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IN THIS ISSUE:
- Jan Bruin highlights three recently published mite papers
- Recently graduated PhD and MSc students summarize their theses
- Marjorie A. Hoy's great book on Agricultural Acarology is introduced

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DEAR ACAROLOGISTS

We are pleased to present you the 6th volume of the EURAAC Newsletter. This time not as voluminous as the previous volume 5 but still containing quite a few interesting news. In the Spotlight section, Jan Bruin (University of Amsterdam, The Netherlands) comments three exciting recent mite papers. He would have loved seeing them published in his esteemed co-edited journal, *Experimental and Applied Acarology*. The Theses section contains the abstracts of recently finished PhD and MSc theses from Iran and Austria. In the Media section, we introduce the great book by Marjorie A. Hoy on Agricultural Acarology and Integrated Mite Management.

Thanks to all contributors for sharing their news with us. Please keep on informing us, the Newsletter lives from your contributions. Deadline for news to be included in the 7th issue (May 2012) is end of April 2012. Please note that the EURAAC Newsletter is now officially registered by ISSN 1650-5557.

Please don't forget to register and submit your abstract to the 7th EURAAC Symposium on time. Registration and abstract submission opened on October 1, 2011, early bird registration runs until March 31, 2012 (http://euraac.boku.ac.at/SympVienna/registration.php).

The Editors (euraacnews@boku.ac.at)
Peter Schausberger + Stefan Peneder

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Jan Bruin (bruinjan@tiscali.nl) selected and comments three recent mite papers.

As an editor of one of the specialized 'mite' journals – *Experimental and Applied Acarology* – I frequently see papers published elsewhere, that likely would also have been accepted for publication in *EAA*. This is not always saddening, but sometimes it is. Here are three examples of papers that would have stood a fair chance, in chronological order.

August 2010. Perhaps a bit 'old' for this feature, but definitely worthy of being in the spotlight: Thomas Van Leeuwen (University of Ghent, Belgium; thomas.vanleeuwen@ugent.be) and colleagues reviewed the mechanisms of acaricide resistance development, focusing on *T. urticae* but also dealing with several other acarine pests. The various classes of acaricides in use are treated systematically. The authors conclude by indicating how more is to be expected from the various genome projects that are near completion. A clear, concise, and much needed paper. Very useful.

T. Van Leeuwen, J. Vontas, A. Tsagkarakou, W. Dermauw & L. Tirry (2010) *Insect Biochemistry and Molecular Biology* 40: 563-572.

ACARICIDE RESISTANCE MECHANISMS IN THE TWO-SPOTTED SPIDER MITE *TETRANYCHUS URTICAE* AND OTHER IMPORTANT ACARI: A REVIEW.

The two-spotted spider mite *Tetranychus urticae* Koch is one of the economically most important pests in a wide range of outdoor and protected crops worldwide. Its control has been and still is largely based on the use of insecticides and acaricides. However, due to its short life cycle, abundant progeny and arrhenotokous reproduction, it is able to develop resistance to these compounds very rapidly. As a consequence, it has the dubious reputation to be the "most resistant species" in terms of the total number of pesticides to which populations have become resistant, and its control has become problematic in many areas worldwide.

Insecticide and acaricide resistance has also been reported in the ectoparasite *Sarcoptes scabiei*, the causative organism of scabies, and other economically important Acari, such as the Southern cattle tick *Rhipicephalus microplus*, one of the biggest arthropod threats to livestock, and the parasitic mite *Varroa destructor*, a major economic burden for beekeepers worldwide.

Although resistance research in Acari has not kept pace with that in insects, a number of studies on the molecular mechanisms responsible for the resistant phenotype has been conducted recently. In this review, state-of-the-art information on *T. urticae* resistance, supplemented with data on other important Acari has been brought together. Considerable attention is given to the underlying resistance mechanisms that have been elucidated at the molecular level. The incidence of bifenazate resistance in *T. urticae* is expanded as an insecticide resistance evolutionary paradigm in arthropods.

July 2011. For more than 20 years work has been done on the olfactory attraction of predatory mites towards plants that are damaged by plant-feeding mites. One of the unsolved puzzles throughout the years

has been: how do these predators cope with the bewildering amount of information? This paper by Michiel van Wijk (University of Amsterdam, The Netherlands; m.vanwijk@uva.nl) and colleagues describes a major step towards solving this puzzle. It also illustrates how thorough knowledge of the arthropod brain and a great deal of perseverance can lead to VERY interesting results.

M. van Wijk, P.J.A. de Bruijn & M.W. Sabelis (2011)**.** *PLoS ONE* 6(7): e21742.

COMPLEX ODOR FROM PLANTS UNDER ATTACK: HERBIVORE'S ENEMIES REACT TO THE WHOLE, NOT ITS PARTS

Background: Insect herbivory induces plant odors that attract herbivores' natural enemies. Assuming this attraction emerges from individual compounds, genetic control over odor emission of crops may provide a rationale for manipulating the distribution of predators used for pest control. However, studies on odor perception in vertebrates and invertebrates suggest that olfactory information processing of mixtures results in odor percepts that are a synthetic whole and not a set of components that could function as recognizable individual attractants. Here, we ask if predators respond to herbivore-induced attractants in odor mixtures or to odor mixture as a whole.

Methodology/Principal Findings: We studied a system consisting of Lima bean, the herbivorous mite *Tetranychus urticae* and the predatory mite *Phytoseiulus persimilis*. We found that four herbivore-induced bean volatiles are not attractive in pure form while a fifth, methyl salicylate (MeSA), is. Several reduced mixtures deficient in one component compared to the full spider-mite induced blend were not attractive despite the presence of MeSA indicating that the predators cannot detect this component in these odor mixtures. A mixture of all five HIPV is most attractive, when offered together with the non-induced odor of Lima bean. Odors that elicit no response in their pure form were essential components of the attractive mixture.

Conclusions/Significance: We conclude that the predatory mites perceive odors as a synthetic whole and that the hypothesis that predatory mites recognize attractive HIPV in odor mixtures is unsupported.

July 2011. Bulb mite males occur in two forms: fighters and scramblers. This is long known and immediately the work by Jacek Radwan and co-workers comes to (my) mind. Recently, the phenomenon has gained the interest of Isabel Smallegange (Imperial College at Silwood Park, United Kingdom; i.smallegange@imperial.ac.uk), an evolutionary ecologist who had been working with crabs and birds. Despite her complete lack of experience with mites, and notwithstanding the fact that not much work on mites is going on at Silwood Park, she has done rather well. Isabel Smallegange is the first to examine how the occurrence and relative success of the two male types is influenced by various factors acting in combination. I could have picked another of her papers (*Ecology* 92: 755-764; *Naturwissenschaften* 98: 339-346, both 2011), this is just the most recent one. Fascinating work!

I.M. Smallegange (2011) *Evolutionary Ecology* 25: 857-873.

COMPLEX ENVIRONMENTAL EFFECTS ON THE EXPRESSION OF ALTER-

NATIVE REPRODUCTIVE PHENOTYPES IN THE BULB MITE

Understanding the evolution and maintenance of within-sex reproductive morphs, or alternative reproductive phenotypes (ARPs), requires in depth understanding of the proximate mechanisms that determine ARP expression. Most species express ARPs in complex ecological environments, yet little is known about how different environmental variables collectively affect ARP expression. Here, I investigated the influence of maternal and developmental nutrition and sire phenotype on ARP expression in bulb mites (*Rhizoglyphus robini*), where males are either fighters, able to kill other mites, or benign scramblers. In a factorial experiment, females were raised on a rich or a poor diet, and after maturation they were paired to a fighter or a scrambler. Their offspring were put on the rich or poor diet. Females on the rich diet increased investment into eggs when mated to a fighter, but suffered reduced longevity. Females indirectly affected offspring ARP expression as larger eggs developed into larger final instars, which were more likely to develop into a fighter. Final instar size, which also strongly depended on offspring nutrition, was the main cue for morph development: a switch point, or size threshold, existed where development switched from one phenotype to the other. Sire phenotype affected offspring phenotype, but only if offspring were on the poor diet, indicating a gene by environment interaction. Overall, the results revealed that complex environmental effects can underlie ARP expression, with differential maternal investment potentially amplifying genetic effects on offspring morphology. These effects can therefore play an important role in understanding how selection affects ARP expression and, like quantitative genetics models for continuous traits, should be incorporated into models of threshold traits.

FOUR FELLOWSHIPS AVAILABLE FROM ACAROLOGY DEVELOPMENT FOUNDATION IN 2012

Vikram Prasad
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This foundation established in October 2004 by Vikram and Indira Prasad, West Bloomfield, Michigan, USA, for the global development of acarology, taxonomy in particular, has continued to provide fellowships since then (see news details in International Journal of Acarology). As in 2011, four fellowships from ADF, consisting of $1,000 (one thousand US dollars) each, are available in 2012 to needy candidates from any part of the world, especially for education and training in acarology, expedition, survey work etc. Applications for the fellowship may be obtained from Vikram Prasad (v.prasad@ix.netcom.com), President, Local Working Committee, ADF.

IDENTIFICATION OF LAELAPIDAE (ACARI: MESOSTIGMATA) ASSOCIATED WITH INSECTS AND SOIL IN IRAN

Omid Joharchi, PhD 2011
Department of Entomology, College of Agriculture and Natural Resources, Science and Research Branch, Islamic Azad University, Tehran, Iran.
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Supervisor: A. Saboori (with R. B. Halliday, K. Kamali, H. Ostovan)

Mites of the family Laelapidae are abundant in agricultural ecosystems, especially in association with Coleoptera and Hymenoptera. The family includes several important benefical species that contribute to the control of pests in soil. This PhD project is based on a survey of Laelapidae that was carried out during 2007-2010 in the area around Tehran, Iran. During this study, 25 species from 10 genera and 3 subfamilies were collected and identified. Ten of these species are new to science, and one genus and nine species are considered as new records for the mite fauna of Iran. The genera and species marked with one and two asterisks are new to science and the Iranian fauna, respectively. The name of the host is written in square brackets after the stage of the mite that is found associated with its host:

Hypoaspidinae Vitzthum, 1940
Coleolaelaps asiaticus Karg, 1999** ♀ [*Polyphylla olivieri*]
Coleolaelaps costai Joharchi & Halliday, 2011* ♀ [*Polyphylla olivieri*]
Hypoaspis integer Berlese, 1911** ♀ [*Polyphylla* sp.]
Hypoaspis larvicolus Joharchi & Halliday, 2011* ♀, ♂ [*Polyphylla* sp., larva]
Hypoaspis maryamae Joharchi & Halliday, 2011* ♀ [*Polyphylla olivieri*]
Hypoaspis melolonthae Joharchi & Halliday, 2011* ♀ [*Melolontha melolontha*]
Hypoaspis pentodoni Costa, 1971** ♀ [*Polyphylla olivieri*]
Hypoaspis phyllognathi Costa, 1971** ♀ [*Polyphylla olivieri*]
Hypoaspis terrestris (Leonardi, 1899) ** ♀ [*Polyphylla olivieri*, larva and adults]
Gaeolaelaps aculeifer (Canestrini, 1883) ♀ [Soil]
Gaeolaelaps queenslandicus (Womersley, 1956) ♀ [Soil]
Pseudoparasitus dentatus (Halbert, 1920) ** ♀ [Soil]
Pseudoparasitus missouriensis (Ewing, 1909) ♀ [*Camponotus* sp.]
Ololaelaps placentula (Berlese, 1887) ** ♀ [Soil]
Melittiphidinae Evans and Till, 1966
Gymnolaelaps messor Joharchi *et al.*, 2011* ♀ [*Messor* sp.]
Gymnolaelaps prestoni Joharchi *et al.*, 2011* ♀ [*Myrmica* sp.]
Laelaspis astronomicus (Koch, 1839) ♀ [*Tapinoma* sp.]
Laelaspis equitans (Michael, 1891) ** ♀ [*Messor* sp., *Camponotus* sp.]
Laelaspis sp. nov. 1* ♀ [Ants]
Laelaspis sp. nov. 2* ♀ [Ants]
Laelaspis sp. nov. 3* ♀ [Ants]
Myrmozercon karajensis Joharchi *et al.*, 2011* ♀ [*Camponotus* sp.]
Pneumolaelaps colomboi (Evans and Till, 1966) ** ♀ [*Bombus* sp.]
Pneumolaelaps hyatti (Evans and Till, 1966) ♀ [*Bombus* sp.]
Laelapinae Berlese, 1892
Haemolaelaps casalis (Berlese, 1887) ♀ [Soil]

THREAT-SENSITIVE ANTIPREDATION BEHAVIOR IN THE SPIDER MITE *TETRANYCHUS URTICAE*

M. Celeste Fernández Ferrari, MSc 2011
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Supervisor: P. Schausberger

The interactions between predators and prey do not always result in the consumption of prey by predators. Prey organisms perceiving predation risk may change and regulate their behavior in order to avoid predation. According to the threat-sensitive predator avoidance hypothesis, prey animals should match the intensity of their anti-predation behavior to the degree of threat posed by the predator. We tested this hypothesis in the two-spotted spider mite *Tetranychus urticae*, subjected to three predatory mite species, *Phytoseiulus persimilis*, *Neoseiulus californicus* and *Amblyseius andersoni*, posing different degrees of predation risk. We first conducted a no-choice test to measure the oviposition and moving behavior of *T. urticae* when exposed to cues left by the predatory mites. Then, we tested *T. urticae* site preference and activity in choice tests where the spider mites were offered an artificial cavity containing predatory mite traces and a neutral cavity. *T. urticae* responded threat-sensitively in the time of its first egg laid. A delay in oviposition was only recorded in presence of *P. persimilis* cues. The spider mites laid less eggs in presence of traces of *P. persimilis* and *A. andersoni* than in presence of traces of *N. californicus* and absence of predator traces. Furthermore, the spider mites were able to distinguish between two different kinds of cues (traces vs. traces and eggs), increasing their time spent moving when predatory mite traces and eggs were present. In all choice situations, the spider mites consistently preferred the cavity with predatory mite cues to the neutral side. We argue that, in a non-plant environment, the spider mites associated the predatory mites cues with the possible existence of a nearby host plant and thus preferred the cavity with the predator cues to the neutral cavities. In conclusion, this study shows that *T. urticae* is able to assess the actual risk of predation, supporting the threat-sensitive predator avoidance hypothesis.

THE INFLUENCE OF SOCIAL FAMILIARITY ON PATCH-EXPLOITATION AND -LEAVING IN JUVENILE PREDATORY MITES

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Supervisor: P. Schausberger

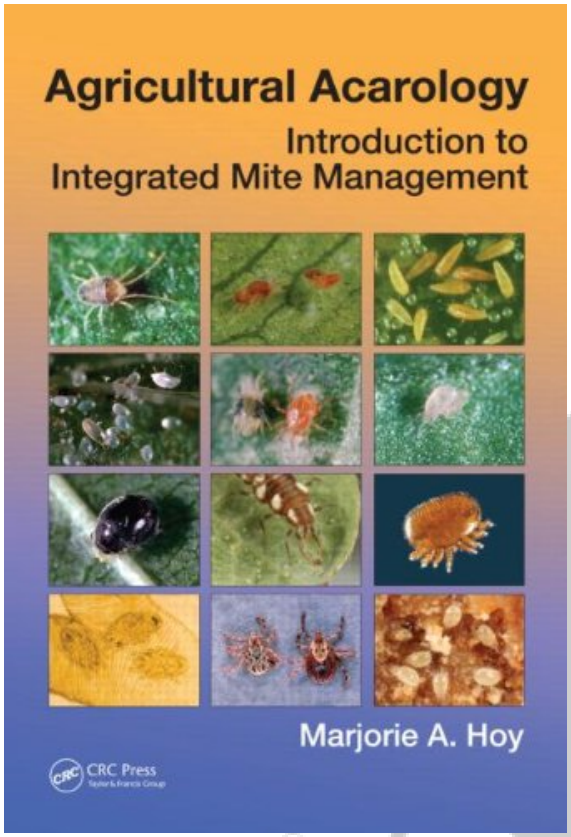
In group-living animals, social interactions and discrimination between different group members are essential features. Accordingly, the ability to recognize familiar individuals, i.e. individuals encountered before, is found in many group-living species and known to strongly affect within-group interactions and between-group movements. The group-living, plant-inhabiting predatory mite *Phytoseiulus persimilis* is a specialized predator of herbivorous spider mites, which are patchily distributed on their host plants. *P. persimilis* is globally used for biological control of spider mites.

As *P. persimilis* tends to overexploit the spider mite patches, optimization of patch exploitation, onset of dispersal and inter-patch movement of the predators is important. I examined the influence of social familiarity on prey patch exploitation, development, predation and dispersal of the predatory mites from the prey patch in two experiments. In both experiments, the predators were offered limited prey amounts. In the first experiment, the predators did not have the option to move to alternative patches, in the second experiment they did have this option. Overall, in both experiments more familiar predators left the patches and they left them earlier than unfamiliar predators did. In the first experiment, familiar predators depleted the prey patches more slowly than unfamiliar predators, probably reflecting a less stressful social environment. In the second experiment, the predatory mites could move among four patches infested with spider mite eggs. Social familiarity led to a faster depletion of the interconnected prey patches as a result of earlier dispersal from the central patch, optimized dispersion and relaxation of intraspecific competition. There was no difference in the number of individuals reaching adulthood, but the female proportion was higher in familiar groups. Altogether, my thesis shows that social familiarity has a decisive influence on patch exploitation and -leaving of *P. persimilis.* The knowledge gained may contribute to optimize the use of *P. persimilis* in biological control.

BOOKS

STRATEGIES IN INTEGRATED MITE MANAGEMENT

Marjorie A. Hoy (2011), CRC Press**,** ISBN: 978-1-4398-1751-3.



ERRATA ON THE BOOK "ILLUSTRATED KEYS AND DIAGNOSES FOR THE GENERA AND SUBGENERA OF THE PHYTOSEIIDAE OF THE WORLD"

D.A. Chant & J.A. McMurtry (2007) available online.

The errata on this well known book, published by Indira Publishing, West Bloomfield, Michigan, USA, has been placed on the website of this company (www.indirapublishinghouse.com). Readers may download the corrections free by going to the site, Products, Books, Corrections, Chant and McMurtry (2007).

JOURNALS

Systematic & Applied Acarology

An information by **Z.-Q. Zhang,** Editor-in-Chief

I am delighted to inform that Systematic & Applied Acarology has been selected for coverage and citation tracking in ISI Science Citation Index Expanded and Current Contents. It is also covered in Journal Citation Reports, which is the official journal for reporting Impact Factors each year. This is a recognition of the increasing quality of the journal. Many thanks to all colleagues, who have supported Systematic & Applied Acarology as readers, authors, reviewers.

http://www.nhm.ac.uk/hosted_sites/acarology/saas/saa.html

2011

3rd ANNUAL ZOOLOGICAL CONGRESS OF "GRIGORE ANTIPA" MUSEUM

November 23 to 25, 2011
Bucharest, Romania

http://www.czga.ro

2012

7th SYMPOSIUM OF THE EUROPEAN ASSOCIATION OF ACAROLOGISTS

July 9 to 13, 2012
Vienna, Austria

http://euraac.boku.ac.at/SympVienna

14th INTERNATIONAL BEHAVIORAL ECOLOGY CONGRESS

August 12 to 18, 2012
Lund, Sweden

http://www.isbe2012lund.org/

24th INTERNATIONAL CONGRESS OF ENTOMOLOGY

August 19 to 25, 2012
Daegu, South Korea

http://www.ice2012.org/

EVOLUTION OTTAWA: 1st JOINT CONGRESS ON EVOLUTIONARY BIOLOGY

July 6 to 10, 2012
Ottawa, Ontario, Canada

http://www.confersense.ca/Evolution2012/index.htm

RESEARCH SCIENTIST (WESTERLO, BELGIUM)

You will work with BIOBEST's R&D department with a focus on the identification, evaluation and of new candidate organisms/products for biological control; induced resistance.

You will work with our subsidiaries, research partners and customers to test new products

You will interact closely with our production and commercial teams to prepare new product releases

Profile:

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You have a good understanding of the needs in horticulture and agriculture

You are a good communicator and a real team player

You are able to communicate in Dutch and/or English, Spanish, French

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Interested?

Please send your curriculum vitae and application letter to Prof Felix Wackers, BIOBEST NV, Ilse Velden 18, 2260 Westerlo, Belgium e-mail:

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Vienna, November 2011