Institute of Zoology
Slovak Academy of Sciences

2012-2015

Departments:

- Animal Ecology
- Medicinal Zoology
- Molecular Physiology
- Biocontrol and Biotherapies

Ecology, behavior and monitoring of climatic changes

Sytematics, phylogeny and bionomy of insects and mites

Systematic Zoology and Ecology

HOI H., KRIŠTOFÍK J., DAROLOVÁ A. Experimentally simulating paternity uncertainty: immediate and long-term responses of male and female Reed Warblers *Acrocephalus scirpaceus*. **PLoS ONE**, 2013, vol. 8., 4, e62541. (IF 3.73)

NOVIKMEC M., SVITOK M, KOČICKÝ D, ŠPORKA F, BITUŠÍK P. Surface Water Temperature and Ice Cover of Tatra Mountains Lakes Depend on Altitude, Topographic Shading, and Bathymetry. **Arctic, Antarctic, and Alpine research**, 2013, vol. 45, no. 1, p. 77-87. (IF 1,43)

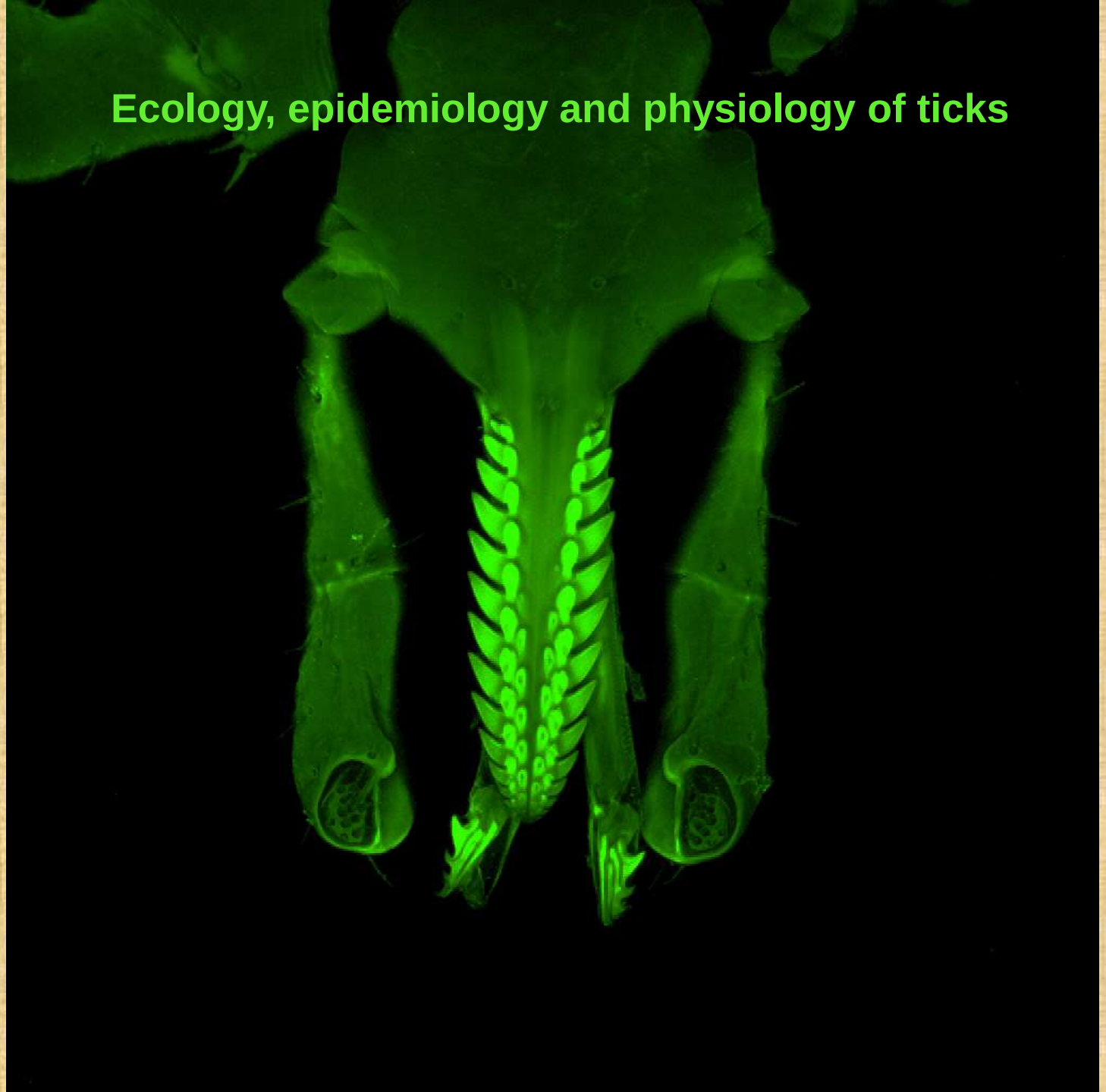
GREENWALT D.E., VIDLIČKA Ľ. Latiblattella avita sp. nov. (Blattaria: Ectobiidae) from the Eocene Kishenehn Formation, Montana, USA. **Palaeontologia electronica**, 2015, vol. 18, 16A, 9 pp. (IF 2.08)

SEMELBAUER M. - KOZÁNEK M. Immature stages of Meiosimyza Hendel 1925 and related genera (Diptera, Lauxaniidae). **Organisms Diversity & Evolution**, 2014, vol. 14 iss. 1, p. 89-103. (IF 3.36)

PROKOP P., MAXWELL M.R. (2012) Gift-carrying in the spider Pisaura mirabilis: nuptial gift contents in nature and effects on male running speed and fighting success. Animal Behaviour, 83, 1395-1399. (IF 3,5)

MAŠÁN P, HALLIDAY B. Review of the mite family Pachylaelapidae (Acari: Mesostigmata). **Zootaxa,** 2014, vol. 3776, p. 1-66.

Ecology, epidemiology and physiology of ticks



Ticks transmit numerous dangerous pathogens

Tick-borne encephalitis virus, Borrelia, Rickettsia, Babesia, Anaplasma

Erythema migrans caused by *Borrelia burgdorferi*

Medical Zoology and Ecology

Melničáková J, Derdáková M, Barák I. A system to simultaneously detect tick-borne pathogens based on the variability of the 16S ribosomal genes. **Parasites & Vectors**, 2013, vol. 6:269, p:1-12 (IF 3,2)

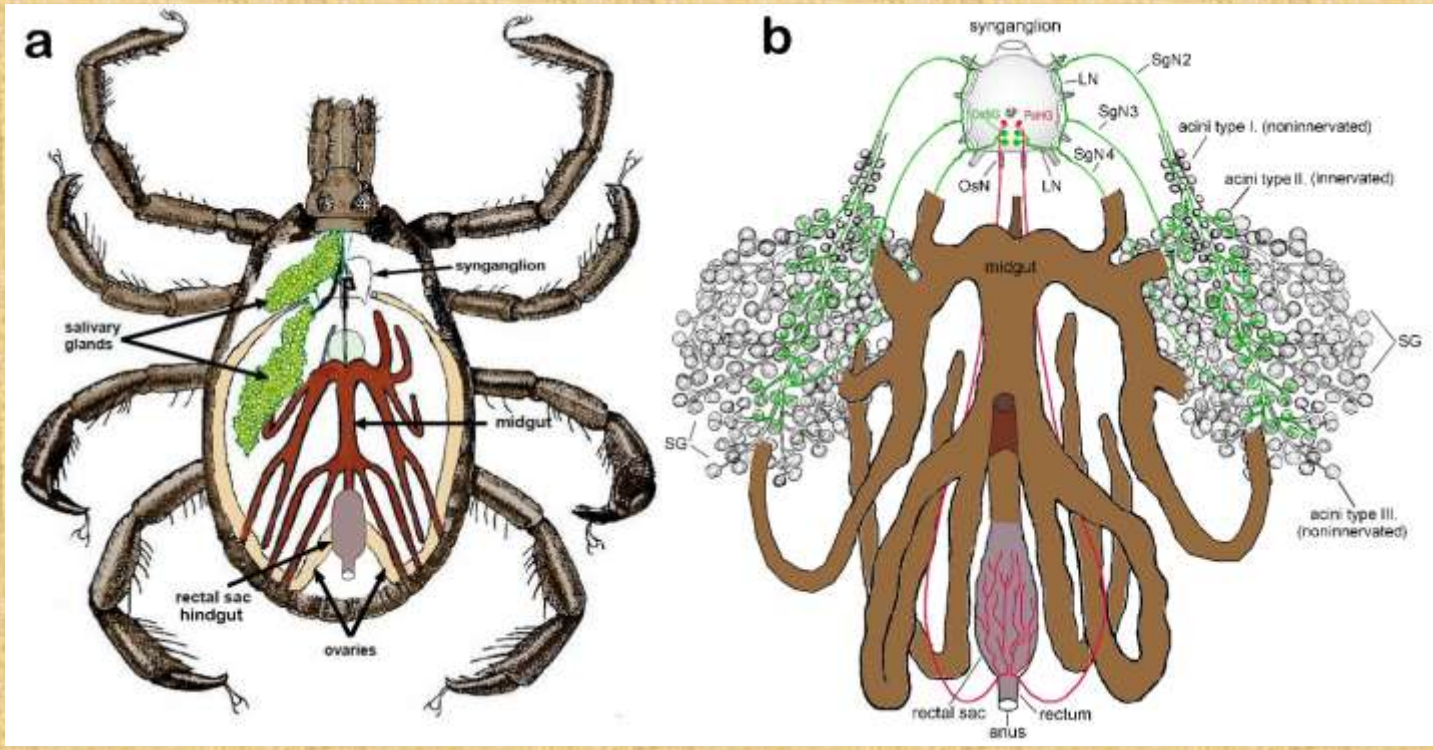
Baráková I, Derdaková M, Carpi G, Rosso F, Collini M, Tagliapietra V, Ramponi C, Hauffe H, Rizzoli A. Genetic and ecologic variability among Anaplasma phagocytophilum strains, Northern Italy. **Emerging Infectious Diseases**, 2014, vol. 20, p. 1082-1085**.** (**IF 7,32**)

Derdáková M, Václav R, Pangračová-Blanárová L, Selyemová D, Kočí J, Walder G, Špitálska E. Candidatus Neoehrlichia mikurensis and its co-circulation with Anaplasma phagocytophilum in Ixodes ricinus ticks across ecologically different habitats of Central Europe. **Parasites & Vectors,** 2014, vol. 7, p.160. (IF 3,25)

Miťková K., Berthová L., Kalúz S., Kazimírová M., Burdová L., Kocianová E. 2015. First detections of *Rickettsia helvetica* and *R. monacensis* in ectoparasitic mites (Laelapidae and Trombiculidae) infesting rodents in south-western Slovakia. **Parasitology Research** 114: 2465–2472. (IF 2,64)

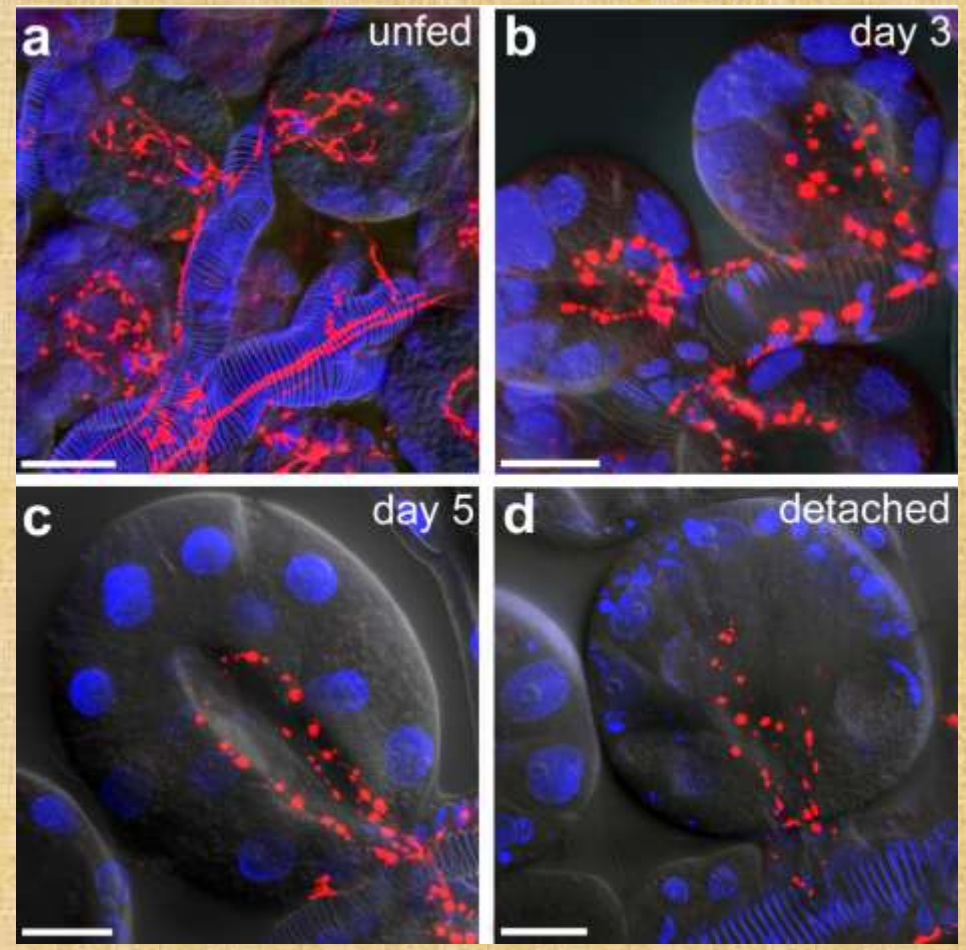
Vayssier-Taussat M., Kazimirova M., Hubalek Z., Hornok S., Farkas R., Cosson J.-F., Bonnet S., Vourch G., Gasqui P., Mihalca A.D., Plantard O., Silaghi C., Cutler S., Rizzoli A. 2015. Emerging horizons for tick-borne pathogens: from the ‘one pathogen–one disease' vision to the pathobiome paradigm (Review). **Future Microbiol.** 10: 2033–2043. (IF 4,3)

Salivary glands and gut are reservoirs of pathogens



Roller et al., 2015

Neuropeptide release from axon terminals of the salivary glands during tick feeding



Roller et al., 2015

Molecular Physiology / Biocontrol and Biotherapies

Šimo L, Žitňan D, Park Y (2012). Neural control of salivary glands in ixodid ticks. **J. Insect Physiol.** 58:459-66.

Šimo L, Sonenshine DE, Park Y, Žitňan D (2014) Nervous and sensory systems: structure, function, genomics and proteomics. In: Sonenshine DE, Roe RM (eds) **Biology of ticks**. Oxford Univ Press, pp. 309–367.

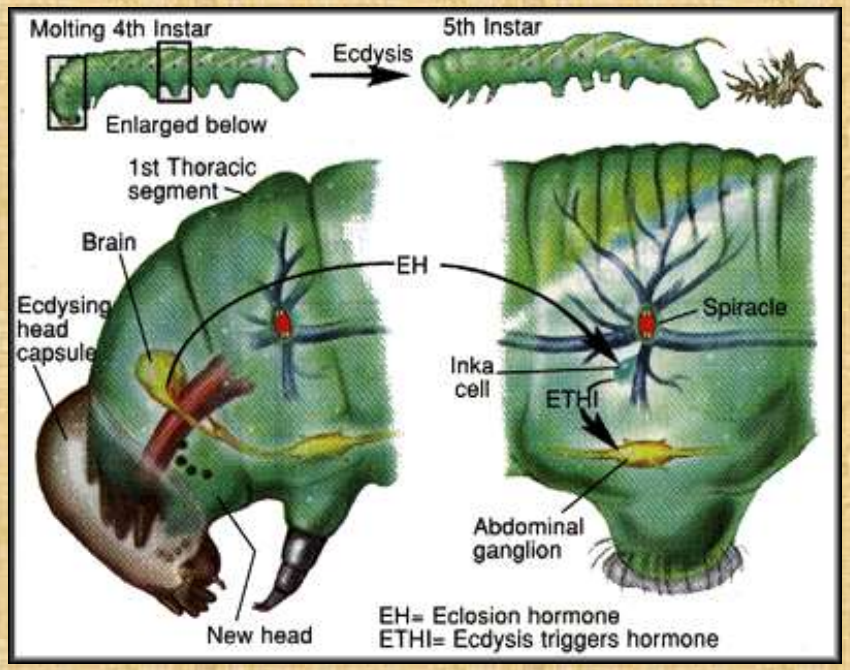
Roller L, Šimo L, Mizoguchi A, Slovák M, Park Y, Žitňan D. (2015). Orcokinin-like immunoreactivity in central neurons innervating the salivary glands and hindgut of ixodid ticks. **Cell Tissue Res**. 360:209-22. (IF 3,56)

Pekáriková D., Rajská P., Kazimírová M., Pecháňová O., Takáč P., Nuttall P.A. (2015) Vasoconstriction induced by salivary gland extracts from ixodid ticks. **International Journal for Parasitology**, 45, 879–883. (IF 3.872)

Development of diagnostic tools for detection of tick-borne pathogens and approaches for preparation of anti-tick vaccines. EU grant, OPVV (ITMS-26240220044)

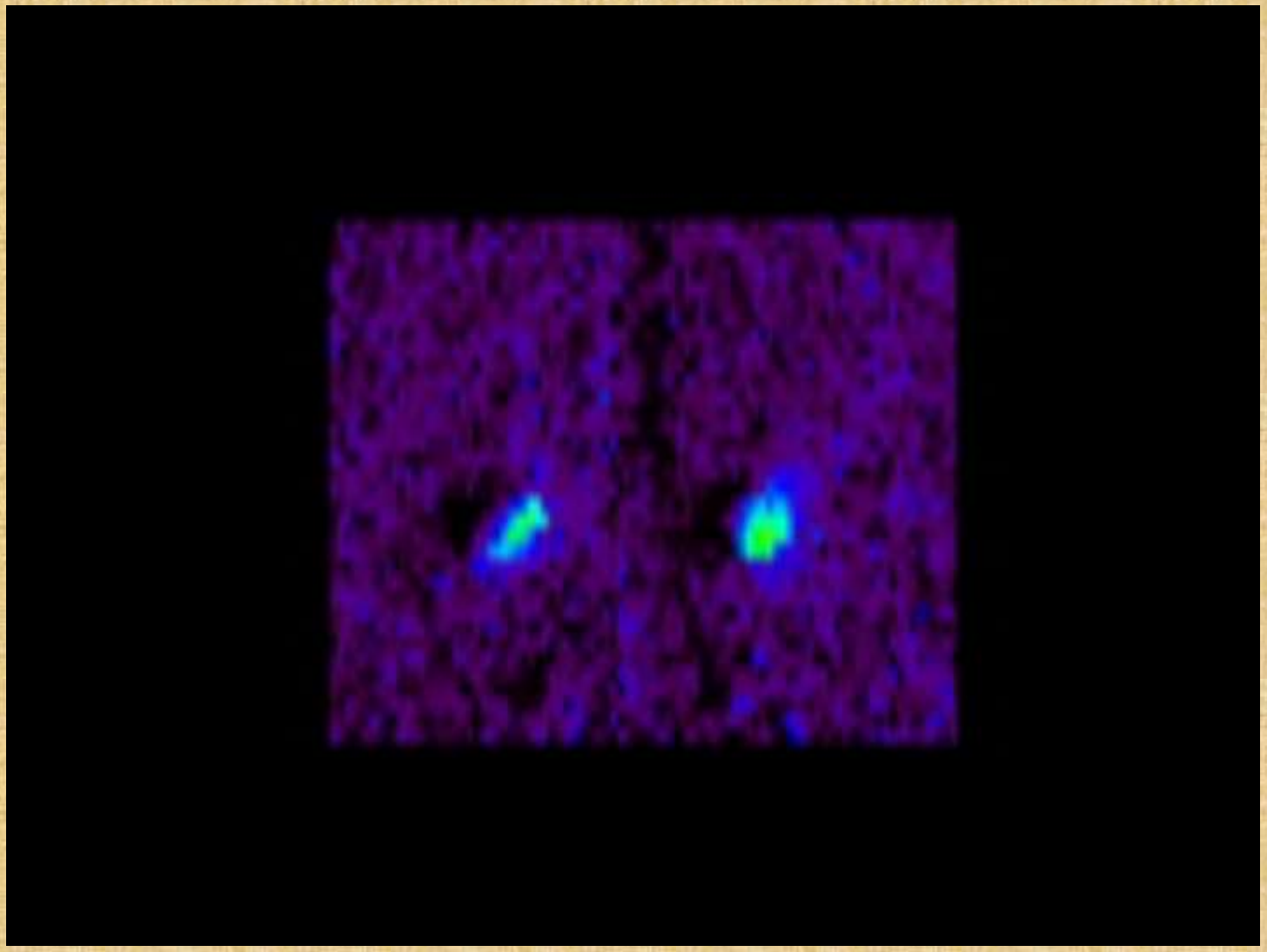
Molecular Physiology

Žitňan D., Kingan T.G., Hermensman J.L. and Adams M.E. (1996). Identification of ecdysis-triggering hormone from an epitracheal endocrine system. ***Science* 271**, 88-91.



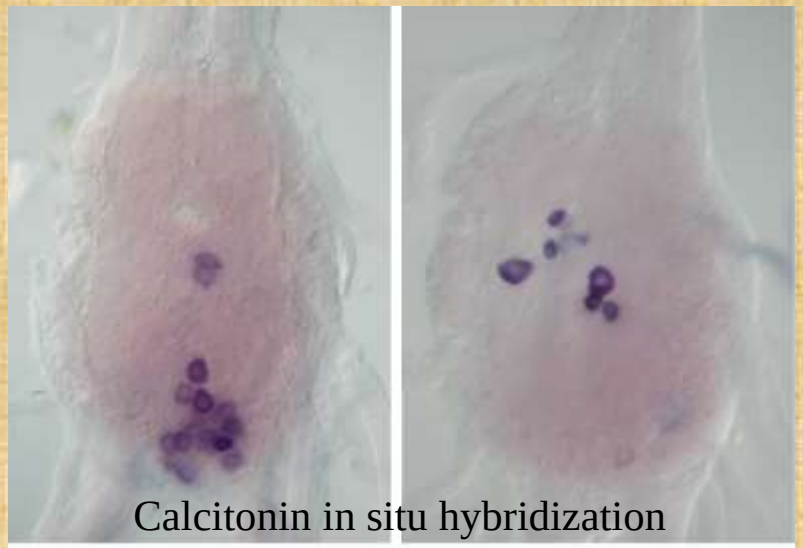
Truman JW. (1996). Ecdysis control sheds another layer. ***Science* 271**, 40-41.

Calcium imaging of neurons in the fly brain



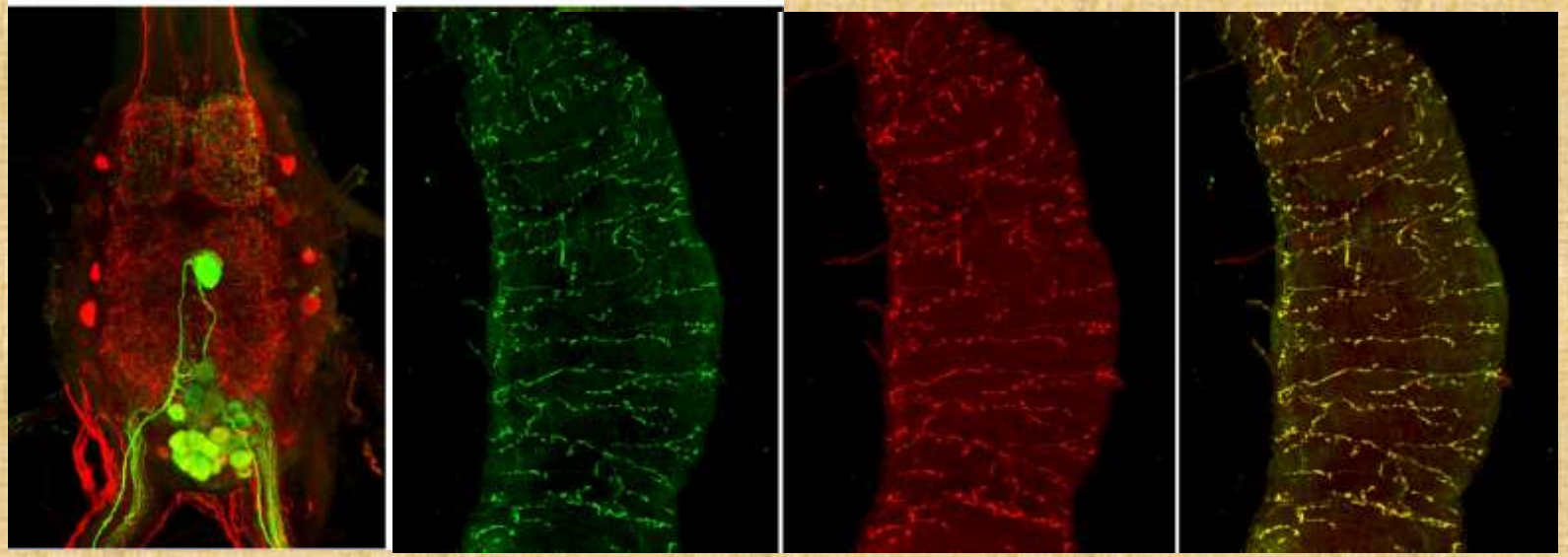
Innervation of the accessory glands by male-specific cluster of neurons

male female



Calcitonin in situ hybridization

Reproduction of the silkmoth, *Bombyx mori*



Abd. ganglion

The male accessory gland

Functions of neuropeptides and receptors of the silkmoth *Bombyx mori* and fruitfly *Drosophila melanogaster*

Žitňan D. and Adams M.E. (2012). Neuroendocrine regulation of ecdysis. **Insect Endocrinology** (L.I. Gilbert, ed.), pp. 253-309.

Jiang H, Ikhagva A, Daubnerová I, Chae H, Šimo L, Jung S-H, Yoon Y-K, Seong J-Y, Žitňan D, Park Y, Kim Y-J (2013). Natalisin, a new tachykinin-like signaling system, regulates sexual activity and fecundity in insects. **Proc. Nat. Acad. Sci. USA** 110(37): E3526-34 (IF 10)

Cho K-H, Daubnerová I, Park Y, Žitňan D, Adams ME (2014). Secretory competence in a gateway endocrine cell conferred by the orphan nuclear receptor βFTZ-F1 enables stage-specific ecdysone responses throughout development in *Drosophila*. **Dev. Biol.** 385, 253-262. (IF 4)

Oh Y., Yoon S-E., Zhang Q., Chae H-S., Daubnerová I., Shafer Orie T., Choe J., Kim Y-J. A homeostatic sleep-stabilizing pathway in Drosophila composed of the sex peptide receptor and its ligand, the myoinhibitory peptide. **PLoS Biol**, 2014, vol. 12, iss.10, e1001974. (IF 11.77)

Lee K-M, Daubnerová I, R. Isaac E, Zhang C, Choi S, Chung J, Kim Y-J (2015) A Neuronal Pathway that Controls Sperm Ejection and Storage in Female Drosophila. **Current Biology** 25, 790–797 (IF 9.57)

Roller L, Čižmár D, Gáliková Z, Bednár B, Daubnerová I, Žitňan D (2016) Molecular cloning, expression and identification of the promoter regulatory region for the neuropeptide trissin in the nervous system of the silkmoth *Bombyx mori*. **Cell Tiss Res** 364(3):499-512 (IF 3.7)

Biocontrol and Biotherapies

Tse-tse fly biology

1. **Obligate blood feeder**
   Requires microbial symbionts to produce specific micronutrients.

2. **Vector of African trypanosomiasis**
   Cause sleeping sickness of animals and humans.

3. **Viviparous** Develops one larva during each gonotrophic cycle (every 10 days). Each female produces only 8-10 offspring.

Sterile male flies are used for biocontrol of African tsetse populations.

Identification of milk and reproductive genes

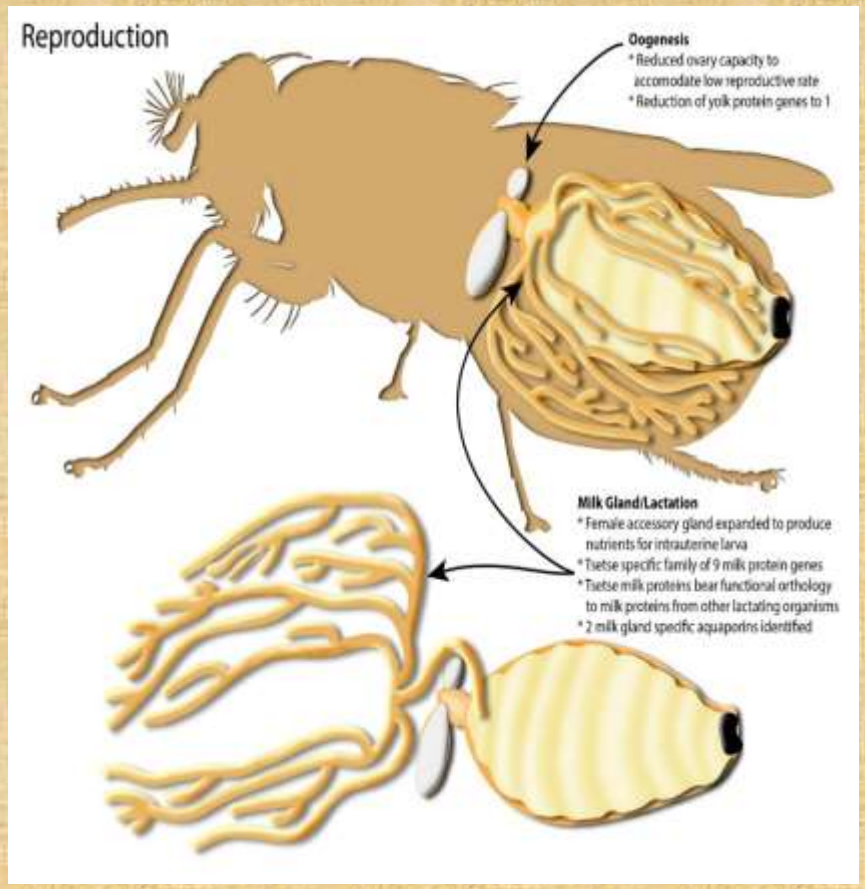
Reduced yolk genes
Only 1 gene from the yolk protein gene family

Tsetse Milk Proteins

12 Milk proteins
Transferrin
Lipocalin
Acid Sphingomyelinase
Novel 9 gene family

10 Aquaporin genes

Milk gland-specific aquaporin



International Glossina Genome Initiative (2014) Genome Sequence of the Tsetse Fly (Glossina morsitans): Vector of African Trypanosomiasis. ***Science*** 344: 380-386

International Glossina Genome Initiative (2014) Genome Sequence of the Tsetse Fly (Glossina morsitans): Vector of African Trypanosomiasis. ***Science*** 344: 380-386 (IF 31.477)

Michalkova V, Benoit JB, Weiss BL, Attardo GM, Aksoy S (2014) Vitamin B-6 Generated by Obligate Symbionts Is Critical for Maintaining Proline Homeostasis and Fecundity in Tsetse Flies. ***Applied and Environmental Microbiology*** 80: 5844-53 (IF 3.952)

Michalkova V, Benoit JB, Attardo GM, Medlock J, Aksoy S (2014) Amelioration of reproduction-associated oxidative stress in a viviparous insect is critical to prevent reproductive senescence. ***PLoS One*** 9: e87554 (IF 3.73)

Attardo GM, Benoit JB, Michalkova V, Patrick KR, Krause TB, Aksoy S (2014) The Homeodomain protein Ladybird Late Regulates Synthesis of Milk Proteins during Pregnancy in the Tsetse Fly (*Glossina morsitans*). ***PLoS Neglected Tropical Diseases*** 8:e2645 (IF 4.57)

Benoit JB, Hansen IA, Attardo GM, Michalkova V, Mireji PO, Bargul JL, Drake LL, Masiga DK, Aksoy S (2014) Aquaporins are critical for provision of water during lactation and intrauterine progeny hydration to maintain tsetse fly reproductive success. ***PLoS Neglected Tropical Diseases*** 8:e2517 (IF 4.57)

Benoit JB, Attardo GM, Michalkova V, Krause TB, Bohova J, Zhang Q, Baumann AA, Mireji PO, Takáč P, Denlinger DL, Ribeiro JM, Aksoy S (2014) A novel highly divergent protein family identified from a viviparous insect by RNA-seq analysis: a potential target for tsetse fly-specific abortifacients. ***PLoS Genetics*** 10: e1003874 (IF 8.517)

Benoit JB, Attardo GM, Baumann AA, Michalková V, Aksoy S. Adenotrophic viviparity in tsetse flies: Potential for population control and as an insect model for lactation. ***Annual Review of Entomology*** 2015, vol. 60, p. 351–371. (IF 13.7)

Identification and functions of genes encoding novel proteins essential for lactation, reproduction, immune processes and chemosenzory reception. Discovery of chromosomal integration of bacterial symbionts.

Maggot therapy and identification of bioactive compounds from the salivary glands and gut of the fly *Lucilia serricata*

Valachová I., Bohová J., Pálošová Z., Takáč P., Kozánek M., Majtán J. Expression of lucifensis in *Lucilia sericata* medicinal maggots in infected environments. ***Cell and Tissue Research***, 2013, 353, 165-171. (IF 3.67)

Valachová I., Takáč P., Majtán J. Midgut lysozymes of *Lucilia sericata* – new antimicrobials involved in maggot debridement therapy. Insect Molecular Biology, 2014, vol. 23, no. 6, p. 779–787. (IF 3)

Čičková, H., Kozánek, M., Takáč, P. 2015. Growth and survival of bowfly Lucilia sericata larvae under simulated wound conditions: implications for maggot debridement therapy. *Medical and Veterinary Entomology* 29:416-424.

Čičková, H., Newton, G.L., Lacy, R.C., Kozánek, M. 2015. The use of fly larvae for organic waste treatment. *Waste Management* 35:68-80.

EU and other international projects 2012-2015

2 projects Centre of excelence
6 projects EU Structural Funds OPVV
1 project National Institutes of Health USA (NIH)
1 project 7. FP (EDENext)
1 project INTERREG
6 projects IAEA - International Atomic Energy Agency

Future plans and directions

Obtain sufficient funding from local grant agencies (APVV, Structural funds) and international grants from EU, USA, Asia

Hire young motivated and independent PhD students and postdocs

Internationalize the research staff

Maintain and develop new collaborations with other labs

Utilize and develop advanced techniques and approaches

Constantly upgrade equipment

New postdocs (age 30-36) hired in 2015-16:

David Wildridge
Ingrid Sveráková-Škodová
Barbora Mangová
Emo Procházka
Nikoleta Janošková
Yulia Didyk
Jasna Kraljik
Zuzana Hamšíková
Jana Bohová (maternity leave)
Daniela Kalaninová (maternity leave)
Matej Kautmann (will be hired in 2017)
Renata Holubek (will be hired in 2017)

Medical Sciences

Institutes	CC publications		CC publ. per person	Citations in WOS		# 7RP EÚ	Horizon 2020	*# scientists*	Budget	# PhP students	Patents
Neurobiology	17/0	18 834	0,7	376/0	16	A0/B0	A1/B2	23,4	320 183	9/8	-
Neuroimunology	8/0	37 381	0,4	292/0	15	-	-	19,5	299 055	14/10	-
Endocrinology	35/0	17 920	0,9	960/0	25	A0/B1	A0/B2	38,8	627 189,88	25/14	-
Pharmacology	29/0	17 960	0,8	588/0	17	-	A1	33,8	520 826	16/15	0/1
Oncology	27/0	30 586	0,5	502/0	10	-	-	49,5	825 824	17/14	-
Mol Fyziol Gen	13/0	37 491	0,4	438/0	13	A0/B1	-	32,7	487 393	11/10	-
Norm Patol Physiology	21/0	15 760	0,8	402/0	16	-	A0/B8	25,5	330 966	14/9	-
Heart Research	7/0	33 782	0,36	233/0	12	-	-	19,2	236 476	10/10	0/1
Virology	40/10	23 197	0,7	1110/0	20	A0/B5	A0/B4	56,3	927 891,95	25/22	2/0

Biological and Chemical Sciences

Institutes	CC publications		CC publ. per person	Citations in WOS		7RP EÚ	Horizon 2020	# scientists	Budget	# PhP students	Patents
Chemistry	61/0	18 912	0,9	1477/2	23	A1/B3	A0/B6	65	1 153 634	23/19	-
Anorganic Chemistry	45/0	15 622	0,8	1262/54	22	A0/B2	A0/B1	56	703 018	13/9	-
Molecular Biology	29/0	21 562	0,68	810/52	19	A0/B1	A0/B2	42,5	625 312	15/15	-
Polymers	66/0	9 560	1,38	1451/0	30	A0/B2	A0/B9	47,7	630 956	17/15	2/5
Zoology	61/0	8 150	**2,7**	610/0	27	0/1	0/2	22,6	497 201	15/13	-

	Institute of Zoology				Research fields						
	2012	2013	2014	2015	Zoology	Biochemistry & Molecular Biology	Physiology	Parasitology	Entomology	Forestry	Ornithology
No. of papers	51	56	71	35							
Median IF	1,70	1,29	1,81	**2,32**	1,02	2,67	2,34	1,65	0,99	1,05	0,70

Acknowledgements, Collaborations

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Michael E. Adams, Univ California, Riverside, USA
Yoonseong Park, Kansas Univ, USA
Young-Joon Kim, Gwangju Univ, Korea
Naoki Yamanaka, Tokyo Univ, Japan (now at Univ California, Riverside, USA)
Akira Mizoguchi, Nagoya Univ, Japan
Yoshiaki Tanaka, NIAS, Tsukuba, Japan