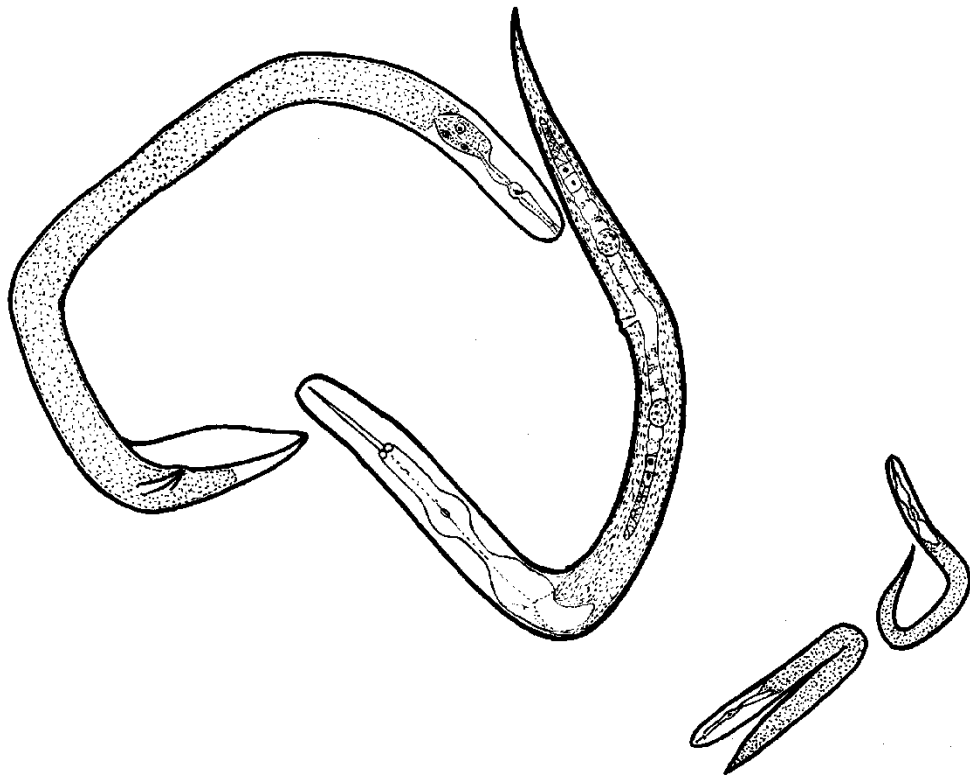


AUSTRALASIAN NEMATODOLOGY NEWSLETTER



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From the Editor

Thank you to everyone who has contributed to this issue of the Newsletter.

Articles on regional news, recent publications, announcements of new research projects, colleagues, visitors, students etc., research reports, conference or workshop reports, abstracts of recently submitted/accepted PhD theses, conference or workshop announcements and photos are welcome. Contributions will be accepted at any time throughout the year so please forward articles and reports to me as they occur, with the deadline for the next issue around mid-December 2018.

I look forward to receiving your contributions for future issues and keeping you up to date with the regional news of our AAN members.

Rebecca Zwart

Contacts

Dr Mike Hodda

President, Australasian Association of Nematologists
CSIRO Ecosystem Science
GPO Box 1700
Canberra ACT 2601

Tel: (02) 6246 4371
Fax: (02) 6246 4000
Email: mike.hodda@csiro.au

Dr Sarah Collins

Secretary, Australasian Association of Nematologists
Department of Agriculture and Food
Locked bag 4
Bentley Delivery Centre WA 6983

Tel: (08) 9368 3333
Fax: (08) 9474 2840
Email: sarah.collins@agric.wa.gov.au

Dr Kathrine Linsell

Joint Treasurer, Australasian Association of Nematologists
SARDI Plant Health and Biosecurity
Plant Research Centre, Hartley Grove
Urrbrae SA 5064

Tel: (08) 8303 9437
Fax: (08) 8303 9393
Email: katherine.linsell@sa.gov.au

Ms Sue Pederick

Joint Treasurer, Australasian Association of Nematologists
SARDI Plant Health and Biosecurity
Plant Research Centre, Hartley Grove
Urrbrae SA 5064

Tel: (08) 8303 9585
Fax: (08) 8303 9393
Email: sue.pederick@sa.gov.au

Dr Rebecca Zwart

Editor, Australasian Nematology Newsletter
Centre for Crop Health
University of Southern Queensland
Toowoomba QLD 4350

Tel: (07) 4631 1544
Email: rebecca.zwart@usq.edu.au

Association News

FROM THE PRESIDENT

A short piece this newsletter as I, like everyone else I know, have been increasingly busy as the pool of nematological expertise shrinks.

Below is a memorandum from Larry Duncan, President of the International Federation of Nematology Societies (IFNS) seeking input in developing the programme for the next international congress of nematology. This congress is in the south of France, and, although a little early in the year for the thermophiles, should have a lovely environment to add to the serious nematology, so should definitely be worth attending.

If people have comments or suggestions, nominations for others or even self, please let me know because I am the AAN representative on the programme committee. Shoot me an email any time.

On the topic of conferences, a reminder that we have funding available for supporting students to attend conferences, especially international congresses. The application process is super easy, and although we seldom give full funding, in almost all cases in the past, having some funding from AAN is enough to secure other funding for the rest (and it is really good training for students to have to do this).

Mike Hodda

See page 3 for the memorandum from Larry Duncan.

See page 14 for the draft program of the 7th International Congress of Nematology.

MEMORANDUM FROM LARRY DUNCAN

Memo, June 3, 2018

To: IFNS Councilors:

Shashi B Sharma
Michael Hodda
Tiago J. Pereira
Peng DeLiang
Liao Jinling
Sanaa A Haroon
Wilfrida Decraemer
Ernesto San-Blas

Eric Grenier
Marisa Teresa Vinciguerra
Johji Miwa
Hiroaki Okada
Pankaj Singh
Bansa Singh
Mieke Daneel

Aurelio Ciancio
Rosa Manzanilla-Lopez
Manzoor Hussain Soomro
Mikhail Pridannikov
Robin Giblin-Davis
Axel Elling
Biodun Claudius-Cole

From: Larry Duncan, Andreas Westphal, Ernesto San-Blas

Subject: INC 2020 scientific program

Hello Everyone. A draft scientific program is attached. It includes topics and potential speakers for plenary talks, topics and schedules for oral sessions, and a topic for one workshop. This draft is intended for distribution to IFNS societies and modification over the next year. Based on the suggestions received from the societies, a working program will be finalized by next May so that speakers and session organizer can be recruited during the year prior to the congress.

Ernesto San-Blas produced this draft, using topics from the last congress and suggestions from councilors received since those topics were circulated to you last year. The program was further modified recently based on the suggestions of Pierre Abad and his local arrangements team. Topics, schedules and speakers are all subject to change in response to feedback from societies. Most of the plenary talks have potential speakers listed, but suggestions are most welcome. Lists of possible session organizers and speakers are being assembled, but are not given in this draft in the expectation that each society will tender names from their membership for many or all of the topics. This input from every society is critical to ensure that the congress delivers information and ideas that truly reflect the breadth of what all of us together have to contribute to the advancement of nematology. In order to encourage innovation, rather than scheduling workshop topics, individuals seeking to organize workshops of broad interest are encouraged to contact Ernesto with a proposal on any topic. However, topics that have been offered generally to date are appended at the bottom of the program.

Thanks in advance to all of you for relaying your society's thoughts in the coming year on how to make the 2020 INC scientific program as relevant as possible to the entire membership.

As always, please check that the membership page for your society is up-to-date and send along any necessary corrections or updates.

Best regards,
Larry Duncan, Ernesto San Blas, Andreas Westphal

Regional News

NEWS FROM QUEENSLAND

University of Southern Queensland

The Crop Nematology team at University of Southern Queensland (USQ) welcomed a new PhD student, Ms Sonal Channale in February this year. She is studying the identification of candidate resistance genes in chickpea (*Cicer arietinum*) against root-lesion nematode *Pratylenchus thornei*, supervised by Dr Rebecca Zwart and Prof. John Thompson at USQ and Dr Mahendar Thudi at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad, India. Sonal was recently awarded a Crawford-in-Queensland Student Award, which she will use at the end of this year to travel to ICRISAT to conduct a transcriptomics study as part of her project.

Rebecca Zwart was recently invited to speak at the 7th International Food Legumes Research Conference in Morocco on the subject of resistance to nematodes in chickpea. The talk was well received, and was an opportunity to remind the audience of the importance of plant parasitic nematodes in production of legumes.

Kirsty Owen spoke at the Grains Research and Development Corporation's Update meetings in early 2018 on the impact of growing susceptible chickpea cultivars on management of *Pratylenchus thornei*. She is heading off to the USA in late July for the Society of Nematologists meeting in New Mexico and the International Congress of Plant Pathology in Boston to present her work on mungbeans and successful crop sequences to reduce the burden of *P. thornei* on grain production in our region.

Kirsty Owen

NEWS FROM SOUTH AUSTRALIA

University of Adelaide

Kerrie Davies has put it in writing, and will retire at the end of 2019. She is finalising a couple of manuscripts, and may (with Mike Hodda) do one last Short Course next year (depending on demand). Most of her time at present is being spent on curation of the Waite Nematode Collection (WNC).

This is the first time Kerrie has had a comprehensive look at the whole Collection, which was started by Frances Reay in the 1970's. This has enabled her to make some observations on the longevity of the slides, and comparisons of the effectiveness of the various techniques used for fixation and mounting over the years.

1. Don't use FA 4:1 as a fixative for plant parasitic nematodes – cuticular features such as the spicules and stylets become more and more faded with time. Two or three percent formalin gives best results
2. Some sticky labels just fall off over time. Unfortunately, we did not record the brands used, so just be aware – some last for 50+ years, others dry out and fall off after about 10. This is something those of us making 'permanent' slides should discuss – how best to glue labels onto glass slides

3. In Adelaide's climate, and given that she has used 'dried' glycerol, fungal contamination of slides in the WNC is not a problem.
4. Slides mounted and not re-examined have generally survived intact (for 40 odd years). As a general rule, the more a slide has been handled and examined, the more likely it is to require re-mounting within 10 years. Kerrie suspects that the problem is that when oil is wiped off a coverslip, the pressure applied breaks the seal between glass and wax, allowing glycerol to evaporate and air to enter the mount.
5. Large bacterial feeding nematodes like *Steinernema* and *Heterorhabditis* have not survived well. The bodies of these appear to have softened with time in the glycerol, and many have had to be thrown out as they have become opaque and 'mushy'. As these were left in fixative for at least a fortnight, this does not seem likely to be a problem of fixation.
6. It is planned to send the Collection to the Australian National Insect Collection (ANIC) in Canberra.

Kerrie Davies.

NEWS FROM WESTERN AUSTRALIA

Department of Primary Industries and Regional Development

Hello from our research group here in Western Australia (WA)! We have not contributed to the Newsletter for a while so this is a big hello and yes we even have a new name to add to the confusing array of changing state government department names. After 123 years as a standalone department, WA's Department of Agriculture has been amalgamated into a 'super department' - Department of Primary Industries and Regional Development, Western Australia – or DPIRD for short. As you can imagine, many changes are afoot as we bring together Agriculture, Fisheries and Regional Development under one umbrella. Not the least of which are our email addresses, websites, logos and alike. So stay tuned and be sure to update contacts.



Hon Ernest Knight (EK) Hoare MLA Minister for Agriculture laying the foundation stone at the Department of Agriculture South Perth office, 1956. (Photo credit: DPIRD)

On the research front, our DPIRD nematology group have, as of Friday 22nd June, all our field experiments sown and underway. After a very dry lead-up to the season, most of the western region's broadacre growing areas now have sufficient rainfall for growers to feel some promise in the season ahead. In 2018, our main areas of research continue with broadacre cropping investigating crop and variety resistance and potential yield loss to root lesion nematodes (RLNs) *Pratylenchus neglectus* and *P. quasitereoides* (Grains Research and Development Corporation (GRDC) funded project DAW00128). We are also working with other research groups within DPIRD to improve our knowledge of RLN's interaction with pastures, other soil borne diseases, weeds, soil renovation and nutrient inputs.

New research this season includes a number of regionally based investigations conducted by our DPIRD Development Officers in the 'Regional Research Agronomy (WA)' project (GRDC, DAW00256). In this venture the regionally based officers work with growers and the wider grains industry using research relevant to grower's problems in all aspects of crop agronomy. In 2018, three research field trials in the project include aims for improved RLN management specific to their regional conditions. Two of the field experiments investigate break crop options for managing RLN in highly infested paddocks but are looking at different RLN species and break crops relevant to their particular growing areas. Bec Swift (DPIRD, Northam) is working in a highly *P. quasitereoides* dominated paddock that also has some *P. neglectus* and rhizoctonia in the soil (LINK). Conversely, Alice Butler (DPIRD, Albany) is working with a grower in Dumbleyung with break crops for the management of *P. neglectus* (see photo below). Break crops include faba beans, lupins and serradella against the standard break crop, canola, and will be compared via gross margin analysis over two years. Bonnie Jupp's (DPIRD, Geraldton) is investigating the influence of soil renovation on crop and weed establishment in a *P. neglectus* infested paddock

<https://www.agric.wa.gov.au/newsletters/pwac/protecting-wa-crops-issue-9-march-2018>;



DPIRD Development Officer, Alice Butler and Dumbleyung grower Glen Ball discussing potential break crops suited to the local conditions. (Photo credit: Alice Butler)

Sarah Collins

Research Report

ARE OATS A GOOD BREAK CROP FOR ROOT LESION NEMATODES?

Root lesion nematodes (RLNs) are major pests in cereal and oil seed crops in Western Australia (WA). There are two main species of RLNs which impact on broadacre crop production in WA, *Pratylenchus neglectus* and *P. quasitereoides* (formerly *P. teres*). Distribution and management of *P. quasitereoides* are a unique issue for WA growers whereas *P. neglectus* also has an impact on broadacre crops in all other states. Currently, there are no economically viable nematicides available to control RLNs in broadacre cropping. Management is based on crop rotation and variety selection. A resistant crop or variety will not cause an increase in RLN levels over a growing season whilst a susceptible crop or variety will cause an increase. Wheat, barley and canola are susceptible crops but there are differences in susceptibility between crop varieties which can be utilized for RLN management by growers. Traditionally it has been thought that oats are the most resistant of the main cereal crops grown in WA but currently grown varieties had not been tested in the field.

The aim of this Council of Grain Grower Organisations Limited (COGGO) funded project was to enhance understanding of oats crops as a break for RLNs in WA. To achieve this, field and glasshouse resistance of oats to *P. neglectus* and *P. quasitereoides* were tested. The resistance of oat crops to *P. neglectus* and provisional oat variety resistance were developed via two glasshouse experiments and two field trials over two seasons. In addition, the field resistance of oat varieties to *P. quasitereoides* was tested in two field trials over two years. Oat varieties tested were chosen in consultation with Pamela Zwer (National Oat Breeding Program) and Georgina Troup (DPIRD Oat Agronomist).

This project has shown that oats are not a good break crop in paddocks infested with either RLN species *P. neglectus* or *P. quasitereoides* as they are likely to cause nematode levels to increase which may then cause issues in subsequent crops. There is also evidence that *P. quasitereoides* may cause yield loss in oats. Oats were more resistant than wheat to *P. neglectus* and more susceptible than wheat to *P. quasitereoides*.

P. neglectus and oats

- All oat varieties tested were susceptible to *P. neglectus* and will likely cause levels in an infested paddock to increase over a season which may affect yield and growth of a subsequent crop. In general, oats were more resistant than wheat and barley to *P. neglectus* and may be a better cereal rotation option to manage *P. neglectus* levels.
- There was little difference in resistance between oat varieties to *P. neglectus* in field trials.
- In glasshouse trials oats were generally less susceptible than wheat and barley but more susceptible than lupin and serradella pastures.

P. quasitereoides and oats

- All oat varieties tested were more susceptible to *P. quasitereoides* than the most commonly grown wheat variety in WA, Mace (moderately susceptible to moderately resistant). This means that growing any variety of oats is likely to cause a greater increase in *P. quasitereoides* levels in a paddock than growing Mace. Results from two field trials indicate that Williams and Mulgara may be the most resistant oat varieties to *P. quasitereoides* but this needs further testing.
- *P. quasitereoides* caused grain yield loss in oats of 0.23 t/ha for every RLN/g soil in Beverly in 2017. Estimation of potential yield loss from RLN's, particularly *P. quasitereoides* requires further research.

Project results can be used by WA grain growers to make more informed decisions on crop and oat variety selection in paddocks infested with RLNs.

Carla Wilkinson and Sarah Collins

Research Report

ROOT LESION NEMATODE – WHERE IS IT IN WA? WHICH SPECIES ARE AT CONCERNING LEVELS?

Department of Primary Industries and Regional Development (DPIRD), Western Australia (WA), compiles information on the levels of root lesion nematodes (RLN) and extent of paddocks infested with RLN species commonly found in Western Australian broadacre cropping areas. These surveys are currently collated annually as part of a national nematology project funded via Grains Research and Development Corporation (GRDC) partnership (DAV00128). Our research group draws information provided by our own nematology field survey during a season, other DPIRD research groups who include RLN soil testing in their research, as well as our DPIRD diagnostic services (<https://www.agric.wa.gov.au/bacteria/ddls-plant-pathology-services>). We also draw on surveys conducted by regional grower groups, consultants and growers where possible. Below is a summary the 2017 RLN survey.

- 181 paddocks were sampled across the western region prior to the 2017 broadacre growing season.
- 63 paddocks were assessed as part of the general survey capacity of this project which extended across all WA broadacre growing areas (Table 1a). Of these paddocks 89% were infested with RLN. Overall, of all paddocks surveyed 44% had *P. neglectus* and 21% had *P. quasitereoides* at medium to high levels which could cause yield loss if a wheat or barley crop was sown that season. In the majority of paddocks only one RLN species was present (57%, Table 2), however more than one species was present in 30% of the paddocks.
- 118 paddocks were sampled for an ‘Eastern Wheatbelt’ survey (Table 1b). The aim of this survey was to increase the number of samples taken in this region to inform the current Murray and Brennan study into the impacts of RLN in Australia. RLN was detected in 92% of these 118 paddocks. The dominant RLN species in this region was *P. neglectus* and levels were mostly in the medium to high risk of yield loss if a wheat or barley crop was sown that season.

Table 1. Western region provisional yield loss risk for a) 63 paddock samples collected general survey and b) 118 paddock samples for eastern wheatbelt survey during the 2017 season. Risk is based on current provisional PreDictaB categories for Root lesion nematode (McKay et al. 2016). Data expressed as percent detection.

a) Nematology general survey

RLN species	Not detected	Low (0.3<2)	Medium (2-<15)	High (>=15)	Paddocks with RLN Detection
<i>P. neglectus</i>	27	29	41	3	73
<i>P. quasitereoides</i>	60	19	19	2	40
<i>P. thornei</i>	97	2	2	0	3
<i>P. penetrans</i>	94	3	3	0	7
1 or more RLN	11	30	49	10	89

b) Eastern wheatbelt survey

RLN species	Not detected	Low (0.3<2)	Medium (2-<15)	High (>=15)	Paddocks with RLN
<i>P. neglectus</i>	9	39	47	5	91
<i>P. quasitereoides</i>	97	3	0	0	3
<i>P. thornei</i>	98	3	0	0	3
<i>P. penetrans</i>	99	0	1	0	1
1 or more RLN	9	39	48	5	92

Data collected in projects: DAW00128 National Nematode Epidemiology and Management Program, DAW00229 Western Region Pathology & DAW00256 (Building crop protection and production agronomy R&D capacity in regional Western Australia project) by DPIRD, GRDC and Royalties for Regions.

Table 2. Occurrence of mixed root lesion nematodes populations in Paddocks sampled during 2017 in general and eastern region surveys. Species present: *Pratylenchus neglectus*, *P. quasitereoides*, *P. thornei* and *P. penetrans*.

Number of RLN species present	General Western regional survey		Eastern port-zone survey	
	No. Paddocks where present	% of paddocks in survey	No. Paddocks where present	% of paddocks in survey
0	7	11	10	9
1	36	57	101	86
2	19	30	7	6
3	1	2	0	0
Total	63		118	

Data collected in projects: DAW00128 National Nematode Epidemiology and Management Program & DAW00256 (Building crop protection and production agronomy R&D capacity in regional Western Australia project) by DPIRD, GRDC and Royalties for Regions.

The 2017 RLN survey results are consistent with DPRID surveys conducted in previous years. Root lesion nematodes are widespread throughout the WA broadacre growing region and are at levels that were likely to cause yield loss in over 50% of paddocks if wheat and barley was sown. *Pratylenchus neglectus* is the most commonly found RLN species followed by *P. quasitereoides*, which is a species of concern only in this state. This was the first time that a specific survey has been conducted for WA's eastern wheatbelt which is characterised by lower rainfall than other broadacre growing zones in the state. Survey results show that RLN populations and distribution are different to other zones in WA. *Pratylenchus neglectus* was very widespread, often at levels likely to cause yield loss in a wheat or barley crop and *P. neglectus* was the only species of concern for growers.

Sarah Collins

Book

XENO'S FEAST: A NEMATODE'S TALE

A young peach tree stands, waist deep in earth, its tender roots in agony.

A baby grub, fat and hungry chews on the tree.

"More..." it grumbles, biting again. "Give me more."

The tree sends pain-waves through the soil, a cry for help that radiates into the darkness.

Far away, the signals reach young Nema.

The timing is right. Nema has just burst out of her writhing mass of family.

She lifts her head, sensing the direction.

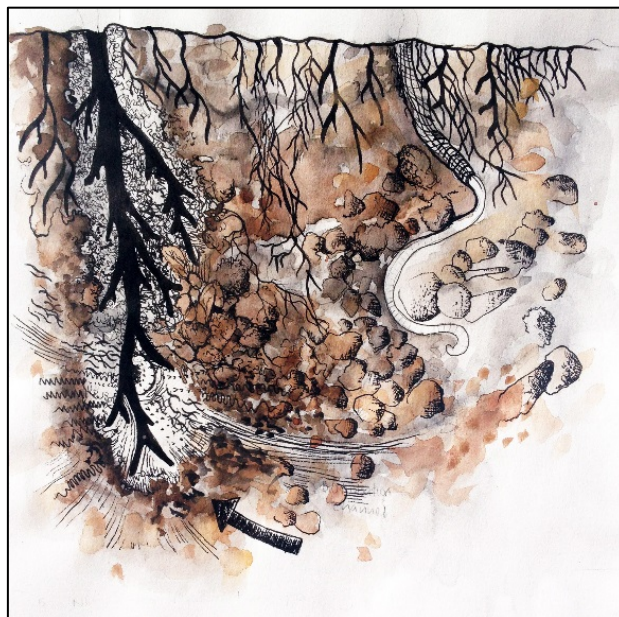
"Come on! Todi, Seri, Glassa," she calls to her gang. "Somebody needs us."

Each nematode is carrying microscopic passengers. Deep inside them, ancient Xenos huddle, a little group of bacteria, riding wherever the nematodes travel.

"Go Nema, go!" the Xenos whisper. "Our feast awaits."

This is an excerpt from a new storybook called *Xeno's Feast* which will be co-published by Scale Free Network and CSIRO Publishing in 2019. Written for 8 – 12 year olds (and bio-curious adults of all ages), it will be the third title in the *Small Friends Books* series – which explores the symbiotic partnerships between microbes and larger life forms.

The narrative of *Xeno's Feast* was inspired by the partnership between *Steinernema* (entomopathogenic) nematodes and *Xenorhabdus* bacteria, taking readers on a journey with a group of juvenile nematodes as they navigate the labyrinthine soil underworld. Many people think of soil as merely 'dirt', rather than the diverse micro-metropolis that it is – home to trillions – and a treasure trove of literary inspiration.

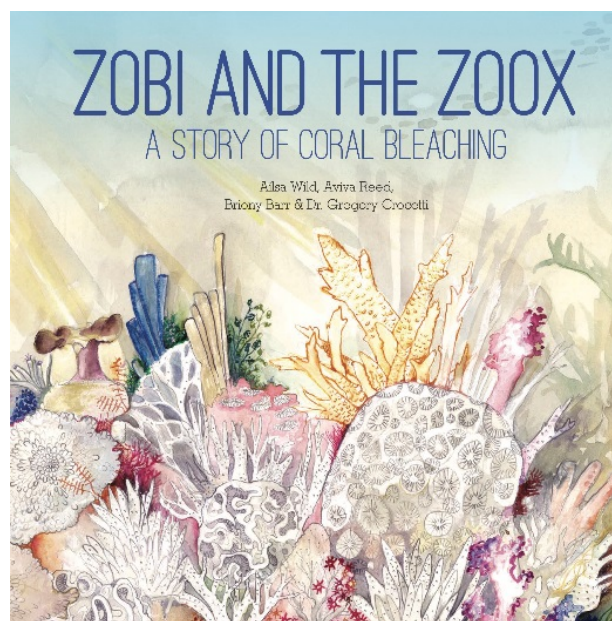


Early sketch for Xeno's Feast, by Aviva Reed.

Comprised of writer Ailsa Wild, illustrator Aviva Reed, art director Briony Barr and science director/microbial ecologist Dr Gregory Crocetti, the team ranges in their level of scientific training. However, the starting point for everyone is the wondrous fact that only 99% of biodiversity on Earth (including most nematodes) is invisible to the naked eye. Despite this, there are very few stories that feature microbes as characters and protagonists. A key goal of the *Small Friends Books* series (and co-publisher Scale Free Network) is 'to make the invisible visible', through adventurous narratives and engaging illustrations that grab readers' imaginations while also accurately communicating complex science. The creative team work in close consultation with scientists and educators on each story, also involving students at key stages of the story development, to integrate their feedback alongside that of experts.

Prior to signing the co-publishing deal with CSIRO Publishing, Scale Free Network independently released two stories in the *Small Friends Books* series (both of which will be re-released by CSIRO). Each of these first edition stories (which explored symbioses between the bobtail squid and *Vibrio fischeri* bacteria, and coral with zooxanthellae, respectively) received several literary accolades and critical acclaim. Members of the *Small Friends Books* team have been featured on ABC Radio National's *Science Show* (with Robin Williams) and articles about the series have appeared in *The Age* newspaper, the Children's Book Council of Australia *Reading Time* blog, *Small Things Considered* (American Society for Microbiology blog), *Books & Publishing* magazine, ABC Science online and more.

To purchase *Zobi and the Zoox: A Story of Coral Bleaching*: <https://www.publish.csiro.au/book/7834/>



Cover artwork for *Zobi and the Zoox: A Story of Coral Bleaching*, co-published by Scale Free Network and CSIRO Publishing

The idea to write *Xeno's Feast*, a story about entomopathogenic nematodes and their bacterial symbionts, was originally inspired by a conversation with USA-based nematologist Patricia Stock, whom we met at the International Symbiosis Society congress in Lisbon in 2015. Over lunch, she enthusiastically described a fantastic and engaging tale, beginning with a cry for help from a plant being attacked by a grub, the signalling of a group of infective juvenile nematodes and their subsequent passage through the soil...and finally the cycle of life, death and feasting that ensues once the juveniles reach their destination.

We find it fascinating how the relationship between the nematodes and the *Xenorhabdus* bacteria changes through their life cycles. We feel readers will find the complexities of this symbiotic partnership to be particularly intriguing and feel confident the slightly gruesome nature of the process will appeal to young readers in particular.

As a creative team, we have all loved delving into the world of nematodes and have relished the challenge of picturing the soil landscape from their unique perspective. Through the story, we hope our readers will gain a greater appreciation of nematodes and their fundamental role in cycling nutrients in soils and sediments around the planet. Moreover, we believe this work will ultimately help readers better appreciate the diverse soil communities and relationships upon which we humans rely...which hopefully nurtures a greater curiosity about the countless dynamic interactions unfolding beneath our feet!

Since commencing our journey into the world of nematodes, we now appreciate that Australia hosts many brilliant nematologists and soil scientists – and ask that any interested members of the Australasian Association of Nematology get in touch, if interested in collaborating to check facts and explain the science behind our story.

To email us about collaborating: gregory@scalefreenetwork.com.au

The *Small Friends Books* series has been fortunate to previously receive financial support from Creative Victoria and the Australian Society for Microbiology. However, each book takes a lot of time and money to develop. We have already finished drafting the backbone of the story along with accompanying storyboards – but we still need to complete the story illustration and book design, as well as test the story in schools. In order to fund this development of *Xeno's Feast*, Scale Free Network is currently partnering with the Australian Cultural Fund to try to raise \$15,000 by July 15th – with all contributions tax deductible. To read more or to donate to our campaign: <https://australianculturalfund.org.au/projects/xenos-feast-a-nematodes-tale/>



**small
friends
books**

To find more information about Scale Free Network and the *Small Friends Books* series:

www.scalefreenetwork.com.au

www.smallfriendsbooks.com

Briony Barr and Gregory Crocetti

Conferences

10TH AUSTRALASIAN SOILBORNE DISEASES SYMPOSIUM

Date: 4-7 September 2018

Location: National Wine Centre of Australia, Adelaide, South Australia

Website: <http://www.asds2018.com.au/>



The Organising Committee invites you to attend the 10th Australasian Soilborne Diseases Symposium *Paddock to Plates* to be held from Tuesday 4 to Friday 7 September, 2018 at the National Wine Centre of Australia, Adelaide, South Australia.

The 10th Soilborne Diseases Symposium will again draw together researchers and industry representatives with an interest in soilborne diseases to review research and to identify new strategies and techniques of potential benefit across a range of crops, and to debate the way forward. Several international and local invited speakers will share their ideas and experience in topical areas.

The Symposium's leading expert key note speakers, in-depth educational offerings, and important delegate opportunities for contribution and discussion, make it a "must attend" event for all those with an interest in plant pathogens, soilborne diseases in grain, pasture, cotton, vegetable and fruit crops, forestry and natural environments, soil health and biosecurity issues.

Pre-symposium workshops on current topics of interest including 'field sampling strategy and experimental design', 'nematode diagnostics', 'discovery of actinobacteria' and post-conference tours to visit cropping and wine regions are planned.

7TH INTERNATIONAL CONGRESS OF NEMATOLOGY



**INTERNATIONAL FEDERATION OF
NEMATOLOGY SOCIETIES**

Date: 4-8 May 2020

Location: Antibes, France

Website: <http://www.ifns.org>

DRAFT PROGRAM (June 3, 2018)

Monday 4 May 2020

8:00-9:00	Opening Ceremony, Local committee rep (Dr. Pierre Abad), IFNS rep (Dr. Larry Duncan) (Auditorium)			
9:00-9:30	Plenary I (Auditorium) Sustainable intensification: The implications of nematodes to global food security, Aurelio Ciancio, Zheng Jingwu			
9:30-10:00	Plenary II (Auditorium) High-throughput sequencing (HTS) and biodiversity studies of nematode communities in diverse habitats, Dorota Porazinska, Senyu Chen			
10:00-10:30	Coffee break			
10:30-12:30	Oral session I Plant resistance and nematode virulence (Auditorium)	Oral session II New challenges in nematodes taxonomy (Room 1)	Oral session III Ecology of free living nematodes (Room 2)	Oral session IV Nematodes in animal and human health (Room 3)
12:30-14:00	Lunch			
14:00-16:00	Oral session V Nematode-plant interactions (Auditorium)	Oral session VI Phylogenetics/Phyl ogenomics: updates on the phylogeny of the Nematoda (Room 1)	Oral session VII Biodiversity of aquatic nematodes (Room 2)	Oral session VIII Social impact of nematode management (Room 3)
16:00-16:30	Coffee break			
16:30-18:00	Poster session I			
14:40-15:00	Workshop I Spectroscopic data analysis for nematode studies Ernesto San-Blas, Mayamaru Guerra	Workshop Forum	Forum Workshop	Forum Workshop
18:00-19:00	Executive Meetings of different societies			

Tuesday 5 May 2020

8:00-8:30	Plenary III (Auditorium) Fossil nematodes and evolution, George Poinar
8:30-9:00	Plenary IV (Auditorium) Nematode microbiomes, Marie-Anne Félix
9:00-9:30	Plenary V (Auditory) Nematodes chemosensation: implications on their management, Ted Turlings (EPN) or Floriian Grundler (PPN)
9:30-10:15	Coffee break

10.15-12.15	Oral session IX “omics” in nematology (Auditorium)	Oral session X Nematology in precision agriculture (Room 1)	Oral session XI Nematode-vector relationships (Room 2)	Oral session XII Chemical control of nematodes (Room 3)
12:15-14:00	Lunch			
14:00-16.00	Oral session XIII “omics” in nematology (cont) (Auditorium)	Oral session XIV Global change and nematode issues (Room 1)	Oral session XV Advances in nematode detection (Room 2)	Oral session XVI Biological control of nematodes/ Biopesticides (Room 3)
16:00-16:30	Coffee break			
16:30-18:00	Poster session II			
14:40-15:00	Workshop Forum	Workshop Forum	Forum Workshop	Forum Workshop
18:00-19:00	Executive Meetings of different societies			

Thursday 7 May 2020

8:00-8:30	Plenary VI(Auditorium) <i>C. elegans</i> as biological model in agriculture systems, Shai Shaham, Menachem Katz, Carola Petersen			
8:30-9:00	Plenary VII (Auditorium) CRISPR/Cas9 system technology in nematode studies, Ralf J. Sommer Ciaran McCoy			
9:00-9:30	Plenary VIII 12.Plant root-knot nematode interaction, Pierre Abad			
9:30-10:15	Coffee break			
10.15-12.15	Oral session XVII Integrated nematode management (Auditorium)	Oral session XVIII Metabolism & Physiology of nematodes (Room 1)	Oral session XIX Trends in entomopathogenic nematodes (Room 2)	Oral session XX Nematode community assemblies (Room 3)
12:15-14:00	Lunch			
14:00-15:30	Oral session XXI Soil suppressiveness and nematode control using subsidiary crops (Auditorium)	Oral session XXII Metabolism & Physiology of nematodes (Cont) (Room 1)	Oral session XXIII Trends in entomopathogenic nematodes (Cont) (Room 2)	Oral session XXIV Legislation and Regulatory aspects of plant nematodes (Room 3)
15:30-16:30	Coffee break			
16:30-18:00	Poster session III			
	Workshop Forum	Workshop Forum	Forum Workshop	Forum Workshop
18:00-19:00	Executive Meetings of different societies			

Friday 8 May 2020

8:00-8:30	Plenary IX(Auditorium) Trade and market access implications of plant parasitic nematodes, Manuel Mota			
8:30-9:00	Plenary X (Auditorium) IFNS Global Capacity building programs in nematology, San-Blas or Westphal			
9:00-9:30	Plenary XI (Auditorium) Challenges of nematology in the big data era (Look for a speaker)			
9:30-10:15	Coffee break			
10.15-12.15	Oral session XXV Interactions of nematodes with micro-organisms (Auditorium)	Oral session XXVI Trade and market access implications of plant parasitic nematodes (Room 1)	Oral session XXVII Management of nematodes in tropical conditions (Room 2)	Oral session XXVIII (Room 3)
12:15-14:00	Lunch			
14.00-15.30	Oral session XXIX Effectors in plant parasitic nematodes (Auditorium)	Oral session XXX Nematodes as bioindicators (Room 1)	Oral session XXXI Future of Nematology, Education and Training (Room 2)	Oral session XXXII Natural Products as nematicides (Room 3)
15:30-16:30	Coffee break			
16:30-17:45	Global change and nematology challenges, Edwin Claerebout and Simone Cesarz			

Workshops

Denom	Title	Coordinators	Email
WI	Spectroscopic data analysis for nematological studies	Ernesto San-Blas Mayamaru Guerra	esanblas@yahoo.com mayamaru.guerra@gmail.com

Potential Workshop Topics

Molecular Biology: Analysis of DNA sequences from metabarcoding studies (e.g., QIIME software)

Organismal Biology: EPN genetics and linkage mapping; Bioinformatics for nematode evolution; Identification of “any group.”

Population Biology/Ecology: Analysis of nematode ecological data (e.g., PRIMER software).

Management: Management of spectral analysis data.

Education: IFNS Global Capacity building programs in nematology (Round-table discussion - particularly in taxonomy, training courses are much needed)