

РОССИЙСКАЯ АКАДЕМИЯ НАУК
СИБИРСКОЕ ОТДЕЛЕНИЕ
Иркутский научный центр

Объединенный совет научной молодежи

АКАДЕМИЯ НАУК МОНГОЛИИ
Министерство образования, науки и спорта Монголии

Аграрный университет Монголии

Ассоциация молодых ученых Монголии

**МАТЕРИАЛЫ МЕЖДУНАРОДНОЙ МОЛОДЕЖНОЙ
НАУЧНО-ПРАКТИЧЕСКОЙ КОНФЕРЕНЦИИ
«РОССИЯ – МОНГОЛИЯ»**

(г. Иркутск, Россия, 16-21 мая 2016 г.;
г. Улан-Батор, Монголия, 5-10 сентября 2016 г.)

Иркутск
Издательство Института географии им. В. Б. Сочавы СО РАН
2016

Материалы Международной молодежной научно-практической конференции «Россия – Монголия» (г. Иркутск, Россия, 16-21 мая 2016 г.; г. Улан-Батор, Монголия, 5-10 сентября 2016 г.). – Иркутск: Издательство Института географии им. В.Б. Сочавы СО РАН, 2016. – 244 с.

Международная молодежная научно-практическая конференция «Россия – Монголия» собрала более 200 участников, представлявших Прибайкальскую часть России (Иркутскую область, республику Бурятия и Забайкальский край) и Монголию. Мероприятие было посвящено 95-летию установления дипломатических отношений между Россией и Монголией и 50-летию молодежного фестиваля советско-монгольской дружбы «Манжерок».

Конференция прошла в два этапа: в рамках первой встречи (16-21 мая 2016 г.) монгольская делегация посетила г. Иркутск. В ходе ответного визита (5-10 сентября 2016 г.) молодые ученые России встретились с коллегами в г. Улан-Батор.

В рамках Конференции был организован ряд научных, культурных и спортивных мероприятий. Научная программа включала пленарную, устные и стендовую сессии, а также круглые столы по актуальным направлениям различных областей знаний от наук о земле до нанотехнологии. Пленарные и секционные сообщения были представлены ведущими учеными России и Монголии.

Главный редактор: к.ф.-м.н. Сорокин Степан Павлович

Редакционная коллегия: Валеева Ольга Валерьевна, к.т.н. Димов Алексей Владимирович, к.ф.-м.н. Добрынина Анна Александровна, к.ф.-м.н. Едемский Илья Константинович, к.г.н. Иванов Егор Николаевич, к.г.-м.н. Канева Екатерина Владимировна, к.г.-м.н. Кононов Александр Матвеевич, к.т.н. Куценко Сергей Михайлович, к.м.н. Лисовцов Александр Александрович, к.б.н. Нестёркина Ирина Сергеевна, к.ф.-м.н. Пержабинский Сергей Михайлович, к.б.н. Сапожникова Юлия Павловна, к.э.н. Сачков Дмитрий Иванович, к.б.н. Семенова Наталья Викторовна, к.ф.-м.н. Ясюкевич Юрий Владимирович

Proceedings of the International youth research and training conference «Russia – Mongolia» (Irkutsk, May 16-21, 2016; Ulan-Bator, September, 5-10, 2016), Irkutsk, Izdatel'stvo Instituta geografii im. V.B. Sochavy SO RAN, 2016, 244 p.

The first International scientific conference of young scientists “Russia – Mongolia” gathered more than 200 participants representing the Baikal region of Russia and Mongolia. The meeting was dedicated to the 95th Anniversary of the establishment of diplomatic relations between Russia and Mongolia and the 50th Jubilee of the Russian-Mongolian festival “Manzherok”.

The Conference was held in two stages: During March 16-21, 2016, the mission of Mongolia attended Irkutsk, Russia, and the meeting proceeded in Ulanbaatar, Mongolia in September 5-10, 2016.

The Conference covered a series of scientific, cultural and sports events. The scientific program embraced the plenary, oral and poster sessions as well as round table talks on a plenty of relevant topics. Plenary and oral talks were performed by the leading scientists of Russia and Mongolia.

cial antihyperlipidemic drug, simvastatin. Serum total cholesterol (TC), triglyceride (TG), high density lipoprotein (HDL) and low density lipoprotein (LDL) were examined after with treatment these compounds.

The results showed that all compounds except paeoniflorin reduced the serum TC, TG and LDL of rats. Especially, quercetin is strongly reduced the TC level by 68.85 %, the TG level by 66.81 % and the LDL level by 39.09 % and slight increase in the HDL level compared to control group. Another compound PGG reduced TC, TG and LDL levels by 39.1 %, 42.3 % and 21.3 %, respectively.

Whereas, kaempferol, kaempferol-3-O- β -D-glucopyranoside, ethylgallate and gallic acid slightly reduced TC, TG and LDL levels while the significant difference in the HDL level was not observed.

Paeoniflorin did not show any antihyperlipidemic activity under our experimental condition.

All the results were statistically significant ($P < 0.05$) and compared to normal and control groups.

These findings highlight the critical role of valuable phenolic compounds: quercetin and PGG of *P.anomala* in hyperlipidemia treatment. Thus, they need to be considered in future therapeutic approaches.

HAIR CELLS AND ULTRASTRUCTURAL CORRELATES OF ACOUSTIC SENSITIVITY IN BAIKAL FISHES³

**Yu.P. Sapozhnikova, L.V. Sukhanova, V.M. Yakhnenko,
O.Yu. Glyzina, V.A. Kulikov**

*Limnological Institute Siberian Branch of the Russian Academy of Sciences
Institute of Automation and Electrometry Siberian Branch of the Russian Academy of Sciences*

Despite some knowledge of inner ear variation, the main question remains widely unanswered – how the morphological variability is linked to hearing abilities [1]. We have tried to search for morphological correlates of functional characteristics of fish hearing. This work is also aimed at estimation of morphological diversity of ultrastructure of the hearing epithelium in fishes which live in the same conditions of Lake Baikal. The ultrastructure of the hearing epithelium was investigated in several whitefishes (*Coregonus* sp., Coregonidae) and sculpin fishes (Cottoidei). The whitefishes polymorphism during their development in the deep-water lake serves as an alternative to specialization and species diversity of sculpin fishes [2, 3]. So the ecological similarity and conjugation of evolutionary change have a special importance in the comparative studies and adaptive features of auditory system in these fish groups. To study interspecific variability in the ultrastructure of the saccular epithelium, we have chosen those species that differ significantly in lifestyle by taking into account the high level of their adaptation to the conditions of Lake Baikal. There were three studied species among whitefishes: pelagic planktophage Baikal omul, near bottom benthophages lacustrine and lacustrine-riverine whitefishes, or Baikal pidschian, as well as their hybrids of the first generation (F1) reared after artificial fertilization under control conditions in the Joint Instrumentation Centre «Freshwater Aquarium Complex» at

³ The work was supported by RFBR Grants №14-04-01242-a, 17-04-02230-a, 17-04-02198-a.

Limnological Institute SB RAS. The various structural elements of the hair cells apical region were studied also in four sculpin fishes: two oilfish species (big and small golomyankas, open pelagic zone), Severobaikalsk yellowfin (near bottom pelagic zone) and stone sculpin (littoral zone).

Samples of sensory epithelium were analyzed using scanning and transmission imaging techniques. The various hair cells morphotypes were revealed in Baikal fishes. The hearing epithelium with a predominantly short stereocilia ($\kappa 11c1$, $\kappa 9c2$ – in sculpin fishes; $\kappa 2c2$, $\kappa 3c2$, $\kappa 6c2$, $\kappa 7c2$ – in whitefish) can identify a high-frequency sound waves against the background of low-frequency noise in the shallow zone. There are hair cells with elongated stereocilia ($\kappa 9c8$ – in sculpin fishes; $\kappa 6c5$ – in whitefish) in pelagic species macula, which probably contributes to the perception of low-frequency acoustic waves. Unlike the whitefishes, non-ostariophysans sculpins possess a high morphological diversity of sensory cells. Their cells are characterized by sensory bundles with high stereocilia that presumably perceive shorter frequency sound oscillations. It was shown the existence of the regions with different tonal specialization in the auditory maculae of whitefish in the experiments, in which intense acoustic stimulation caused different degree of hair cells damages in different parts of the macula. According to the data which were obtained in behavioral experiment the maximum of whitefishes acoustic sensitivity is in a high-frequency range compared to sculpin fishes. This difference is apparently determined by the saccular apparatus morphology, in particular, the presence of shorter stereocilia as well as the swim bladder presence in whitefish: Baikal omul – 400-800 Hz, Baikal pidschian ♀ x Baikal omul ♂ F1 hybrids – 500-800 Hz, Baikal pidschian – 600-800 Hz, Baikal whitefish – 600-1500 Hz) in the opposite of sculpin fish (stone sculpin – 300-700 Hz, Severobaikalsk yellowfin – 300-500 Hz).

The morphological polarization presumably plays also important role in the ability of fish to determine direction based on acoustic signals in water. The morphological polarity of sensory hair cells in Baikal species has some differences from the earlier described ones in other sculpins and whitefishes [4]. It was shown that the horizontal orientation of hair cells prevail over vertical on the saccular macula of pelagic Baikal fishes. It is assumed that directional sensitivity of fish sacculus determines the characteristics of their acoustic behavior due to morphological polarization of hair cells.

It is possible to conclude that Baikal fishes are characterized by high plasticity in relation to a diverse acoustic environment, and adaptations are formed, first of all, at the ultrastructural level. Due to the increasing availability of new methods of the ultrastructural analysis of sensor systems, fish that are studied in their ecological context play an important role and can serve as an adequate model for revealing functional and cause-and-effect relations between a phenotype and natural selection.

REFERENCES

1. Ladich F., Schulz-Mirbach T. Diversity in Fish Auditory Systems: One of the Riddles of Sensory Biology // Front. Ecol. Evol. 2016. Vol. 4, № 28.
2. Smirnov V.V., Smirnova-Zalumi N.S., Sukhanova L.V. Microevolution Baikal omul: *Coregonus autumnalis migratorius* (Georgi). Novosibirsk: Publishing House of the SB RAS, 2009. 246 p.
3. Sapozhnikova Yu.P., Klimenkov I.V., Khanaev I.V., Makarov M.M., Belous A.A. Ultrastructure of saccular epithelium sensory cells of four sculpin fish species (Cottoidei)



4. Popper A.N. Ultrastructure of the auditory regions in the inner ear of the lake whitefish // Science. 1976. Vol. 192. P. 1020-1023.

Information about authors

Yulia Sapozhnikova, Ph.D., Limnological Institute Siberian Branch of the Russian Academy of Sciences, 3, Ulan-Batorskaya, Irkutsk, 664033, Russia, P.O. box 278, e-mail: jsap@mail.ru

Lyubov Sukhanova, Ph.D., Limnological Institute Siberian Branch of the Russian Academy of Sciences, 3, Ulan-Batorskaya, Irkutsk, 664033, Russia, P.O. box 278, e-mail: lsukhanova@yandex.ru

Vera Yakhnenko, Ph.D., Limnological Institute Siberian Branch of the Russian Academy of Sciences, 3, Ulan-Batorskaya, Irkutsk, 664033, Russia, P.O. box 278, e-mail: vera@lin.irk.ru

Olga Glyzina, Ph.D., Limnological Institute Siberian Branch of the Russian Academy of Sciences, 3, Ulan-Batorskaya, Irkutsk, 664033, Russia, P.O. box 278, e-mail: glyzina@lin.irk.ru

Viktor Kulikov, Ph.D., Institute of Automation and Electrometry Siberian Branch of the Russian Academy of Sciences, 1, Academician Koptug ave., Novosibirsk, 630090, Russia, e-mail: kulikov.victor@gmail.com

CHARACTERISTICS OF TICK-BORNE ENCEPHALITIS VIRUS STRAINS (EUROPEAN SUBTYPE) IN THE TERRITORY OF SIBERIA

Y. Savinova

Federal State Public Scientific Institution "Scientific Centre for Family Health and Human Reproduction Problems" (FSPSI "SC FHHRP").

Scientific advisor: Phd I.V. Kozlova (Science Centre for Family Health and Human Reproduction Problems, The Head of Laboratory of molecular epidemiology and genetic diagnostics)

Tick-borne encephalitis is one of the most widespread zoonotic neurological infections transmitted through the bite of Ixodid ticks. Tick-borne encephalitis virus is endemic in the Eurasian forest-steppe zone ranging from the Japanese island of Hokkaido in the east to the British Isles in the west.

Great scientific interest to conduct the comparative analysis of genetic and phenotypic characteristics of tick-borne encephalitis virus strains (European subtype) isolated in their habitat area at the points separated by a long distance and considerably different in the biocenotic structure of natural focuses of infection. Our research is aimed the genetic and biological properties of TBEV of the European subtype isolated in the territory of Siberia.

We used molecular-genetic methods (full-genome DNA sequencing, phylogenetic analysis) and virological methods (cytopathic activity, study of S-feature, rct42 and T50-markers, pathogenicity for laboratory animals) in our work.

In the territory of East Siberia, tick-borne encephalitis virus strains (European subtype) were isolated from a human infected with TBEV, long-tailed ground squirrel, narrow-headed vole, and northern red-backed vole.