submit 1) the official CRC application form (contact Mike Jones), 2) a copy of their academic transcript and 3) the names and contact details for two referees (including at least one University referee).

Please send applications to Prof Mike Jones

by email to

m.jones@murdoch.edu.au

or by mail to

WA State Agricultural Biotechnology Centre, School of Biological Sciences, Murdoch University, Perth, Western Australia 6150.

The successful applicant must be available for immediate commencement.