# Newsletter of the Russian Society of Nematologists

# Abstracts of the Eleventh International Symposium of the Russian Society of Nematologists (Russia, Cheboksary, 6-11 July, 2015)

**BELOVA E.B., KOLSANOVA R.R., SHAGIDULLIN R.R., KALINNIKOVA T.B. & GAINUTDINOV M.KH. Synergism in toxic action of agonists of nicotinic acetylcholine receptors and acetylcholinesterase inhibitors on the organism of soil nematode *Caenorhabditis briggsae*.**

It is known that toxic effects both of acetylcholinesterase (ACh-esterase) inhibitors and agonists of nicotinic acetylcholine receptors (nAChRs) are a consequence of hyperactivation of nAChRs in neurons and muscles. However, our experiments with soil nematode *Caenorhabditis briggsae* showed the existence of synergism in toxic effects of ACh-esterase inhibitor aldicarb and agonists of nAChRs levamisole and nicotine. This synergism was revealed either in enhancement of aldicarb toxic effect by low concentrations of nicotine and levamisole, which are subthreshold for worms' paralysis or in enhancement of levamisole or nicotine toxic effects by low concentrations of aldicarb. Agonist of muscarinic acetylcholine receptors (mAChRs) arecoline caused a strong rise of levamisole toxicity for *C. briggsae*. Therefore, the increase of levamisole toxic effect by low aldicarb concentrations can be explained by modulation of nAChRs' sensitivity by activation of mAChRs by a slight rise in acetylcholine level due to non-toxic slight ACh-esterase inhibition. On the other hand, the increase of aldicarb toxicity by low concentration of levamisole or nicotine can be the result of stimulation of acetylcholine release by activation of nAChRs in neurons if sensitivity of neuronal nAChRs is higher than that of muscle mAChRs. Synergism in toxic effects of aldicarb and levamisole supposes the possible efficiency of joint use of ACh-esterase inhibitors and agonists of nAChRs for pest control in agriculture. – **Research Institute for Problems of Ecology and Mineral Wealth Use of the Tatarstan Academy of Sciences, Kazan, 420089, Russia; E-mail: mgainutdinov@gmail.com.**

**BELOVA E.B., KOLSANOVA R.R., SHAGIDULLIN R.R., KALINNIKOVA T.B. & GAINUTDINOV M.KH. The influence of environmental pH and temperature on the toxicity of pesticides – agonists of nicotinic acetylcholine receptors for organisms of soil nematodes *Caenorhabditis elegans* and *Caenorhabditis briggsae*.**

Free-living soil nematodes *Caenorhabditis elegans* and *Caenorhabditis briggsae* are convenient model organisms for evaluation of the effectiveness of nematicides. In experiments with *C. elegans* and *C. briggsae* we have shown that pH and temperature are physical environmental factors which have great influence on the toxicity of nematicides. The pH rise from 6.0 to 8.0 caused the increase of toxicity of levamisole and nicotine. In *C. briggsae* this increase was stronger than in *C. elegans*. However pH changes in the range 6.0-8.0 did not affect the toxicity of other nematicides – pyrantel and aldicarb. Not only the rise of pH but also a temperature rise from 22 to 30°C caused increased sensitivity of *C. elegans* and *C. briggsae* to toxic effects of levamisole, nicotine and aldicarb. Temperature rise up to 30°C caused a stronger increase in levamisole and nicotine toxicity at pH 7.0 or 8.0 than at pH 6.0. As a result of synergism in effects of pH changes and temperature on toxicity of levamisole and nicotine, their toxicity at pH 8.0 and 30°C was 12-15-fold higher than at usual conditions (pH 6.0 and 20-22°C). Since pH and temperature of soil are very variable factors, it is evident from our data that their influence on the effectiveness of nematicides used in pest control can be very significant. – **Research Institute for Problems of Ecology and Mineral Wealth Use of the Tatarstan Academy of Sciences, Kazan, 420089, Russia; E-mail: mgainutdinov@gmail.com.**

**BUTORINA N.N, UDALOVA ZH.V., KHASANOVA O.S., FILIMONOVA L.V., PETROSYAN V.G. & ZINOVIEVA S.V. Helminthological collections and prospects of their development.**

The huge amount of material accumulated in the worldwide collections of nematode parasites dictates a need to develop specialised information retrieval systems (IRS) and databases (DB). It is essential to elaborate new means of information storage, presentation and exchange, making worldwide access to collection material user-friendly, quick and easy. Creation of a local version of Microsoft Access-formatted DB and IRS of the Helminthological Museum RAS is an example of such developments in Russia. Tabular and screen data entry forms were developed. A complete species label includes 27 indices, providing most important information on location in the museum, systematics and biology of

local environment with food deficit. – **Research Institute for Problems of Ecology and Mineral Wealth Use of the Tatarstan Academy of Sciences, Kazan, 420089, Russia; E-mail: mgainutdinov@gmail.com.**

**KOSAKA H.[1] & KANZAKI N.[2] *Contortylenchus* sp. from the bark beetles, *Ips typographus* and *I. cembrae*, in Japan.**

*Ips* bark beetles usually propagate on declining trees. However, if they occur in large outbreaks, they attack and kill healthy trees. *Ips typographus* is a pest of the spruce, *Picea* spp., and *I. cembrae* is a pest of the larch, *Larix* spp., in Japan. In the exploration of their natural enemies, the parasitic nematode *Contortylenchus* species was found from *I. typographus* and *I. cembrae*. The mother nematodes from the bark beetles show dorsally curved body shape, which is the typical characteristic of the genus. The mother nematodes were found directly or encapsulated in the haemocoel of beetles. It is unclear whether this difference means the existence of two nematode species or is part of the developmental process. The prevalence of nematode in *I. typographus* and *I. cembrae* was about 50% and less than 10%, respectively. The sequences of D2-D3 rRNA gene of the nematodes are closely related with those of *Contortylenchus* sp. on the GenBank. In addition to *Contortylenchus* species, two species of tylenchid parasitic nematodes were found in *I. typographus*. – **[1]Kyushu Research Center, Forestry and Forest Products Research Institute, Kumamoto, 860-0862, Japan; E-mail: hkosaka@ffpri.affrc.go.jp. [2]Forest Microbiology Division, Forestry and Forest Products Research Institute, Tsukuba, 305-8687, Japan; E-mail: nkanzaki@ffpri.affrc.go.jp.**

**KUZNETSOV D.N.[1, 2], AKSYONOV A.P.[1], BURAKOVA A.V.[3], VERSHININ V.L.[3], KUZNETSOVA N.A.[4] & SPIRIDONOV S.E.[1] The results of molecular-phylogenetic analysis of Ostertagiinae nematodes (Rhabditida, Strongyloidea).**

The Subfamily Ostertagiinae Skrjabin & Schulz, 1937 comprises a wide group of nematodes that parasitise the abomasum of domestic and wild ruminants. An infection with the ostertagiinae nematodes can lead to loss of productivity and decrease of immunity. A substantial species variety within the subfamily complicates the taxonomy of the Ostertagiinae. The generally acknowledged concept of the Ostertagiinae taxonomy is still lacking. Several attempts of analysis of the phylogenetic relationships within the Ostertagiinae suggested the existence of two separated evolutionary lines within this taxonomic group. The aim of the present study was to assess the phylogenetic relationships of the Ostertagiinae based on ITS1+5.8S+ITS2 rDNA sequences analysis. The sequences deposited in NCBI GenBank and the newly obtained sequences were used. The ITS1+5.8S+ITS2 rDNA sequences of *Spiculopteragia spiculoptera* from *Capreolus pygargus* (Russian Far East), *Trichostrongylus vitrinus*, *T. axei*, *T. colubriformis* from *Capreolus capreolus* (Ryazan Region) and *Oswaldocruzia filiformis* (*Rana ridibunda*, Ural Region) were obtained for the first time. The phylogenetic analysis was performed with maximum parsimony, neighbour joining and maximum likelihood methods. The obtained results confirm a hypothesis of two independent lines within the Ostertagiinae. One phylogenetic line is represented by *Spiculopteragia* and *Mazamastrongylus* genera and another one comprises *Ostertagia*, *Orloffia*, *Teladorsagia* and *Marshallagia* (Support: RFBR 13-04-00341-a). – **[1]Center of Parasitology, A.N. Severtsov Institute of Ecology and Evolution, RAS, Moscow, 199071, Russia; E-mail: dkuznetsov@mail.ru. [2]K.I. Skrjabin All-Russian Institute for Fundamental and Applied Parasitology of Animal and Plants, Moscow, 117292, Russia. [3]Institute of Plant and Animal Ecology, UB RAS, Yekaterinburg, 620144, Russia. [4]Central Research Institute of Epidemiology, Moscow, 111123, Russia.**

**KUZNETSOV V.P., SLIVKO-KOLTCHIK G.A. & PANCHIN YU.V. Electrophysiological study of gap junctions in *Heterhabditis megidis* intestine cells.**

*Caenorhabditis elegans*, one of the most studied organisms in the world, has a rhythmic behaviour that is not controlled by the nervous system. During the defecation process, the action potential was generated about once per 50 s and spread through the gut cells, recruiting muscle cells into the process. Electrophysiological experiments in *C. elegans* are difficult because of the small cell size of this nematode. We suggest a new model organism *Heterhabditis megidis* that is closely related to *C. elegans* but has bigger gut cells suitable for electrophysiological methods. Our study demonstrates the important role of all-or-none hyperpolarization action potential in the nematode defecation rhythm. We reveal that this rhythm with a period up to 15 min is cell-autonomous. In addition, it was shown that gut cells are closely electrically coupled *via* gap junctions (Support: RFBR 15-04-06148-a). – **Institute for Information Transmission Problems, RAS, Moscow, 127051, Russia; E-mail: s.koltchik@gmail.com, empire.patr@gmail.com, ypanchin@yahoo.com.**