

FULL TITLE OF THE PROJECT AND ITS ACRONYM

SECONDARY METABOLITES OF PLANTS AND PLANT-INSECT INTERACTIONS:
DISTRIBUTION AND IDENTIFICATION OF ECDYSTEROIDS AGONISTS
IN TWO GEOGRAPHICALLY REMOTE FLORAS (INTAS 96-1291)

BRIEF PREHISTORY OF PROJECT

The research on ecdysteroids, structural analogs of hormones of molting and metamorphose of insects, were launched in the Institute of Biology in 1992. Soon after the laboratory research was started, the world acknowledged the results of searching the new phytoecdysteroid-producing plant species, study of composition and distribution of ecdysteroids within the whole plant and obtaining cell cultures of ecdysteroid-containing plants. The International Workshop on Phytoecdysteroids took place in 1996 in Syktyvkar, on the basis of the Institute of Biology. Leading specialists from Russia, CIS countries and Western Europe took part in the Workshop. The Workshop allowed to get acquainted in detail with the directions of the research work and to assess the possibility of scientific cooperation. In 1997, scientific teams of Prof. Rene Lafont (Ecole Normale Superieure, Paris, France), Dr. Laurence Dinan (Exeter University, Great Britain), Prof. Z.Saatov (Institute of Chemistry of Plant Substances, Tashkent, Academy of Sciences of Uzbekistan Republic) and Dr. Biol. Sci. V.V.Volodin (Institute of Biology, Komi SC UrD RAS, Syktyvkar) developed a project aiming at the studies of distribution of ecdysteroids in geographically remote floras (European North-East of Russia and Middle Asia) which got the support of International Program INTAS.

DATES OF IMPLEMENTATION OF PROJECT

1998-2000

FUNDING ORGANIZATION

INTAS

Photo: V. Volodin



Photo: I. Chadin



PROJECT CO-ORDINATOR

Dr. Laurence Dinan (Exeter University, Great Britain)

RESPONSIBLE SCIENTIST

Dr. Biol. V.V.Volodin

GOAL AND TASKS

Determination of regularities of distribution of ecdysteroids among the Angiosperms (on the examples of geographically remote floras of the European North-east of Russia and Middle Asia)

PARTICIPATING ORGANISATIONS

Exeter University, Great Britain (Dr. Laurence Dinan): studying extracts of plant samples, whether they contain ecdysteroids, with the help of radio-immune analysis and bio-testing upon cell cultures of *Drosophila melanogaster*.

Ecole Normale Superieure, Paris, France (Prof. Rene Lafont): determining the structure of ecdysteroids with the help of nuclear magnetic resonance spectroscopy and mass-spectrometry.

Institute of Chemistry of Plant Substances, Tashkent, Academy of Sciences of Uzbekistan Republic (Prof. Zijadilla Saatov): collecting plant samples, extraction of ecdysteroids from plants.

Institute of Biology, Komi SC UrD RAS, Syktyvkar (Dr. Biol. Sci. V.V.Volodin): collecting plant samples, extraction of ecdysteroids from plants.



Photo: I.Chadin



Photo: V. Volodin



MAIN SCIENTIFIC RESULTS

A strategy was developed for screening plants that possibly can contain ecdysteroids. The strategy is based upon the systematic principle of "positive" tribes and using new methods of biological testing of plant material upon cultures of cells of *Drosophila melanogaster*, methods of radio-immune analysis and high-performance liquid chromatography. For the first time it was established that most plants contain traces of ecdysteroids that can be identified by radio-immune analysis. There is only a few plant species which ecdysteroid concentrations are above the threshold of biotest identification. Those plants are phylogenetically remote, although inside the families, in certain genera and tribes, ecdysteroid-containing plants display closely related groups. The obtained data allow to consider that the plants with concentration of ecdysteroids sufficient for deterring phytophagous insects, should better be identified by bio-tests upon the cell cultures of insects. Those bio-tests ground upon hormone-receptor interactions. Low concentrations of ecdysteroids identified with the help of radio-immune analysis in young growing organs of the majority of studied plants belonging to various taxonomic groups, allow to postulate the possible physiological role of ecdysteroids in growth processes of higher plants. The analysis of distribution areas of ecdysteroid-containing plants displayed that significant number of such plants belong to south and polyzonal latitudinal groups. It testifies to the impact of ecological-geographical factor upon distribution of ecdysteroids among plants. The practical value of the performed research lies in identification of plants with high content of ecdysteroids. Such plants can be possibly used as a raw material for ecdysteroid-containing medicines of adaptogenic and tonic action.

MAIN PRODUCTS

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