



- IN THIS ISSUE:**
- Heinrich Schatz highlights three recent oribatid mite papers
 - Andreas Walzer and Barbara Fischer introduce their research projects
 - Exciting abstracts of just finished PhD and MSc theses

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DEAR ACAROLOGISTS

We are pleased to present you the 5th volume of the EURAAC Newsletter. Mi(gh)ty get-togethers ahead - both to take place in September - are the meeting of the IOBC Working Group on *Integrated Control of Plant Feeding Mites*, Cesky Krumlov, Czech Republic, and the *Milbenkundliche Kolloquium*, Tübingen, Germany. Please check out the relevant websites (given on page 25 of this issue) for details. In the Spotlight section, Heinrich Schatz (University of Innsbruck, Austria) introduces and comments three recent papers on oribatid mites. In the Forum section, Barbara Fischer (University of Innsbruck, Austria) and Andreas Walzer (University of Natural Resources and Life Sciences, Vienna, Austria) introduce their PhD and PostDoc projects. The Theses section contains interesting summaries of just finished PhD and MSc theses from the Netherlands, S-Korea, and Turkey.

Thanks to all contributors for sharing their news with us. Please keep on informing us, the Newsletter lives from the contributions of its readers. Deadline for news to be included in the 6th issue (November 2011) is end of October 2011. The same deadline applies to submission of sub-symposia topics for next year's EURAAC symposium (for details see <http://euraac.boku.ac.at/SympVienna/subsymp.php>).

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

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Heinrich Schatz (Institute of Zoology, University of Innsbruck, Austria) selected and comments three recent oribatid mite papers with focus on morphology, taxonomy/biogeography, and trophic ecology heinrich.schatz@uibk.ac.at

September 2010. The morphology of the ovipositor of oribatid mites has been only occasionally described and rarely investigated in detail. **S. G. Ermilov*** gives an overview of the ovipositor morphology of different species of “higher” oribatid mites (Brachypylina). This study was published in *Entomological Review*, 90: 783-792 (in English), and in *Zoologicheskii Zhurnal*, 89: 694-702 (in Russian).

*ermilovacari@yandex.ru

THE STRUCTURE OF OVIPOSITORS IN HIGHER ORIBATID MITES (ACARI, ORIBATIDA, BRACHYPYLINA)

The ovipositor of oribatid mites consists of a proximal and a distal elongate cylinder, latter with a base and three distal lobes. The publication deals with the similar and distinctive morphological characters of ovipositors in different oribatid taxa and presents new data on the morphological structures of the ovipositor of 60 different species, belonging to 46 genera and 30 families. A detailed analysis is given of the ovipositor shape, size, length ratios of the particular structures, of the number, position and arrangement of setae, supplied with numerous illustrations.

As a result, the possibility of using the ovipositor characters in identification of oribatid mites was estimated. The ovipositor morphology in species belonging to the same genus was found to be almost identical; however, representatives of different higher taxa may vary considerably. Based

on the new material and the scarce data published, one may assume that morphological features of ovipositors may be used as additional characters for identification of supraspecific taxa of higher oribatid mites; however, these characters are not always valid, since representatives of different higher taxa sometimes have morphologically similar ovipositors.

October 2010. Recent investigations on the biogeography of mites are quite rare. **M. J. Colloff*** considered this topic in the course of studying and describing Australian species of different oribatid mite taxa. The present publication is part of a larger series of publications on *Crotonia* species. The distribution of members of the species-groups of *Crotonia* in the southwestern Pacific indicates that the species from Lord Howe Island has affinities with species from Australia, while the species from Norfolk Island are both most similar to species from New Zealand, and represents further evidence of the capacity of *Crotonia* spp. for long-distance dispersal to oceanic islands. *Zootaxa*, 2650: 1-18.

*matt.colloff@csiro.au

NEW SPECIES OF CROTONIA (ACARI: ORIBATIDA: CROTONIIDAE) FROM LORD HOWE AND NORFOLK ISLANDS: FURTHER EVIDENCE OF LONG-DISTANCE DISPERSAL EVENTS IN THE BIOGEOGRAPHY OF A GENUS OF GONDWANAN RELICT ORIBATID MITES

The Gondwanan relict oribatid mite genus *Crotonia* is of considerable biogeographical and evolutionary interest. Its distribution shows harmonic Gondwanan and disjunct trans-Pacific vicariant patterns with the majority of the 68 species recorded from South and Central America, Africa,

Australia, New Zealand and New Caledonia. This paper provides additional evidence of long-distance dispersal events to oceanic islands. *Crotonia* species has formerly been used as an example for dispersal, e.g. in relation to continental drift (Hammer & Wallwork 1979).

The author discusses different means of dispersal to isolated islands and habitats for the large *Crotonia* species, as anemochory or hydrochory, possibly even by developing eggs if the female does not survive the event. The concept of closely related species groups is useful in relation to biogeographical affinities and possible source areas. Additionally, the author described three new species from the Lord Howe and Norfolk Islands including juvenile instars as far as they were available.

March 2011. A review summarizes the knowledge of using stable isotopes for a better understanding of the trophic ecology of oribatid mites. The authors **M. Maraun***, **G. Erdmann**, **B. M. Fischer**, **M. M. Pollierer**, **R. A. Norton**, **K. Schneider** & **S. Scheu** recapitulate the history of stable isotope research in soil animals with a focus on oribatid mites. They also overview the current state of knowledge of oribatid mite trophic niche differentiation and present new stable isotope data for oribatid mites, compiling limitations of stable isotope based analyses of trophic relationships. Future challenges and problems that may be solved using stable isotope analyses and other novel techniques for improving our understanding on the trophic ecology of soil invertebrates are suggested. *Soil Biology & Biochemistry*, 43: 877-882.

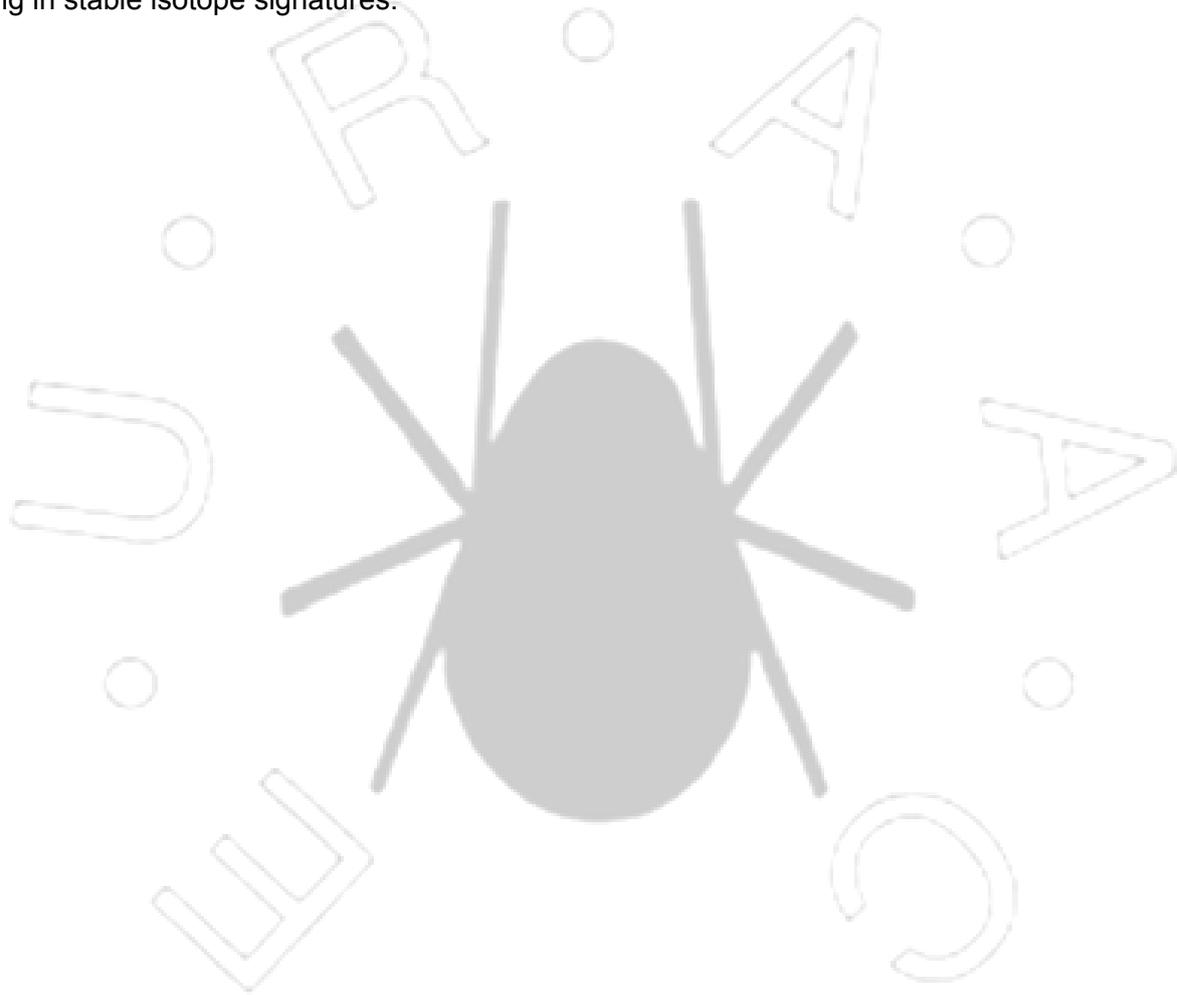
*mmaraun@gwdg.de

STABLE ISOTOPES REVISITED: THEIR USE AND LIMITS FOR ORIBATID MITE TROPHIC ECOLOGY

Stable isotopes had been used for a long time to study trophic relationships in marine and freshwater systems, but terrestrial soil ecologists started rather late to use this method to analyze the structure trophic levels and structure of food webs as well as the trophic ecology of specific taxonomic groups, including oribatid mites (Schneider et al., 2004, *Soil Biology & Biochemistry* 36, 1769-1774). Earlier studies based on physical gut content analyses and direct observation on oribatid mites had already suggested that "mycophagous" animals in fact are trophically diverse and include species living as predators, scavengers, algal and lichen feeders. The combined analysis of nitrogen ($^{15}\text{N}/^{14}\text{N}$) and carbon ($^{13}\text{C}/^{12}\text{C}$) ratios of oribatid mites is useful in delineating the structure of soil and bark food webs and the identification of food resources of oribatid mites. A certain oribatid mite species appears to occupy a very similar trophic niche, irrespective of habitat or soil depth. This conclusion was supported by recent analyses of stable isotope signatures of bark-living oribatid mites.

The present review summarizes recently obtained stable isotope data and compiles problems and limitations of this method for the future. The use of stable isotopes contribute to our understanding of the trophic ecology of oribatid mites. It allows e.g. the separation of lichen- and moss-feeding species, demonstrating that there likely are many lichen but no moss feeding oribatid mite species. Adult oribatid mite taxa that are endophagous as juveniles, burrowing in decaying woody substrates or hard fungal sporophores (e.g. ptyctimous oribatid mites, many *Carabodes* spp.) are

separated by their stable isotope signatures from all other oribatid mite species. Fungivorous and algivorous oribatid mite species cannot be separated further, e.g. the fungal taxa they feed on cannot be delineated. A particular problem in using stable isotope data is the difficulty in determining signatures for basal food resources, since decomposing material and fungi comprise various components differing in stable isotope signatures.



Andreas Walzer, University of Natural Resources and Life Sciences, Vienna, introduces his new PostDoc project andreas.walzer@boku.ac.at

Project leader: P. Schausberger
Funding: FWF (Austrian Science Fund)

SEXUAL SELECTION AND MALE BODY SIZE PLASTICITY IN LOW AND HIGH LEVEL POLYANDROUS MITE SPECIES

Sex-specific body size plasticity in female-biased size dimorphic arthropods is well documented. Potential ultimate explanations for sex-specific body size plasticity can be deduced from the adaptive canalization hypothesis. Traits closely linked to fitness are assumed to be canalized via past stabilizing or directional selection, which leads to robustness against environmental stress resulting in low phenotypic plasticity.

The objective of the project is to scrutinize the fitness implications of male body size plasticity/canalization in two sexually size dimorphic predatory mite species with differing mating systems, *Phytoseiulus persimilis* Athias-Henriot and *Neoseiulus californicus* McGregor (Acari: Phytoseiidae). The body size is female-biased in both species and males are polygynous. However, males differ in the reaction norm in body size with a significant positive correlation between consumption rate and body size in *N. californicus* but not *P. persimilis*. Female mating frequency differs among *P. persimilis* and *N. californicus*. *Phytoseiulus persimilis* needs a single mating for maximum egg production, whereas *N. californicus* needs multiple matings. This fact raises the hypothesis that the differential reaction norms in male body size of *P. persimilis* and *N. californicus* are the result of previous intrasexual selection, acting

more strongly on canalization of male body size in *P. persimilis* where males have less mating opportunities. Four experimental series will be conducted to find out whether deviation from the optimal body size is linked with higher fitness costs in males of *P. persimilis* than *N. californicus*: (1) male lifetime mating frequency and lifetime reproductive success (2) paternity success in dependence of male mating sequence, (3) body size plasticity and paternity success, and (4) female choice/male competition and male body size.

The project is a collaboration of Peter Schausberger/Andreas Walzer and the research group of Masahiro Osakabe, Kyoto University, Japan. M. Osakabe and collaborators will develop genetic markers (microsatellites) for *P. persimilis* and *N. californicus*, allowing to discriminate the offspring of different iso-female lines.

Barbara M. Fischer, University of Innsbruck, informs about her PhD project barbara.fischer@uibk.ac.at

FEEDING BIOLOGY OF ORIBATID MITES IN HIGH ALPINE REGIONS

Project leader: E. Meyer
PhD supervisors: E. Meyer & H. Schatz
Funding: FWF (Austrian Science Fund)

Oribatid mites (Acari: Oribatida) are among the most abundant and species rich taxa of the soil living mesofauna. Presumably they play an important role in decomposition and are significantly engaged in nutrient cycles and dispersal of fungal spores. Oribatid mites dominate mesofauna-communities, reaching densities up to several hundred thousand individuals per square meter. The colonization

success is multifactorial, and primarily resource availability, reproduction mode and mobility, and secondarily habitat characteristics have to be considered. According to the present state of knowledge oribatid mites feed mainly on fungi or detritus, but with noteworthy feeding specializations on animal tissue or lichen. Oribatid mites display both sexual and parthenogenetic reproduction; the question why most species reproduce sexually is still an unresolved problem. Potential explanations are evolutionary constraints, e.g. interactions between food source and animal, or limitation of food resources. Species composition in oribatid mite communities has been investigated frequently and is mainly influenced by habitat type. But the mechanisms for habitat specific colonization success of oribatid mite species are largely unknown.

The main objective of this project is to understand mechanisms which lead to spatial distribution patterns of oribatid mites. We investigate the feeding biology of oribatid mite species along an altitudinal gradient in the Central Alps. The feeding biology of oribatid mites will be analyzed with dual stable isotope analysis (^{13}C , ^{15}N). Additionally food choice experiments will be carried out and sex ratios of oribatid mite species will be investigated. Analysis of the gathered data on community structure, reproduction mode and feeding biology of oribatid mites will enhance the knowledge about mechanisms leading to spatial distribution patterns of oribatid mites and their ecological requirements in alpine habitats.

An invitation from the **Acarological Society of Iran**

Dear colleagues,

The Acarological Society of Iran (ASI) was established on 30 August 2008. It aims at promoting the development of acarology in Iran and fostering the communication and cooperation among acarologists in Iran and other parts of the world. ASI is an international society for Iranian acarologists living home and abroad. However, anyone who is interested in acarology and in promoting the communication and cooperation among acarologists in Iran and other parts of the world, is invited to join ASI. ASI currently has over 70 members from Iran, Japan, Pakistan, Turkey, Egypt, Italy and China. ASI will publish a research journal, Persian Journal of Acarology in 2011. Iranian acarologists have long wished to establish an acarological society and to publish a journal in which they can present their works on the Acari. We are very pleased to announce that their dreams have now come true. Please join us in promoting the development of acarology in Iran and fostering the communication and cooperation among acarologists in Iran and other parts of the world. For more information, please visit <http://www.acarology.ir/index.htm>.

All the best,

Acarological Society of Iran

Rakhima Zhaxylykova seeks collaborators in dust mite research
zhax-rd@mail.ru

At present time the presence of pandemic acariases, caused by dust mites, is an indisputable fact (see my publications and www.allergy.kz). In 2008, visiting the Congress of European Acarologists in Montpellier, I hoped for cooperation. I thank Professor M. Bertrand: he was ready to help me in all conditions. But I have arrived on

the congress not prepared in respect of dialogue language. There was no translators. I want to my achievements in the field of clinical acarology become property of EURAAC and all acarologists because the achievements of one person remain on a paper and in a memory of few, but achievements of many acarologists will be realized. Acarologists have already proved the presence of mites in dust of living quarters and manufacturing firms on all continents (except Arctic and Antarctic). The problem consists in repeating the same researches, but in dynamics of treatment of sick people. Only the acarologists are able to find out virtually the mites. This fact is especially actual because of the beginning of the 21st century without the proof of cause of illness the clinical diagnostics can be seem unpersuasive for a number of medical employees and many patients. But it is necessary to notice that clinical diagnostics should be always predominating.

As any not diagnosed and not identified, and presented for a long time among the population infection - acarosis gives the most different clinical masks with which the doctors of all clinical specialities are dealing practically. Indirect acknowledgement of the given fact is uncontrollability of morbidity of initially-chronic illnesses: despite all diligences of an experts the "non infectious" diseases grows every year and it is predicted their growth. At the same time the clinical acarology is in the rudimentary. In medical institutions the acarological inspection of patients is not realize. The acarofauna of biotope even of allergic men (as the indicator of elimination of a life from mite allergens) in dynamics is not studying. Parasitological services at sanitary-and-epidemiologic establishments carry out the acarological control superficially. Hence, now the help of acarologists

on dust mites is extremely necessary for medical employees and sick people.

Considering the above statement I offer colleagues - acarologists on house dust mites - to realize the following work:

1. Every acarologist on house dust mites should offer to medical institutions (private and/or state) in their region the services on acarological control of external covers and biotope of patients with allergic, skin, rheumatic and oncological diseases.
2. The expert with which you plan to work should have experience of clinical work not less than five years. Please, recommend to these experts spend the treatment against a background carefully elimination of patient's biotope (questions of elimination of a family life from dust and mites allergens are developed by allergists and described in the medical press). In the present time the acarosis is present practically in any person (adult or baby) or in the form of an accompanying pathology, or in the form of leading disease - a clinical mask of acarosis. Therefore the elimination of a family life, bed, underwear and other accessories of the patient from mites of a household dust should make positive impact on recovery of the patient from any disease. Please, read the articles «Obligatory conditions for full recovery», «The prevention of an allergy and allergodermatoses», «Everybody should know about it», etc. on our site. Only against a background of elimination a family life from dust mites we have achieved full recovery of patients from many allergic and skin illnesses. Acarological inspection of patients with rheumatic and oncological illnesses, and also carrying out treatments against a background elimination of family life from dust mites was not done by anybody and nowhere and you will be the first

in this area of researches. I am sure that during the given work you will offer many new techniques of an inspection patients and environment on presence of mites.

3. The question of payment of acarologists work is important. For acarologists, who work about dust mites in government programs, the offered work will be only expansion of researches. The work of other acarologists, probably, will be remunerated by clinics at which they will be addressed. In private hospitals the acarological control of external covers and biotope of patients can be included in the list of rendered paying services. Each patient of 21st century wishes to know the reason of his illness, therefore he exactly will not refuse from offered inspections. Probably some should work gratuitously within one year: the given work is planned exactly for such term.

The payment of the labour of attending physician from a former source of payment will remain. From desire of patient the attending physician can offer him the full recovery (the list of the completely cured illnesses is here: <http://www.allergy.kz/en/beginning/what/>). The patient will make additional payment for full recovery, and part from this payment will compensate attending physicians. My advisory help to such doctors and patients will be free of charge.

4. Dear colleagues! For proper job management it is necessary to select a coordination council led by the most active, well-knowing both English and Russian languages, acarologists on dust mites. Personally, I offer a nominee of acarologist from Poland, Krzysztof Solarz. Please understand me correctly: because of age and poor English I can't supervise and coordinate the work by myself, but I under-

take to render free aid within questions of my competence. For this purpose I undertake to be one of the members of coordination council.

5. For simplification of acarologist's work, it is necessary to develop and introduce modern ways of diagnostics of acaroses - the diseases caused by mites. Therefore it will be possible for some acarologists from region with hi-tech manufactures to contact the qualified technical officers for the purpose of jointly working out modern diagnostic devices of acarological control over external covers of people and entourage of them. Problems on creation of similar devices are reflected in article at <http://www.medlinks.ru/article.php?%20sid=43304>

Warnings!

1. During work we (attending physicians, acarologists, and me) should strictly adhere to the principle «Do not harm!». We must use only resolved by public health corresponding country and WHO methods of diagnostics and treatment plus non-invasive methods of diagnostics (see <http://euraac.boku.ac.at/EuraacNews4.pdf>, pp. 9-11).

2. The attending physician should adhere strictly to the legislation in the field of country public health services in which he carries out the works. The treatment of patients should be spent by strictly installations in medicine. In supervision and treatment of patient is supplemented only acarological control over external covers, household and industrial conditions (elimination of family life from dust and mite allergens does not contradict the legislation of any country).

3. I will recommend only legal methods of

treatment in clinical medicine. Therefore the terms of treatment and full recovery will be considerable (the newest methods of treatment will be developed and will take root into medical practice only at a following stage of work and will be realized according to the standard rules of clinical medicine).

4. My help to colleagues will be gratuitous! Only for the patients, wishing to consult me personally, my services will be paid.

Dear colleagues!

You well know that there are no trivia in research work. Therefore, in advance I ask not to criticize me for excessive detailed elaboration of interrogation of the patient or family life. Sometimes even small details are important for diagnostics and subsequent treatment. I will give only one example. In the summer of last year an old woman has addressed to me with complaints to presence on the body of 3-year-old granddaughter rash and itch. The rash was found out by mum overnight during bathing the child. An earlier allergy of the child was not observed. There was the bright red with slightly oedema papula rash. The quantity of rash considerably descend to the front surface of body, arms and legs. The face and head were clean. I have told: strange localisation of rashes, such impression, that the girl was to slip on something dirty. The grandmother with surprise answered: Yes, yesterday she to slip on the fabric which covered the cage of parrot. Naturally, antiparasitic (anti-acariatic) treatment has helped the girl at once.

Desirably, it is better to conduct acarological researches in a patient's house without warning of forthcoming inspection. Ana-

lyse the collected material as soon as possible because of excessive mobility of mites. It is extremely important to supervise the correctness of performance on elimination of biotope. Thus a quality of monitoring can be different: from an unostentatious question till participation during cleaning. It is possible to learn to judge gradually about it on a condition of an integument of the patient in dynamics.

Please write down the time of the acarological inspections (which will allow to group the subsequent material on time signs) depending on the hygienic action carried out. If the patient and members of his family already had cleaned, it is necessary to mark each time before the given research of acarofauna was carried out.

The material should be taken from all walls, curtains, devices of heating, floors near a bed and other places, from external and internal walls of a bed, blankets, surfaces of pillows, from all surfaces of mattresses, etc. Please, especially pay attention to materials from walls adjoining a ladder platform. Besides, it is necessary to investigate the material from shelves for clothes and products, carpets, upholstered furniture, etc.

The doctor-clinician carefully collects not only the anamnesis of illness and life, but also carefully asks about conditions of life, hygienic, labour, food, weekend and other habits of patient, etc. Such interrogation will help to define roughly the reasons of development of illness, and also to define the places of more accumulations of mites in household conditions, wherefrom acarologists necessarily should take some material. It is desirable that the acarologist is present at interrogation of the patient as the results of acarological researches in subsequent aspects will help to explain

features of clinical current of disease of the interrogated patient. For example, in one of these days I had on reception a 6 year old patient with his grandmother. The one-year-old kid often had aggravating bilateral purulent otitis. On objective results of researches the child had a very old feather pillow. When I have told about it the grandmother confirmed it. «But how you recognize about it? We slept together with grandson on the trestle bed and very old feather pillow. Recently, I have bought the grandson a synthetic pillow, and to myself had left the former. The grandson sleeps near me and breathes in my pillow». Grandmother has discoid lupus erythematosus on the face. Here is a trick of a mites! Another example happened 15-years ago. Mum referred to us with 10 years old son with complaints about a not healing purulent wound on the left auricle. Before this they addressed everywhere but unsuccessfully. There was a triangular defect covered with pus oedema edges on the left auricle. The skin condition on the left side of head and neck allowed thinking that the boy likes to sleep on left side and on old feather pillow. Mum has confirmed our assumptions. The disease cause was eliminated. Literally in two days the wound was cleared from pus. During 4 days the wound has completely healed up.

I now offer a list of additional questions which should be asked to each patient.

Questions to the patient about habitation

In what house lives: separately standing or municipal apartment. A residing floor. How many floors are there. How many people live in how many rooms? Has the patient a separate room? Where does he sleep: on the bed, sofa or floor? The quality of bedding: blankets, pillows, mattress, etc. How often are the bed-clothes changed? As

cleaning in bedroom, how often is it made? How is the bed situated with respect to wall, heating devices, windows, curtains, etc. What is on floor of the bedroom and other rooms? Are there animals in the house? Likes to bath in a bathtub or under a shower. How often bathes, uses soap and a bast whip or without them? What kind of soap or washing-up liquids does he use. How often visits a bathhouse or sauna. Is there dampness in apartment, in the house, bathroom? How many times a day wash a face, with or without soap?

Is apartment solar or shadow? The condition of apartments of neighbours of the patient from above, from below, side by side. The condition of resting place in front of an apartment. Do the neighbours have any animals? How long time the old things is stored in the house, where are they stored, etc.

Questions about cleaning in the house or the apartment

Who and how cares for the cleaning? How frequently? How often the subjects in the house are vacuumed? What kind of vacuum cleaner is used (with water, usual, frying a dust or other)? Is there an abundance of carpets, heavy curtains, etc. What fabric upholsters the furniture? What kinds of special means are applied to washing the subjects in the house? What temperature of water is applied in a vacuum cleaner, washing of floors? How often is the dust collector of the vacuum cleaner cleaned? How many niches, cases for linen and things are in the apartment, etc.?

How often takes cleaning place in the bedroom, drawing room and other rooms?

How often are the subjects moved in a

house with cleaning it from all sides? How often is cleaning in a closet, niches, wardrobes, bookcases, kitchen cabinets, larders? Are carpets, oriental carpets and other subjects dried in the sun before the subsequent cleaning? How often these subjects are maintained in the cold in the winter before subsequent cleaning?

How often is the refrigerator cleaned? How often is directed the full order in kitchen and bookcases? How are the winter things (in summer) and summer things (in winter) stored? When is a repair in apartment made?

Questions about bed hygiene

Who and how remakes a bed? How often are the bed-clothes changed? How often a bed and its accessories are wiped? How often a sofa if it using instead of a bed is cleaned? How often the floor under a bed is cleaned?

If under a bed there are parts of a carpet, an oriental carpet - how often is it vacuumed, shaken up and dried in the sun? Is the bed directly touching wall, a battery, curtains, a computer table, etc.? From what materials a mattress, blankets, pillows are?

On what mode of a washing machine the bed-clothes are washed? How the underwear is washed? Is underwear and bed-clothes ironed, when it was made: before application or in advance? From what material floors are made?

Data about state of health of other members of the family

Gathering of the corresponding anamnesis by the attending physician of the observed patient. It is possible to photograph by

digital camera most "healthy" and most "sick" (having any changes, beginning from dryness till rough changes) sites of an integument and send it to me by e-mail. Interpretation of a condition of a skin in respect of presence or absence of acariasis signs will be sent by me. If the attending physician has desire and possibility he can learn the clinic of acariasis from me. But during the given work the attending physician will learn the clinic of acariasis himself.

Dear acarologists!

In the medical literature there is an opinion that it is impossible to completely clear a house from dust mites. Such opinion is connected by now practically there are no people with a clean skin, not infected by mites. Acaricidosis, caused by dust mites, is an initially chronic infection. Therefore, acaricidosis has more percentage of latent and atypical forms of illness than any other sharp infectious disease. From a position of a doctor well-knowing clinic of acaricidosis, they are the infected people, but from a position of a modern medicine they are "practically healthy" people. That is why obvious infection by allergic, rheumatic, skin, oncological and some other illnesses are hidden from view. At the same time these people are hotspots of invasion. From any person infected with mites, besides of superficial skin epithelium, are also fall mites during crawling from one skin pore to others. Falling on surrounding conditions (including bed) these mites adapt to new conditions, procreate and because of that allow asserting, that the life of the modern person cannot be cleared from dust mites (plus there are known cases of bringing the mites from the outside with clothes, footwear, products, the wind, etc.). The presence of not diagnosed acaricidosis was the main reason

of those laboratory indicators of presence of an allergy in an organism (Ig E, etc.) remained the invariable at the allergic people taken out in conditions of the extreme north.

All set forth above and many other questions quite often will help to co-ordinate roughly a condition of skin and visible mucous membranes of the concrete patient and together with him living people with a condition of acarofauna of houses, apartments, bedrooms, beds, wardrobe, etc.

I can accept direct participation in work of each of you through the Internet. I can assure, that my help to the attending physician will be effective in cases of treatment of the illnesses, listed on <http://www.allergy.kz/en/beginning/what/>.

We have only single supervisions in the field of rheumatic and oncological illnesses. Treatment of these patients should be spent at the rules of modern medicine! We only will add the acarological control of skin and subjects of their environment. I am sure, that continuous correct elimination of the nearest environment, underclothes and bedding from dust mites will essentially improve a condition of patients receiving treatment.

During the given work patients can completely get rid from an allergic or skin problems. The attending physician will study clinic of acariasis and will learn to cure completely the patient from an allergy, skin pathology and some other clinical masks of acariasis. Acarologists will make an invaluable help to contemporaries. Pharmaceutical firms will increase release of the medicines necessary to patients, etc.

I invite as many acarologists on house dust mites as possible (from different re-

gions of the planet) to participate in the given work. Having united results, you receive a useful practical exit, will lift the prestige of clinical acarology on due level, will publish many combined articles, will find the answer to a question why in one houses are so many mites, and in the others – there are a little bit of them («why some houses have a thriving mite population, whereas quite similar dwellings in the same neighbourhood are almost devoid of mites and mite allergens»), etc.

Dear colleagues!

Good lucks and successes to you in the proof of presence of acariasis pandemic - the illnesses caused by mites of house dust! You have already proved that mites are present at a dust of premises practically on all continents.

Please contact me by e-mail: zhaxrd@mail.ru, or via skype rakhima86 in the working days from 8 to 9 PM (time of Astana).

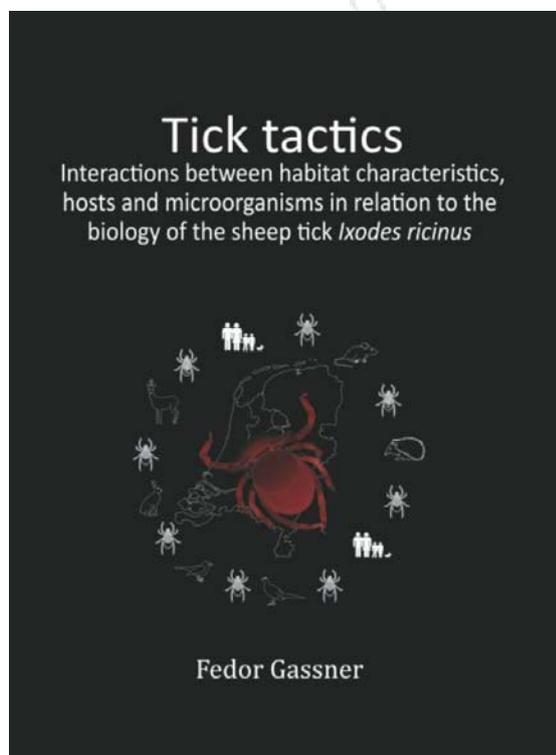
TICK TACTICS – INTERACTIONS BETWEEN HABITAT CHARACTERISTICS, HOSTS AND MICROORGANISMS IN RELATION TO THE BIOLOGY OF THE SHEEP TICK *IXODES RICINUS*

Fedor Gassner, PhD 2010

Laboratory of Entomology, Wageningen University

fedor.gassner@wur.nl

Supervisors: W. Takken & M. Dicke (with L.S. van Overbeek)



The sheep tick *Ixodes ricinus* (L.) is known to transmit a large number of pathogens of medical and veterinary importance, including the bacterium *Borrelia burgdorferi* sensu lato, the causative agent of Lyme borreliosis. *Ixodes ricinus* is found predominantly in woodlands, which provide suitable hosts and microclimates for tick survival. Three blood meals from a wide array of possible hosts are needed to complete the tick life cycle within 2 to 6

years. Ticks can acquire *B. burgdorferi* s.l. during a blood meal on an infected host and can infect a new host during the next blood meal. In this thesis, interactions between hosts, habitat characteristics, and microorganisms in relation to the biology of *I. ricinus* were investigated. A longitudinal study that was initiated at 24 sites across The Netherlands revealed that ticks infested with *B. burgdorferi* s.l. were found at all sites, but with strong spatial and temporal variation. This variation could be partially attributed to habitat characteristics. Substantial variations in the bacterial diversity within *I. ricinus* nymphs were also observed between habitats. Molecular genetic analyses indicated the presence of several potentially pathogenic and non-pathogenic bacteria. The interactions of these bacteria with hosts, ticks and other micro-organisms that reside in the tick need to be established in the future. It is known that rodent populations can mediate *B. burgdorferi* s.l. circulation in nature. Therefore, we studied the potential effects of rodents on the spatial variation of *Borrelia* infections in host-seeking ticks. Wood mice (*Apodemus sylvaticus*) and bank voles (*Myodes glareolus*) were abundant at most sites, but had varying tick burdens and *Borrelia*-infection prevalence between sites. It is argued that the infection prevalence in host-seeking *I. ricinus* ticks in the vegetation depends on the degree of contact between ticks and mice, which is, in turn regulated by habitat characteristics.

Larger hosts, such as ruminants, are important for tick reproduction. Because domestic cattle is frequently used in the management of forested areas in The Netherlands, the effect of such management on tick populations was addressed. Results from this thesis show that the presence of cattle in a woodland resulted in a locally reduced tick density, whereas

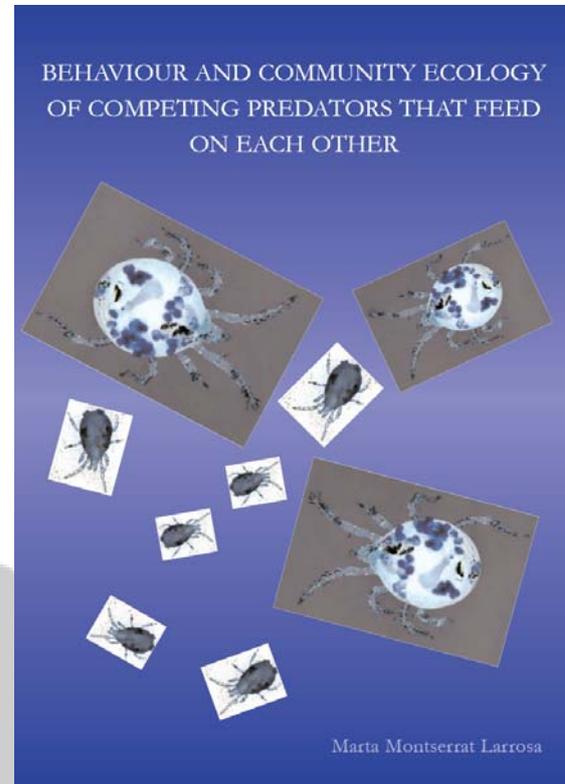
Borrelia infection prevalence remained the same compared to ungrazed woodlands. The tick-reducing effect of cattle was attributed to the negative effect of cattle on rodent populations. Effects of other mechanisms such as habitat alteration by the cattle are arguable and require further study. A central issue in the ecology of Lyme borreliosis is the mechanism by which *Borrelia* species circulate between the life stages of ticks and their hosts. This circulation is strongly affected by the chance that the tick will find a host. It was found that that *B. burgdorferi* s.l.-infected *I. ricinus* nymphs displayed increased walking activity and had a greater resistance to desiccation than uninfected ticks. These *Borrelia*-mediated effects can contribute to increased chances of host finding by the tick, and thereby to an increased transmission of *Borrelia* species. In conclusion, *Borrelia*-infected ticks were present at all locations studied, but with a dynamic heterogeneity, which is partly influenced by habitat characteristics and rodent hosts. The introduction of large herbivores could become an advantageous management strategy to help reduce the incidence of Lyme borreliosis, and further experiments confirming the mechanisms underlying this relationship would be valuable. The established *B. burgdorferi* s.l.-mediated behavioural changes in *I. ricinus* contribute to the understanding of the ecology of Lyme borreliosis, and create opportunities for future studies on tick-parasite interactions.

BEHAVIOUR AND COMMUNITY ECOLOGY OF COMPETING PREDATORS THAT FEED ON EACH OTHER

Marta Montserrat Larrosa, PhD 2011
Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam

mmontserrat@eelm.csic.es

Supervisors: M.W. Sabelis & A.M. de Roos (with A. Janssen)



Assigning animal species to trophic levels is difficult because many of them are omnivores, i.e., they feed on resources at different trophic levels. For instance, in intraguild predation (IGP), two species engaged in predator-prey interactions are also potential competitors for limiting resources. This simplest form of omnivory is very common both in natural and agroecosystems. However, mathematical models of IGP cannot explain why IGP is so ubiquitous; most theory predicts that omnivory is detrimental to species coexistence. It is clear, therefore, that the effects of omnivory on persistence of food webs is not fully resolved, and that studies are still needed to reveal which factors are essential in promoting persistence of food webs with omnivory.

In this thesis I have sought to contribute to the understanding of why communities with IGP are so widespread and what factors may contribute to coexistence of species engaged in IGP. I have approached the question empirically and from two different viewpoints, which correspond to two different organization scales: that of individuals, in the first part of this thesis, and that of populations interacting in a community in the second part. The main organisms in my experiments were: the phytoseiid mites *Iphiseius degenerans*, *Neoseiulus cucumeris* and *Phytoseiulus persimilis*, the western flower thrips *Frankliniella occidentalis*, the predatory bug *Orius laevigatus*, and a variety of food plants and pollens.

In the first part of the thesis, I have looked at behavioural features that may influence the interaction strength between IG-predators and IG-prey, and that may therefore affect the dynamics of IGP communities. One of such features is cannibalism. Cannibalism may promote coexistence of IG-predators and IG-prey in two ways: by a reduction of the actual IG-predator numbers and, consequently, by a reduction of predation and competition pressure on the IG-prey. In chapter 2 I show that when cannibals are able to discriminate conspecifics from heterospecifics, the preference of consuming conspecifics or heterospecifics is simply determined by the relative quality of both types of prey. Because heterospecific prey were of better quality in our system, IG-predators chose the IG-prey over conspecifics. Therefore, cannibalism is not likely to promote coexistence in our experimental system. Anti-predator behaviour is another behavioural feature that may promote coexistence of IG-predator and IG-prey,

especially when such behaviour facilitates the spatial segregation of the two species. In chapter 3, I show a mechanism by which spatial segregation can be facilitated. I show that IG-prey females reduce oviposition when they are exposed to IG-predators that can feed on their juveniles, and that they do so by retaining eggs inside their body. This flexible anti-predator behaviour may provide the IG-prey with time to find predator-free patches before ovipositing, thus reducing predation risk of their offspring. On the other hand, in chapter 5 I study the cues that trigger anti-predator behaviour in the IG-prey, and I reveal that the diet of intraguild predators is essential for intraguild prey to recognize intraguild predators as such.

In chapter 4 I studied whether the addition of alternative prey to communities with IGP affects their persistence. Furthermore, I also considered the effect of host plant quality on the choice of alternative prey by the omnivore, and show that preferential feeding on one alternative prey versus the IG-prey, triggered by the quality of the host plant, deeply affects the persistence of the whole community.

In the second part of the thesis I perform replicated experiments on population dynamics under controlled conditions, to allow close comparison of the experimental results with model predictions and the testing of model assumptions. This is a necessary step to reveal where theory and reality are at odds and to identify the factors that may affect the persistence of communities with IGP. In chapter 6, I test experimentally whether there is evidence for the existence of productivity-dependent regions of coexistence, as predicted by theory. Surprisingly, I failed to detect such

productivity-dependent coexistence, but found that the two species excluded each other. The initial IG-prey/IG-predator ratio strongly affected which species was excluded, and this was independent of environmental productivity. In short, when the initial IG-prey/IG-predator ratio was high, the IG-prey excluded the IG-predator, and when the initial IG-prey/IG-predator ratio was low, the IG-predator excluded the IG-prey. Subsequently, I hypothesised that exclusion of the IG-predator by the IG-prey at high productivity levels could be explained by the existence of vulnerable stages in the IG-predator. To test this hypothesis, I evaluated the effect of stage structure on species invasion in systems with reciprocal intraguild predation (RIGP) in chapter 7. First, I confirmed that IG-prey reciprocated predation, and second, I found that the population structure of the resident species (a population with only juveniles vs. a population with stage structure) clearly determined the ability of the other species to invade. Thus, I experimentally confirmed the importance of stage structure for population dynamics of systems with RIGP. This result is even more at odds with the ubiquity of IGP because it shows that resident populations of IG-prey and IG-predators will always be protected from invasion by the other. However, alternatively, this result also points at the fact that, even if mutual exclusion will be found at a local scale, coexistence between IG-predator and IG-prey can be observed at a metapopulation level.

One factor that can also facilitate spatial segregation of species is spatial structure of the habitat. In the last chapter I study the effects of habitat structure on IGP by means of a meta-analysis of data obtained from the literature on the effects of intra-

guild predation on the IG-predator, IG-prey and the shared prey. The meta-analysis strongly suggests that intraguild prey and shared prey suffer less from IGP in structured habitats. Thus, habitat structure can reduce the effects of intraguild predation, and is therefore a possible factor explaining persistence of natural systems with intraguild predation.

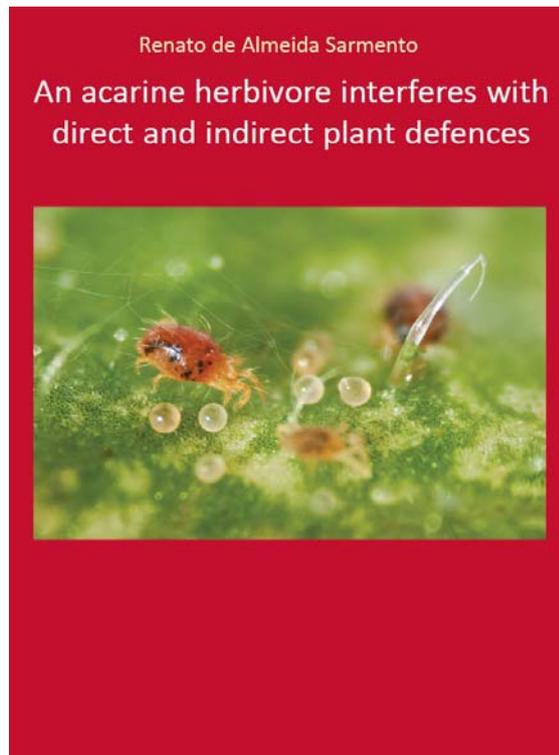
AN ACARINE HERBIVORE INTERFERES WITH DIRECT AND INDIRECT PLANT DEFENCES

Renato de Almeida Sarmiento, PhD 2011
Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam
rsarmiento@mail.uft.edu.br

Supervisors: M.W. Sabelis (with A. Janssen)

Phytopathogens and herbivores induce plant defences. Whereas there is evidence that some pathogens suppress these defences by interfering with signalling pathways involved in the defence, such evidence is scarce for herbivores. This thesis deals with an example of a herbivore that interferes with the defence of tomato plants. I examined the consequences of this interference for competition between two herbivore species on tomato plants. I investigated how the invasive spider mite *Tetranychus evansi* copes with the induced defences of tomato plants, and found that *T. evansi* suppresses the induction of the salicylic and jasmonic acid signalling routes, the main pathways involved in induced plant defences in tomato. This was reflected in the levels of inducible defence compounds, such as proteinase inhibitors, which were reduced to even lower levels in mite-infested plants than the constitutive

levels in herbivore-free plants. Consequently, the mites performed much better on previously attacked plants than on non-attacked plants. I also found that *T. evansi* suppressed the release of some inducible volatiles that are also implicated in defence.



Counter to my expectation, *T. evansi*, two species of predatory mites and a ladybird predator were attracted to plants attacked by *T. evansi* in an olfactometer. This suggests that the plant-herbivore complex did produce some attractive volatiles, in contrast with the results of the analysis of plant volatiles. The identity of the volatiles that attract *T. evansi* and the three predators is still unresolved.

I also investigated how the effects of *T. evansi* on plant defence affect a closely related spider mite species, *T. urticae*, and how it affects competition between these two herbivores. I found that *T. urticae* indeed also performs better on tomato

plants as a result of the action of *T. evansi*. In contrast to *T. evansi*, *T. urticae* induces plant defences, thus reducing its performance on plants attacked by conspecifics. This so-called induced plant resistance is commonly caused by herbivore damage. I show that *T. evansi* is sensitive to this resistance: it performs worse on plants previously attacked by *T. urticae* than on clean plants. Hence, the two herbivores affect each other's performance through the plant: *T. evansi* promotes performance of *T. urticae* and *T. urticae* reduces performance of *T. evansi*. The question then is, which species would profit from attacking a plant together. Competition experiments on tomato plants show that *T. evansi* wins this competition, in spite of its positive effect on its competitor. This begs the question of how *T. evansi* manages to win this competition. A striking characteristic of *T. evansi* is its high production of web compared to other spider mite species. Web produced by spider mites in general is thought to function as a defence against predators. In this thesis, I show that the web produced by *T. evansi* negatively affects the population growth of its competitor *T. urticae*, and that *T. evansi* produces denser web when exposed to cues associated with *T. urticae*. It therefore seems that *T. evansi* protects the leaves on which it induces reduced defences by covering it with a dense web, thereby hindering its competitors. With respect to the function of web as protection against predators, I found that the production of web by *T. evansi* does not seem to be affected by predator cues. However, the spider mite did lay more eggs suspended in the web, away from the leaf surface, in the presence of predator cues. These suspended eggs suffered less from predation than eggs that were laid on the leaf surface under the web. Thus, by

altering their oviposition behaviour in response to predator cues, females of *T. evansi* protect their offspring. Thus, the silken web produced by *T. evansi* serves to protect their colonies from predators, but also to reduce interference with heterospecific competitors. This last function of spider mite web has not been described before.

In conclusion, the phytophagous mite *T. evansi* seems to interfere with plant defences in a fundamentally different manner than other herbivores. These findings provide a new perspective on plant-herbivore interactions, herbivore competition, plant protection and plant resistance to invasive species.

BIOLOGICAL CHARACTERS OF A PREDATORY MITE, *NEOSEIULUS CALIFORNICUS* MCGREGOR (ACARI: PHYTOSEIIDAE) ISOLATED FROM KOREA IN RELATION TO ENVIRONMENTAL PARAMETERS

Hasan Fuad El Taj, PhD 2011
Department of Bioresource Sciences, Andong National University

Supervisor: C. Jung
cjung@andong.ac.kr

1. As temperature is the most vital abiotic factor for invertebrate species, which affects survival, reproduction and development (Bale and Walters, 2001), we evaluated the effect of temperatures on the life-history traits including development, reproduction and fecundity and important life table parameters of the native Korean *N. californicus* strain feeding on *Panonychus ulmi* under laboratory conditions.

2. Humidity is considered as the second

important factor to temperature in determining the development and predation performance of phytoseiid mites (Tanigoshi, 1982; Sabelis, 1985). In terms of egg hatch success and subsequent survival, there is variation among phytoseiid mites in their response to relative humidity and temperature (van Dinh et al. 1988; Baier 1991; Bakker et al. 1993; Croft et al. 1993; van Houten et al. 1995; Shipp and van Houten 1997; Schausberger 1998) and in some cases these responses may limit the use of phytoseiid mites in biological control (Baier 1991; Gaede 1992; Shipp and van Houten 1997). However, under different ambient and food shortage conditions, the interactions of the phytoseiids *N. californicus*, *N. womersleyi* and *Phytoseiulus persimilis* are studied in the second experiment for effectively use as spider mites biological control agents in the field and greenhouse crops.

3. The hostile environmental conditions such as low temperature, short photoperiod, shortage of foods and shelter would be the challenging conditions for winter survival of the predatory mites (Croft et al., 1998; Kim et al., 2005). The weather condition during winter in the mainland of Korea is characterized by a very low temperature, normally -10 to 5°C, which is critical to survival of poikilothermal arthropods such as phytoseiid mites. Diapause is one of the survival mechanisms in a harsh environment for poikilothermal arthropods especially for successful overwintering. Many mite species overwinter in diapause (Veerman, 1992) in protected habitats. Even though *N. californicus* is naturally occurring in the warmer Jeju Island, there is no information of natural occurrence in the cooler mainland of Korea. However, knowledge of their overwintering biology such as induction of diapauses of

the Korean strain of *N. californicus* is of prime importance for implementing this predatory mite in field crops in mainland Korea. So, in the present study, we tried to find out the diapause expression in *N. californicus* as the advantageous physiological mechanism to survive against the more adverse environmental conditions found on the mainland. Additionally, we measured the reproductive potential and food consumption of the predatory mites during the experimentation.

4. *N. womersleyi* from the Korean mainland enter a diapause state (Kim et al., 2009) but the result from the third part of the study concluded that the Korean strain of *N. californicus* has no diapause induction. Hart et al. (2002) mentioned that the US strain of *N. californicus* survived over three months without entering diapause outdoors in winter under sheltered condition in UK, where the temperature did not fall below 0°C. As the Korean strain is a non-diapausing one, the establishment of this predator in the cooler mainland is very important. In the temperate zones, overwintering strategy of both the non-diapause and diapause phytoseiid mites is the major constraint for the successful biological control of the pest mites. So, the cold hardiness of *N. californicus* compared to *N. womersleyi* was measured in the fourth part of the study to verify the establishment of the Korean *N. californicus* in the mainland without diapause condition.

POST-FIRE COMMUNITY OF ORIBATID MITES (ACARI: ORIBATIDA) AT MOUNTAIN SITES WITH DIFFERENT BURN SEVERITIES IN SAMCHEOK, KOREA

Jiwon Kim, MSc 2011

Department of Bioresource Sciences, Andong National University

Supervisor: C. Jung
cjung@andong.ac.kr

Post-fire community of oribatid mites was studied in Samcheok-si, Gangwon province. Study sites were arranged based on the burn severity and subsequent recovery rate in a year after the fire. Soil samples were collected 8 times from 2005 to 2007. The study focused on abundance of major soil microarthropods in relation to the environmental condition and on analysis of oribatid mites community (abundance, species richness, diversity and evenness, similarity, dominant species, MGP analysis). Abundance of soil microarthropods was highest in unburned control sites and decreased as the burn severity increased. Among the microarthropod groups, abundances of Gamasida, Oribatida and Collembola were significantly different among the sites. The soil moisture contents and organic matter contents were lower in sites with higher burn severities. However, soil pH values were in reverse trend. The abundances of oribatid mites and collembolans were positively correlated with the soil moisture contents and the organic matter contents but negatively to the soil pH. Abundance of gamasid mites, which are the predators in microarthropod food web in soil, was positively correlated to those of its preys, oribatid mites and collembolans.

From this study, four families, 58 genus, 123 species, and the oribatid mites species richness and abundance decreased as the burn severity increased. Diversity index of control site was higher than all other sites and decreased as the burn severity increased. Similarity index between control and C2 sites was highest among

the sites and cluster analysis showed control and C2 as closely related followed by T3, T2 and T1 respectively. MGP-I analysis revealed oribatid mites of all sites as GP type. MGP-II analysis showed control as G type and all other sites as GP type.

COMPARISON OF GAMASID (ACARI: MESOSTIGMATA) COMMUNITIES AT MOUNTAIN SITES WITH DIFFERENT BURN SEVERITIES IN SAMCHEOK, KOREA

Eunsun Keum, MSc 2011

Department of Bioresource Sciences, Andong National University

Supervisor: C. Jung
cjung@andong.ac.kr

This study investigated the soil dwelling gamasid mite community during 8-9 years after a massive mountain fire which occurred in April 2000. The post-fire study was conducted from 2008 to 2009 at mountain sites in Imwon-ri and Yang-ri, Samcheok, Korea. Study sites were arranged based on the burn severity and subsequent ecosystem; ranging from unburned control to heavily burned site in sequence of Con, T3, C2, T2 and T1. Soil samples were collected 5 times from 2008 to 2009.

A total of 11 families, 44 species and 943 individuals were found. Abundance and species richness of soil gamasid mites was high in less fire-impacted sites (C2 and T3) including unburned control site (Con) than in severely impacted sites (T1 and T2). Abundance of the latter was about 30% of the former while the species richness of the latter was about 70% of the former.

Shannon (H') index also support the recovery of the gamasid mites from the less burned sites. However, the similarity and cluster analysis showed that the community structures of the gamasid mites from the fire inflicted sites were separated from the unburned control site.

Among the dominant species of gamasid mite, *Holaspina alstoni* and *H. communis* were found from all sites while *Hypoaspis kargi* was only dominant from T1 and T2, and *Asca aphidioides* was only in Con. Interestingly, *Rhodacarus deniculatus* was dominant in T1, T2 and Con. Species in the Genus *Holaspina* comprised 40-84% of the total abundance of gamasid mites indicating this group may play the key role in soil food web. Some detail biological information was pursued in this group. After 8-9 years from the massive fire, it was noted that the soil gamasid mite communities were recovered from the less severely burned sites but not from the severely burned sites.

DETERMINATION OF CRIMEAN CONGO HEMORRHAGIC FEVER VIRUS (CCHFV) IN IXODID TICKS FROM HUMAN AND HEDGEHOGS IN TOKAT AND AMASYA USING MOLECULAR METHODS

Mustafa Ekici, MSc 2011

Department of Biology, Graduate School of Natural and Applied Sciences, Gaziosmanpasa University
mekici060@gmail.com

Supervisor: A. Bursali

Ticks are mandatory blood sucking ectoparasites carrying and transmitting numerous deadly pathogens to animals and human. In the present study, presence of Crimean Congo Hemorrhagic Fever Virus

(CCHFV) in hard ticks (Acari: Ixodidae) infesting hedgehogs and humans from Tokat and Amasya, respectively, using Revers Transcription-Polymerase Chain Reaction (RT-PCR) by RealTime RT-PCR. As a results, presence of CCHFV was detected in a *Hyalomma aegyptium* tick from a hedgehog in Tokat and in 7 out of 25 *Hyalomma* tick pools (%28) collected from humans in Amasya. Results indicate that hard ticks infesting hedgehog and humans in Tokat and Amasya posses CCHFV and might have an important role for the transmission of CCHFV to humans.

A FAUNISTIC STUDY OF HARD TICKS (ACARI: IXODIDAE) OF AMASYA PROVINCE

Adem Keskin, MSc 2010

Department of Biology, Graduate School of Natural and Applied Sciences, Gaziosmanpaşa University
biyoogadem@gmail.com

Supervisor: A. Bursali

Ticks are important ectoparasites as a major biological vector of various pathogens and playing roles in transmission of diseases to humans and animals. The goal of the present study was to determine the hard tick fauna of humans in Amasya province. A total of 2528 hard tick samples collected from humans applied to health clinics and 70 ticks from cattle, sheep and tortoises during 2008-2009 were studied. Out of 2598 ticks, 1995 adult tick samples were identified to species level by using well-known tick identification keys. As a result, 25 ixodid tick species from 5 genera were identified. *Ixodes redikorzevi*, *I. ricinus*, *I. hexagonus*, *Dermacentor daghestanicus*, *Hyalomma rufipes*, *H. isaaci*, *H. turanicum*, *Haemaphysalis erinacei*,

Rhipicephalus turanicus were new records for Amasya tick fauna. These results indicate that the species diversity of tick fauna of Amasya province is very high.

DETERMINATION OF TICK-BORNE ENCEPHALITIS VIRUS IN IXODES TICKS (ACARI: IXODIDAE) FROM TOKAT AND ORDU VICINITY

Tünay Karan, MSc 2010

Department of Biology, Graduate School of Natural and Applied Sciences, Gaziosmanpaşa University
biyo_tunay@hotmail.com

Supervisor: Ş. Tekin

Tick-borne encephalitis virus (TBEV) is a member of the genus Flavivirus in the family of Flaviviridae. TBE is an endemic disease from Europe to Asia. TBE is an infectious disease involving the central nervous system, which may result in death. There are three major forms of the disease: Central European, Far Eastern and Siberian subtypes. TBEV is transmitted to humans by ixodid tick species such as *Ixodes ricinus*, *Ixodes persulcatus* and *Haemaphysalis concinna*. There is no evidence for the presence of TBEV in ticks species in Turkey. In the present study, presence of TBEV in hard ticks from Tokat and Ordu and Fatsa provinces were tested using revers transcriptase-polimerase chain reaction (RT-PCR). According to RT-PCR results, no TBEV was detected in ticks collected in this study. This result indicated that hard ticks of the region tested did not harbor TBEV and have no potential for transmission of TBEV.

BOOKS

Denmark, H.A. and Evans, G.A. (2011) Phytoseiidae of North America and Hawaii (Acari: Mesostigmata). Indira Publishing House, West Bloomfield, Michigan, USA; ISBN: 0-930337-26-3.

Prasad, V. (2011) Phytoseiidae and Otopheidomenidae of the world (Acari: Mesostigmata): A Self Study Guide. Indira Publishing House, West Bloomfield, Michigan, USA; ISBN: 0-930337-28-X.

Radovsky, F.J. (2010) Revision of the genera of the parasitic mite family Mycro-nyssidae (Mesostigmata: Dermanys-soidea) of the world). Indira Publishing House, West Bloomfield, Michigan, USA; ISBN 0-930337-25-5.

JOURNALS

Acarologia

A call for papers by **S. Kreiter**, Editor-in-Chief of *Acarologia*
kreiter@supagro.inra.fr

Dear colleagues,

We are now processing the Volume 51 for 2011 (first issue appeared end of March 2011) and we still need good papers on various topics concerning mites and ticks.

Please, send us your excellent papers!
<http://www1.montpellier.inra.fr/CBGP/acarologia/>

Persian Journal of Acarology

A call for papers by **A. Saboori**, Chief Editor of the Persian Journal of Acarology

Dear colleagues,

The Persian Journal of Acarology is an international journal of the Acarological Society of Iran and will be published semi-annually and will publish original research work on a wide variety of acarological subjects including mite and tick behavior, biochemistry, biology, control, ecology, evolution, morphology, physiology, systematics and taxonomy. To ensure continued quality of journal content, manuscripts submitted to Persian Journal of Acarology are critically reviewed up to seven reviewers, including outside reviewers and Editorial Board members, who are specialists on the subject matter. The language of choice for Persian Journal of Acarology is English. Persian Journal of Acarology has a distinguished editorial board composed of leading Acarology researchers from around the world. A current list of the journal's editors can be found at <http://acarology.ir/editors.htm>.

We kindly invite you to submit your manuscript(s) to pja@acarology.ir for publication. For more information, please see <http://acarology.ir/journal.htm>.

Acarines

A. Rasmy informs that the 5th volume of *Acarines*, 2011, will be released shortly.

The title of the lead article of this volume is "Entomological and Acarological evidence of bloodstain patterns in forensic investigation " by Aly Rasmy.

LINKS

Z.-Q. Zhang informs that “Mites injurious to economic plants” by **Jeppson L.R., Keifer H.H. and Baker, E.W.** (1975), University of California Press, is freely accessible at

http://books.google.com/books?id=RIE1_jsBtbAC&printsec=frontcover&source=qbsatb#v=onepage&q&f=false

P.B. Klimov informs that their monograph on chaetodactylid mites is available for download via the following link:

http://insects.ummz.lsa.umich.edu/acari/staff/pklimov/PDF/Klimov&OConnor2008_Chaetodactylidae.pdf. The size of the file is 42.8 Mb.

Klimov, P.B. and OConnor, B.M. (2008). Morphology, Evolution, and Host Associations of Bee-Associated Mites of the Family Chaetodactylidae (Acari: Astigmata), with a Monographic Revision of North American Taxa. Miscellaneous Publications, Museum of Zoology, University of Michigan 199. 243 pp.

**TICKS AND TICK-BORNE PATHOGENS
CONFERENCE (TTP7)**

August 28 to September 2, 2011
Zaragoza, Spain

<http://www.unizar.es/ttp7>

**7th SYMPOSIUM OF THE EUROPEAN
ASSOCIATION OF ACAROLOGISTS**

July 9 to 13, 2012
Vienna, Austria

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

**3RD MEETING OF THE IOBC/WPRS WG
“INTEGRATED CONTROL OF PLANT-
FEEDING MITES”**

September 13 to 16, 2011
Český Krumlov, Czech Republic

<http://www.iobc-icpfm2011.cz/index.php/iobc/2011>

**14th INTERNATIONAL BEHAVIORAL
ECOLOGY CONGRESS**

August 12 to 18, 2012
Lund, Sweden

<http://www.isbe2012lund.org/>

**IOBC/WPRS WG MEETING “INTE-
GRATED CONTROL IN PROTECTED
CROPS, TEMPERATE CLIMATE”**

September 18 to 22, 2011
Nr Winchester, Hampshire, UK

<http://www.aab.org.uk>

**24th INTERNATIONAL CONGRESS OF
ENTOMOLOGY**

August 19 to 25, 2012
Daegu, South Korea

<http://www.ice2012.org/>

8. MILBENKUNDLICHES KOLLOQUIUM

September 22 to 25, 2011
Tübingen, Germany

<http://www.oribatida.com/milbenkollog2011/>

Peter Schausberger + Stefan Peneder

Institute of Plant Protection, Department of
Applied Plant Sciences and Plant Biotech-
nology, University of Natural Resources
and Life Sciences

Peter Jordanstrasse 82
1190 Vienna, Austria

Ph + 43 1 47653 3361
Fax +43 1 47654 3359

auraacnews@boku.ac.at
<http://www.dapp.boku.ac.at/ips.html>
<http://auraac.boku.ac.at>

Vienna, May 2011