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NEMATOLOGY NEWSLETTER

The official quarterly publication of the Society of Nematologists (SON)

Upcoming Events, Deadlines & Reminders

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From the President

Happy New Year SON Members! I hope 2024 brings you all success and happiness. The SON Executive Board continues to push forward several efforts. As outlined in the column below regarding the **Cobb Foundation/SON merger**, we are at the stage where members of the boards of both organizations will meet with lawyers to discuss the legal ramifications of the merger and logistics. We will keep membership posted of what we learn and continue to pursue the merger in as transparent a manner as possible.

The Executive Board recently voted and approved a **Diversity, Equity, and Inclusion statement** for the Society of Nematologists. The following statement will be posted on our website: We all belong here. The Society of Nematologists welcomes participation and strives to create an environment that values all individuals interested in Nematology, regardless of culture, race, ethnicity, gender identity, marital status, military service, physical ability, professional status, age, appearance, citizenship, religion, or sexual orientation. Our goal is to cultivate a culture where all nematologists from across the world can discuss our science to build hypotheses, conclusions, and further questions that lead to better scientific outcomes for everyone. We support a diversity of people from early, mid, to full career and ideas that inspire basic and applied research in education, research, extension, and industry.

I look forward to a productive, successful, and happy 2024 for the Society of Nematologists. We have lots to look forward to with our meeting in **Park City, Utah August 4-8, 2023**, the induction of an Honorary Member to our Society (something that hasn't happened in 11 years), and more outstanding science in the field of nematology.

Inga Zasada

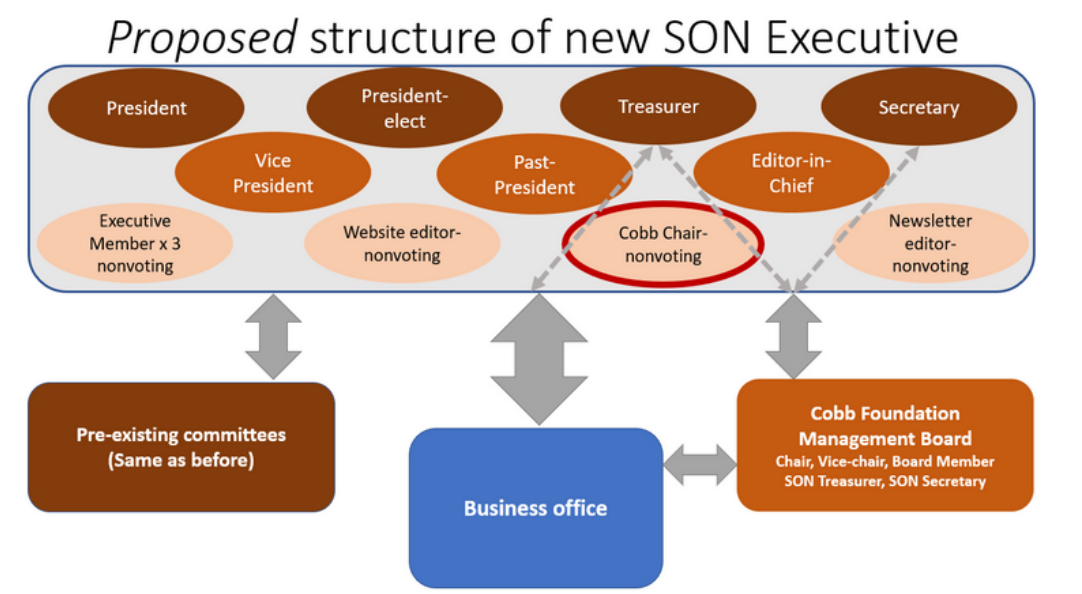
N.A. Cobb Merger Update

-Listening Session Feedback-

We continue to make progress towards merging the Cobb Foundation into the Society of Nematologists. On November 17, 2023 we hosted a 2 hour online listening session to allow membership feedback about the proposed reorganization. To recap, during the Business Meeting at the 2023 SON Meeting in Columbus, OH, Tom Forge (Chair, Cobb Foundation) and Axel Elling (President, SON) presented to membership the vision of the merger. Based upon feedback during this meeting, Inga Zasada (current President, SON) formed an ad hoc committee to address membership concerns and to make changes to the proposal. The result of this effort was a modified vision that was further presented to membership in the September 2023 NNL.

During the listening session, the revised plan of the merger was presented and discussed. The conversation was positive and constructive. A recommendation was made to make the at-large member position on the Cobb Foundation Board an elected position rather than an appointed position as had been proposed in the plan presented in the September 2023 NNL. This modification was discussed in the December 1, 2023 meeting of the Cobb Board of Directors and approved.

The merger would bring several key benefits including: 1) The Foundation would have direct access to support from the SON Business office as well as any legal or professional financial advice it may need; 2) The proposed structure and successional model within the Foundation Board would result in two fewer elected positions than the current structure; and 3) The SON President and President-elect would no longer be required to meet as part of the Foundation Board, reducing the “meeting burden” for these key executives.



Moving forward, this is the tentative timeline to achieve the merger:
January 16, 2024 – Meet with SON lawyer to discuss legality of merger.
February to May 2024 – Revise SON Constitution and Ops Manual to merge Cobb Foundation with SON.
July 2024 – Send Constitution changes to membership 30 days prior to 2024 SON Annual Meeting.
August 2024 – Present of Constitutional amendments to membership during Business Meeting on **Aug 8.** Discuss and voice vote to proceed or not.
September/October – Publication of the amendments, including justifications and criticisms, will be distributed by email, newsletter, probably both, after the meeting. Within 30 days of publication, a poll will be constructed for members to vote upon the amendments.
We continue to actively solicit and encourage membership to provide feedback on this idea. You are free to contact us any time.

Tom Forge, Chair, Cobb Foundation
Inga Zasada, President, SON

Executive board updates

Announcement of Diversity, Equity, and Inclusion Statement

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Our goal is to cultivate a culture where all nematologists from across the world can discuss our science to build hypotheses, conclusions, and further questions that lead to better scientific outcomes for everyone. We support a diversity of people from early, mid, to full career and ideas that inspire basic and applied research in education, research, extension, and industry.

The N.A. Cobb Foundation Continues to Grow, Thanks to Generous Donors

Members of the Society of Nematologists have once again demonstrated their generosity and commitment to the objectives of the N.A. Cobb Foundation. Our 2023 “November-Day of Giving” drive for donations was a resounding success. By the end of November, the Foundation received $3,751 in direct donations targeted to the N.A. Cobb Fund (aka “general fund”), the Mai-Ferris-Bird Endowment, the Pierre Baujard Endowment to African Nematology, the Presidents’ Endowment, the Economic Nematology Endowment, and the John Webster Outstanding Student Award Fund. As advertised, SON generously agreed to match all donations received during the month of November. With the matching funding from SON, the Cobb Foundation grew by $7,502 during the month of November! To top it off, in the first week of December another $1,000 donation was received. Two individuals donated $1,000 each!

All donations to the N.A. Cobb Foundation go directly to building the principal of the Foundation’s investments, so each and every donation has a long-term impact. The income earned from investments each year is used to fund the Student Travel Awards, the Art and Science Contest, the John Webster Outstanding Student Award and other initiatives of the Foundation that promote the professional development of graduate students, the science of nematology, and the Society of Nematologists. The N.A. Cobb Foundation Board extends a sincere “Thank You” to all donors - their generosity is truly inspiring.

JON - Editor's Pick

Research Paper | DOI: 10.2478/jofnem-2023-0036

JOURNAL OF NEMATOLOGY
e2023-1 | Vol. 55

Evaluation of Solanaceous Species as Nonhost Trap Crops for *Globodera pallida*

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This paper was edited by Adrienne M. Gorny.

Received for publication March 20, 2023.

Abstract

Globodera pallida, the pale cyst nematode (PCN), is a quarantine pest of potato posing a serious threat to the Idaho potato industry. *Globodera pallida* only hatches in the presence of a hatching stimulus produced by a host plant or closely related species. In the absence of this hatching stimulus, *G. pallida* can remain viable in the soil for decades. A trap crop stimulates hatch of *G. pallida* but is a nonhost, which means the nematode cannot develop or reproduce. This study evaluated the trap crop potential of several solanaceous species by determining *G. pallida* host status and hatching effect of each species. The species under investigation included *Solanum aethiopicum*, *S. macrocarpon*, *S. quitoense*, *S. retroflexum*, and *S. douglasii*. All species were determined to be nonhosts of *G. pallida*. The most promising trap crop candidates with a hatching stimulatory effect comparable to potato were *S. quitoense* and *S. retroflexum*. Further research is needed to assess whether these species could be effective *G. pallida* trap crops under Idaho field conditions.

Keywords

Globodera pallida, hatching, management, pale cyst nematode, potato cyst nematode, Solanaceae, trap crop

HTTPS://DOI.ORG/10.2478/JOFNEM-2023-0036

Research Paper | DOI: 10.2478/jofnem-2023-0052

JOURNAL OF NEMATOLOGY
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Parasite load effects on sex ratio, size, survival and mating fitness of *Heleidomermis magnapapula* in *Culicoides sonorensis*

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This paper was edited by Erik J. Ragsdale.

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Abstract

Heleidomermis magnapapula parasitizes the blood-feeding midge *Culicoides sonorensis*. Most (84%) single mermithid infective second stage juveniles (J2) developed into adult females, while parasitism by multiple J2 yielded 97% male adults. Nematodes emerged from the midge larval host as adults and mated immediately; females were ovoviviparous. Host larvae were exposed to nematode J2 and examined intact microscopically to score initial parasite load. Midge hosts were reared individually. Premature midge death, nematode survival within the host, and emerging adult nematode sex ratio and size as a function of load and host size were all tracked. Higher nematode loads produced smaller adult nematode males. The higher loads also increased and accelerated premature host death. Emergence of > 7-9 adult nematode males was rare, but up to 19 tiny males emerged from a single host. Larger midges supported higher parasite loads and a larger total volume of emerged nematode biomass. Virgin adult nematode males then were paired with females of variable, known sizes (volume) and held to determine size effects on fertility (egg hatch), and male survival (longevity). Tested adult males ranged in size from 0.0025 - 0.0334 mm^3 and females from 0.0121 - 0.1110 mm^3. Logistic regression indicated female nematode fertility was positively influenced by male nematode size, while nematode load and female nematode size had no significant effect. While fertility was reduced statistically in smaller males, even some of the smallest male and female individuals could be fertile. Findings are related to field studies in this system.

Keywords
Mermithidae, Diptera, Ceratopogonidae, *Culicoides*, biological control

HTTPS://DOI.ORG/10.2478/JOFNEM-2023-0052

Research Note | DOI: 10.2478/jofnem-2023-0045

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e2023-1 | Vol. 55

Plant Parasitic Nematode Identification in Complex Samples with Deep Learning

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This paper was edited by Zafar Ahmad Handoo.

Received for publication July 7.

Abstract

Plant parasitic nematodes are significant contributors to yield loss worldwide, causing devastating losses to every crop species, in every climate. Mitigating these losses requires swift and informed management strategies, centered on identification and quantification of field populations. Current plant parasitic nematode identification methods rely heavily on manual analyses of microscope images by a highly trained nematologist. This mode is not only expensive and time consuming, but often excludes the possibility of widely sharing and disseminating results to inform regional trends and potential emergent issues. This work presents a new public dataset containing annotated images of plant parasitic nematodes from heterologous soil extractions. This dataset serves to propagate new automated methodologies or speedier plant parasitic nematode identification using multiple deep learning object detection models and offers a path towards widely shared tools, results, and meta-analyses.

Keywords
detection, diagnosis, identification, deep learning, method, technique

HTTPS://DOI.ORG/10.2478/JOFNEM-2023-0045

JON Updates

-Author Guidelines-

The Journal of Nematology has updated guidelines for authors. The updated guidelines can be found on the Society of Nematologists website.

https://nematologists.org/resources/Documents/Journal%20of%20Nematology/JON%20Guide%20to%20Authors_JAN%202024_new-layout.pdf

Know Your Nema-folx

Clemen Oliveira, PhD - Certis Field Development Manager

My name is Clemen Oliveira, and I work for Certis Biologicals as the Field Development Manager for the southeast USA. Certis' mission overlapped with mine in terms of using integrated pest, disease, and nematode management and developing solutions to growers. In my role, I manage the southeast territory field trial program by cooperating with academic research/extension institutions and private contractors. The program includes entomology, plant pathology, and nematology trials testing the efficacy of commercial and new products in the pipeline that are based on biological agents such as bacteria (*Bacillus* spp.), fungi (*Beauveria bassiana*, *Isaria fumosorosea*, *Purpureocillium lilacinum*, and *Trichoderma* spp.), baculovirus, biochemicals (coppers, polyoxin-D zinc, insecticidal soap and bait, and organic herbicide) and botanicals (Neem seed extracts). The main goal is to generate efficacy data on different crops and regions, rate recommendations for growers and registration purposes, product positioning and application intervals, and any information related to the product efficacy as well as ways to improve efficacy in the field (application method, improved formulation, etc.).

That information is translated into technical support for the sales team and growers as well as training for customers and the scientific community. Another part of my role is to work with Product Development and Marketing teams, providing analysis and technical input to develop and support new product launches and market expansion of existing products. For example, some exciting news – a new bionematicide will be launched next year by Certis Biologicals and growers will have one more option available in their integrated nematode management toolbox.

I started my agriculture career while living on my parents' sixth generation cattle and dairy farm in Brazil, where I assisted and helped with daily farm duties. I faced many struggles, and it motivated me to pursue education, so I started my undergraduate studies at the Federal University of Goiás (UFG) under Dr. Mara Rubia da Rocha's supervision (2011-2016). During this time, I was involved in nematology projects focusing on biological control of nematodes testing Pseudomonas spp., Burkholderia spp., and Waitea circinate against lesion nematode in soybeans at the UFG and at the Brazilian Agricultural Research Corporation (EMBRAPA). Within this program, I also did an internship at the University of Minnesota under Dr. Senyu Chen' lab testing Pasteuria spp. on lesion nematode.

After receiving my Bachelor's degree, I participated in a "sandwich program" between the Federal University of Viçosa in Brazil and the University of Florida, under the supervision of Dr. Leandro Grassi de Freitas and Dr. Johan Desaeger, respectively. In this Master's project (2017-2018), I took off my applied research hat and instead donned a molecular and taxonomic hat to embrace a cooperative study in the southeastern United States where we disclosed several cryptic species: A. besseyi sensu stricto; A. oryzae; A. pseudobesseyi and A. pseudogoodeyi using an integrated taxonomic approach. For my PhD (2019-2022), I went back to applied research, which aimed to understand the biology and management tools for major plant-parasitic nematodes in Florida agriculture once again under the supervision of Dr. Desaeger. I received my PhD in Nematology with a minor and Plant Pathology from the University of Florida in 2022 with my dissertation titled "Integrated Nematode Management in Florida Strawberry."

In my role at Certis Biologicals, I interact with our field development, research and development, regulatory, and business and marketing teams to provide effective products that are commercially available to growers. It is my career goal to assist growers in finding the best strategies to help maximize their profits and minimize their risks, both environmentally and financially. My go to phrase is "connecting science and farmers in defense of a sustainable and profitable food production." I am currently living in Tifton, GA with my family and I am very excited about continuing to explore the world of nematode biological control.

SON Committee Updates

Industry and Graduate Student Committees
-Crop Protection Tour-

The SON Industry and student/postdoc Committee are planning an Industry Tour for Spring 2024. The idea is that members can visit at least one industry facility to gain experience on the development and market of crop protection products, including nematicides. In addition, students/PostDocs could visit USDA-ARS facilities, growers, and universities. The proposal comprises two different tours, one in the West Coast (California) and one in the Southeast (Georgia), so that the travel is not too costly. Stay tuned!

Education Committee
-Online Resources-

The Education Committee is seeking to develop an online resource of Nematology course materials, to be hosted on the SON website. This resource will be publicly available with the goal of increasing nematode awareness and inclusion in biology and plant-based courses and extension materials. We are asking for your input - If you have nematology course material (from any subject or level) and would like to submit, please email Dr. Peter DiGennaro at pdigenn@wisc.edu.

Hawaii Agriculture Seminar at North Dakota State University

Dr. Guiping Yan invited Dr. Koon-Hui Wang to North Dakota State University (NDSU) campus at Fargo to present a research seminar on "Sustainable Nematode Management for Regenerative Agriculture in Hawaii" on October 14, 2023 during their weekly Plant Pathology Departmental Seminar. More than 70 plant pathologists (faculty, staff and students) gathered to listen to the Nematode Ecology research in tropical climates, something very different from their temperate zone large commodity driven research.

Wang is fascinated by the department size, facility, and hospitality. After the seminar, a group of 12 students/researchers spent another hour with Wang to learn and "talk story" about Nematode Community Analysis and NINJA app.

People in the photo (left to right): Matthew John, Dinesh Poudel, Addison Plaisance, Bisho Lawaju, Koon-Hui Wang, Guiping Yan, Nitha Rafi, Karthika Mohan, Prabhat Poudyal, Sabina Paudel, Bonventure Mumia, and Harkamal Kaur.

Graduation
-Tylka Lab-

Monica Pennewitt received her PhD in plant pathology at Iowa State University in December 2023. She conducted field and laboratory research on the soybean cyst nematode and root-lesion nematodes while at Iowa State. The title of her doctoral dissertation was “Evaluating potential management strategies for control of plant-parasitic nematodes in soybean”. Pennewitt will join Bayer Crop Science as a Seed & Trait Technical Development Representative based in Columbia, MO, in January 2024.

New Emeritus Member
-David Bird-

David Bird joined SON in 1984, whilst a postdoc with Don Riddle at the University of Missouri-Columbia. In 1987 he accepted the position of Assistant Professor at the University of California-Riverside, where he was an early adopter of RNA-Seq to study Meloidogyne-host interactions. His research attracted strong federal funding and yielded papers in high impact journals (including Cell, Molecular and Cellular Biology, Gene, Molecular Plant-Microbe Interactions).

Nonetheless, Dr. Bird failed to win tenure at UC-R, and so in 1995 he moved his program to Raleigh to accept a faculty position at NC State University. Pivotal to Bird's move was the opportunity to cement what became a decades-long collaborate with Dr. Charlie Opperman at NCSU. Since joining NCSU Bird has risen through the ranks of academia to his retirement in 2023. Bird was honored by appointment as William Neal Reynolds Distinguished Professor. En route, Dr Bird was named Fellow of SON (2013), and in 2017 was elected Vice-President, although anticipated progression to President was disrupted for medical reasons). Dr. Bird has been active with the Journal of Nematology, serving as Editor in Chief (2006-2008), Senior Editor, 2005 and Associate Editor, 1995-1999. Bird's research has focused on the physiology of the host response to Meloidogyne infection. He has published approximately 85 peer-reviewed papers/patents and 15 books/chapters. Many (20%) have been cited more than 100 times.

His working hypothesis, stated in 1996, has been that the inductive principal of feeding sites is “active in the apoplast where it might be presented, perhaps as a ligand, to the cell surface.” The Meloidogyne-encoded, CEP peptide-hormones, which regulate nitrogen allocation throughout the plant, are prime candidates for this role in parasitism. Over the past 40 years, Bird formed strong collaborations with peers globally, many of whom in 1994 attended a conference in the beautiful Italian town of Martina Franca.

Funded by NATO this meeting cast a broad net, and invitees (see group photo) represented most of contemporary plant nematology community. Conglomerated with the meeting was a small monograph: Advances in Molecular Plant Nematology. Participants were encouraged to submit chapters, which could be revised after the fact. The result was the best hypotheses of the mechanisms underpinning nematode-plant interactions. Three decades on, some of the guesses have been solved; much remains to be done.

New Emeritus Member
-Ralf Udo-Ehlers-

Dr. Ehlers' research focused on entomopathogenic nematodes (EPN) over the span of his 40-year career. He completed his Dr. Agr. in 1989 and Habilitation in 1995 from the University of Kiel, Germany, where he served as Scientific Counselor teaching biological plant protection. In 1997, he founded the biotechnology company e-nema GmbH and transferred the technology for liquid culture mass production of EPN into commercial biocontrol products. In 2009 he was honored with the title Professor by the University Kiel.

Dr. Ehlers was convenor of the International Organization for Biological Control (IOBC/WPRS) working group "Microbial and Nematode Control of Invertebrate Pests" from 1988 until 2011 and as chairman of several EU COST Action (Cooperation in Science and Technology) in the area of biological control. Since 2004 he was teaching EPN as guest professor at the University in Gent, Belgium, at the Master Course for Nematology.

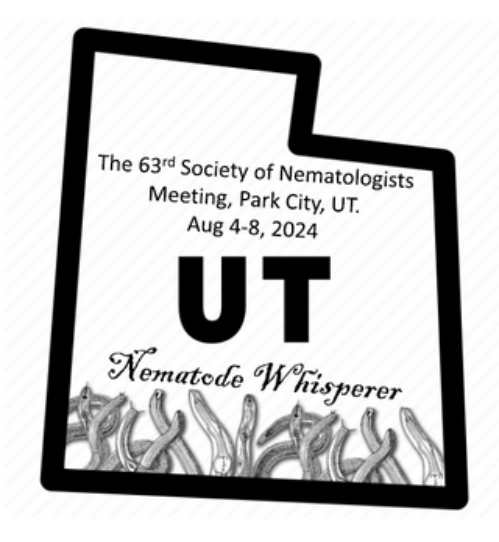
In 2012, he left University Kiel and continued R&D in his company. From 2013-2018 Dr. Ehlers was member of the executive board of the International Biocontrol Manufacturers Association, lobbying for promotion of biological control at the European Commission in Brussels. In 2015, he was honored with the Escherich Award of the German Society for General and Applied Entomology.

Dr. Ehlers' research focused on mass production technology, application and genetic improvement of beneficial traits of EPN. Another focus was on the use of microorganisms in biological control and aspects of safety and regulation. He has contributed to over 150 peer reviewed journal and book publications and has edited two books. He has presented research at over 300 scientific meetings and served as an associate editor for the journals Nematology and BioControl.

As an instructor, he taught 8 courses and as an advisor, mentored 42 PhD students and over 100 Master's and Bachelor's students. His professional memberships include 6 professional societies, including SON, and he served as president of European Society of Nematologists from 2014-2022. Dr. Ehlers retired from e-nema in 2023 and now serves as a member of the board of trustees for the Max Planck Institute for Evolutionary Biology.

Nominate someone for a special emeritus membership in SON! Nominations and self-nominations can be submitted directly to an Executive Board Member or through the SON website: https://nematologists.org/Emeritus

SON 2024 Save the Date
August 4-8, 2024



Park City, Utah

The meeting will feature:

- Student oral presentation competitions
- Symposia and workshops on nematology topics
- Student/Industry social
- End-of-meeting banquet
- Outdoor adventures of your choosing

More Details to Come!

Entomopathogenic Nematode Congress
-Abstract Deadline Extension-

The EPN 100th Anniversary Scientific Programme has extended the abstract submission deadline! You have one extra month to submit your abstract to be included. Submission guidelines, abstract template, and abstract submission instructions can be found on the conference website.

NEW Deadline for abstract submission: **15th January 2024**

Meeting venue: **Riojaforum Conference Centre**
Location: **Logroño, La Rioja (Spain)**

TOPIC FOR DISCUSSION: PAST, PRESENT AND FUTURE

1. Systematics, diversity & biogeography
2. Bacteria biology, symbiosis, and application
3. Behavioral Ecology (dispersal, chemical signaling)
4. Population ecology
5. Survival, Virulence and immunity
6. Mass production, include safety & regulation
7. Commercial use & future targets (including inundative and conservation approaches)
8. Application technology
9. EPN omics OR Genome and evolution
10. New Frontiers in EPN (selected from abstract submission)

Website: http://www.icvv.es/english/epn

Do you have any updates that you want to share with the nematology community?

- Send it to the **newsletter** editor, Benjamin Waldo (Benjamin.Waldo@usda.gov), by the end of January, April, July or October of the calendar year to be included in the upcoming quarterly issues of NNL in May, August, September and December respectively.

- For immediate announcements on our **social media platforms**, send the content to our social media editor, Zane Grabau (**zgrabau@ufl.edu**).

- To be put up on our **website** (especially job postings), contact our web editor, Jacki Beacham (societyofnematologists@gmail.com).

Team SON

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