Evaluation of Estonian Research

- Taxonomy -

Report to the Estonian Science Fund Council

by

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and
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The authors of this report were appointed for the purpose of this evaluation by the Swedish Natural Science Research Council.

NFR Naturvetenskapliga forskningsrådet
Swedish Natural Science Research Council

Foreword

Several Swedish organizations have been asked to take part in a general evaluation of all research performed at academic institutions in Estonia. NFR has agreed to organize the evaluation of Estonian research within the field of natural science. This report has been prepared according to an agreement between the Estonian Science Fund Council and the Swedish Natural Science Research Council (NFR).

During the spring of 1991 Estonian scientists completed reports on their research which were sent to NFR. These reports have subsequently been distributed among 14 Swedish evaluation groups. In total about 40 Swedish scientists are engaged in the evaluations. The groups are making site visits to the Estonian laboratories and institutes during 1991/92 to discuss the research performed, the plans for future activities and to get information about the working conditions, experimental facilities, financial resources etc. Each group has been instructed to produce a report assessing its particular research area.

This report concerns the sub-field of Taxonomy and will eventually be a part of an extensive report covering all Estonian research in natural science.

The organization of the site visits is done in close cooperation with the Estonian Science Fund Council. Although difficult times prevail in Estonia the site visits performed so far have been successful. The NFR is grateful to the Estonian Science Fund Council for its efforts to handle all practical matters in connection with these visits.

The NFR is also grateful to the Swedish scientists who with enthusiasm and great skill have taken part in the demanding evaluation work.

Finally, the Council wishes to express its sincere hope that this evaluation report will contribute to a further positive development and strengthening of Estonian science.

Carl Nordling
Secretary General

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INTRODUCTION

The Estonian Science Fund Council has instructed Estonian scientists in the field of Taxonomy to prepare reports concerning their research activities during the last 5 years. These reports were completed during the spring of 1991 and dealt with the following points:

- project leader(s)
- short description of the objectives
- summary of results
- summary of resources
- scientific staff and their qualifications
- list of publications
- dissertations
- scientific meetings organized
- prognosis of the future development of the project

In most cases the reports were accompanied by reprints of scientific publications written in English and Russian.

In July 1991 the reports were sent to NFR and during the autumn the evaluators received the reports. A site visit by the evaluators to the relevant Estonian research institutions was done in the period February 4-7 1992. The Estonian Science Fund Council had appointed Dr Tarmo Timm as organizer and contact persons for this evaluation. Dr Timm was the contact person during the entire site-visit of the Evaluation Group.

This report was drafted in February 1992 and was finally approved by the Evaluation Group in June.

ACKNOWLEDGEMENTS

We were met with great hospitality in Estonia, and we especially want to acknowledge the most generous help of Dr Timm. The interviewed scientists took part with openness and enthusiasm in the discussions. We hope that this report will be taken as constructive criticism and will help to further, in some small way, the development of Taxonomy in Estonia.

GENERAL COMMENTS ON TAXONOMY

Systematics is the science that deals with organic diversity within the framework of evolutionary theory. Modern systematics, which is something entirely different from the purely descriptive Linnean taxonomy, is inseparabale from morphological, ecological, and behavioural biology. While collection and description of new species and careful curation of museum collections is the foundation of taxonomy, modern systematics goes beyond this. Our impression is that while Estonian taxonomists as a rule are well trained and very competent when it comes to knowing the local flora and fauna, their analytical skills are in general much more limited.

The production of local floras and faunas is no doubt of great national interest and a task which also requires a very good knowledge and scientific training. Internationally, however, such work is of limited interest, with low visibility outside the Baltic region. It is important that the skills and knowledge shown by the people engaged in these activities are combined with more analytical taxonomic work. We fail to see that there is a conflict between the national needs for faunas and floras, and more stringent systematics of a wider international interest. It is of fundamental importance for systematics in Estonia to be more aware of, and involved in, the international debate on taxonomical and biogeographical theory. This is achieved by increasing the contact both with foreign taxonomists, and between taxonomists within Estonia. We identify this as one of the most important steps that can be taken to increase the standard of systematic research in the country. It is also mandatory that Estonian taxonomists have access to the leading international journals in their field, as well as modern textbooks in taxonomy and biogeography. Lack of modern literature is probably a main reason for some of the outdated views we often encountered when discussing taxonomic theory.

We conclude that the prospects for systematics in Estonia are good; the systematists we met are overall very competent and well trained to fulfill their tasks. In general, they have enough time to do research and few have heavy teaching obligations. However, most of the projects are poorly defined in terms of goals and time allocation and it is often difficult to identify the scientific leadership. In general, the technical support in the form of staff seems adequate, although the vast collections of animals and plants from Central Asia and the Far East are not well curated due to lack of technicians and suitable localities. These are internationally interesting collections which should be taken better care of. The availability of literature is very poor, optical equipment appears in general to be of low standard, and computers (including software) are scarce. These are deficiences that must be taken care of for Estonian systematics to become of the highest standard. Most essential, though, is that Estonian systematists become part of the international scientific community. It is therefore important that they can attend international meetings, work for shorter or longer periods at foreign institutions, and that scientists from abroad are invited to Estonia.

D Sci Vello Jaaska, Department of Botany and Mycology, Institute of Zoology and Botany, Estonian Academy of Sciences, Tartu - Project leader

Isoenzyme variation and phylogenetic relationships in selected grass and legume genera

Principal activities

This project uses isoenzyme electrophoresis to estimate genetic polymorphism to be used for taxonomic purposes. Work has been going on since 1968 and has been devoted mainly to the grass tribe Triticeae and, lately, to the bean genera *Vigna* and *Phaseolus*. In the last five year period seven papers have been published, all in English and four of them in international journals. So far the taxonomic framework for synthesis has been a traditional biosystematic one, but plans have recently been made to use the information for cladistic analysis. Progress in this direction is presently impeded by lack of computers and software. Laboratory equipment is simple but effective. The project leader has a good network of international contacts that has, among other things, provided him with rewarding study material. The possibilities for foreign travel has, however, been very restricted due to administrative and economic constraints. The project has attracted two diploma students, but has at present no graduate students. No meetings have been organized.

Evaluation

This project is scientifically very good. It has yielded important and convincing results, based on competent laboratory work and perspicacious analysis. These are published in English in well known international journals. Prospects for planned work are very good, providing that the necessary chemicals and equipment can be put at the groups disposal. The group, which consists of one scientist and two technicians is small and vulnerable.

Recommendations

Continued support for this project is strongly recommended. It is particularly important that a personal computer with appropriate software for data analyses is put at the disposal of the group. The supply of necessary chemicals must be secured. Graduate students should be attracted to this project and the project leader should consider to collaborate with other research groups.

Sc D Eino Krall, Institute of Zoology and Botany of the Estonian Academy of Sciences, Department of Zoology, Tartu - Project leader

M Rah - Scientific staff

Plant nematology: taxonomy, ecology and evolution of plant parasitic nematodes including host-parasite relationships and theoretical aspects of control

Principal activities

The project consists of twelve parts of which five involve taxonomy, and hence are included in this evaluation. The project includes a survey of the most important plant parasites in Estonia, including descriptions of new species and genera. Lately, E. Krall has focussed his interest on the evolution and phylogeny of cyst nematodes of the family Heteroderidae. Several of Krall's previously published monographs (some in collaboration with E. S. Kiryanova) have been translated to English and published in India and in Europe. The project has recently also employed scanning electron miscroscopy as an aid in finding new characters to be used in the systematics of these worms, and as an aid in the identification of the various economically important species.

The project will in the future concentrate on the morphology, systematics, and co-evolution of host plants and plant-parasitic nematodes. Krall is also looking for international specialists who can collaborate in the production of a monograph on cyst-nematodes.

Evaluation

This project is led by a very good scientist with an international reputation in his field. The prospects of the project are good, but can be made very good if the emphasis of the project is more directed towards phylogeny.

Recommendations

Further support is strongly recommended; it is essential that enough grants are furnished for chemicals and other expensives. Krall lacks funding for keeping up with the literature in his particular field, and this is also a need that should be taken care of. Krall is undoubtedly a very competent and well known scientist in many respects; his knowledge of modern evolutionary and phylogenetic theory is, however, somewhat outdated and it is important that he, and future students, are given the possibility to interact with international and national scientists to increase their knowledge.

Dr Vilma Kuusk, Institute of Zoology and Botany, Department of Botany and Mycology, Estonian Academy of Sciences, Tartu - Project leader

Malle Leht and Tiiu Kull - Scientific staff

Taxonomy and protection of Baltic higher plants

Principal activities

This project has grown out of the work with the impressive *Flora of the Estonian SSR*, published 1953-1984. The present principal activities are the compilation of a *Flora of the Baltic Republics*, an elaborate critical checklist with synonymy and distributional data, a critical checklist of Estonian Hepatics and mosses, key books of Estonian vascular plants, and Red Data Books of Estonia and the Baltic Sea region. The first volume of the *Flora of the Baltic Republics* is now finished, as are the checklist of the Estonian bryoflora and the Red Data books. Substantial work has also been done by the group on the taxonomy of Baltic species of *Potentilla*, the karyology of Estonian orchids, and the reproductive and population ecology of *Cypripedium calceolus*. The results of this work has largely been published in Estonian and Russian, but some also in English, albeit in journals of limited international distribution. Critical examination of material of the genera *Lotus* and *Anthyllis* for the flora of the Baltic republics has resulted in popular treatments published in Estonian. The international contacts of this group are mainly with scientists from other Baltic republics and Finland, but also with Polish botanists. The group has furthermore hosted two excursions with botanists from the Baltic republics and Sweden. The project has attracted two diploma students and two graduate students are active within it.

Evaluation

This project is mainly of national interest and is rated as fair; with an internationally more visible publication some of the spin-off might have rated higher. The group is well organized and quite efficient, and with a redirection of research it may become internationally successful. Availability of literature and computer equipment is clearly insufficient.

Recommendations

Support is recommended to finish the ongoing subprojects. Future support should depend on the redirection of the research programme towards more analytical work and a more international publication of results.

D Sci Erast Parmasto, Department of Botany and Mycology, Institute of Zoology and Botany, Estonian Academy of Sciences, Tartu - Project leader

Jeli Järva, Kuulo Kalamees, Anu Kollom, Bellis Kullman, Urmas Köljalg, Ilmi Parmasto, Ain Raitviir, Maret Saar, Mall Vaasma - Scientific staff

Taxonomy, evolution and distribution of fungi

Principal activities

This is more of a research programme than a project. The subprojects range from applied work of purely national interest (such as surveillance of airborne spores and pollen) to problems of high level classification, that is of great international interest. The group is internationally leading in the taxonomy of the Aphyllophorales, particularly of the Corticiaceae s. lat. Monographic work is also being done on various groups of Discomycetes and Agarics. Methods include traditional microscopy, SEM, and crossing experiments with cultivated mycelia. Methods for data analysis include numerical phenetics and cladistics. Several papers deal with the nature of the specific and generic categories in mycology. Several papers are general treatments of the use of spore measurements in fungal taxonomy. The group has a fair number of personal computers with appropriate software. Among important facilities are a collection of some 1400 live mycelia, of which 900 monosporous, and an herbarium largely brought together by the group members and which is for several groups of fungi the most important single collection in the world. Optical equipment is, however, of mediocre quality. Eighty publications are listed for the period 1986-1991. These range from popular treatments in Estonian over scientific papers in journals of limited distribution to papers in well known international journals. It should be remarked, that due to the international reputation of the group, inhouse publications tend to have a much higher visibility among mycologists than such publications usually enjoy. Three meetings with regional or international participation were organized by the group in the last five year period. One Doctor of Sciencethesis and three diploma papers have been produced within the group. Three graduate students are presently active in the group.

Evaluation

The overall rating of this group is very good, single contributions ranging from fair to excellent. Dr. Parmasto is a highly dynamic leader and has shown an impressive capability to introduce new theories and modern techniques in his team. Equipment is fair, but the need for more and better microscopes is urgent, as is the need of international journals and textbooks. The group is well established internationally and prospects for future development are very good. With its dynamic leadership, numerous active international contacts, and fair number of promising junior members, this is the most vital research group in Estonia.

Recommendations

Support for this group is most strongly recommended. The ambitions to apply modern theories should be encouraged, by making it possible to interact with the international scientific community. It is particularly urgent that support for modern high quality microscopes, and literature, is granted.

Cand Sci Toomas Saat, Department of Zoology and Zoological Museum, Tartu University, Tartu - Project leader

A Kirk, T Keskküla, N Laanetu, R Ling, J Luig, M Martin, A Miljutin, K Poldvere, J Ristkok, A Tamm - Scientific staff

Systematics, faunistics and ecology of some invertebrate and vertebrate taxa in Estonia

Principal activities

This project, which deals with insects and various vertebrates, is composed of six subprojects. Three are taxonomic and involve faunistic and systematic studies of insects, fish, and amphibians. The project is led by T. Saat, who is mainly the administrative leader; his own major field is embryology which falls outside our evaluation. The taxonomic projects are concerned with the production of local faunas for the groups under study and faunistic notes in general. Little in terms of systematics has been produced during the last five years by the taxonomists engaged in these projects. The plans for the taxonomic projects for the near future include: faunistics and systematics of some insect groups; the compilation of a monograph "Estonian fish"; and the compilation of catalogues of the Museum collections.

Evaluation

The evaluation group did not meet the scientists engaged in the taxonomic subprojects. Judged from the publication list, we regard this project as fair. We are not prepared to assess the scientific qualifications of the individual scientists.

Recommendations

This project should be split into a number of projects where one scientific leader per project should be identified and made responsible for the scientific content of her/his part. Further support is not recommended for this project in its present form, except for salaries. The research should in the future not only involve faunistic work, but aim to a wider understanding of the variation and phylogenetic relationships within the studied taxa.

APPENDIX

Background of evaluators

Prof Lennart Andersson

Prof of Systematic Botany, presently at the Institute for Systematic Botany, University of Gothenburg. His research interests concern the classification and cladistic biogeography of the Angiosperm family Rubiaceae, particularly in the neotropics. His earlier research was concerned mainly with the taxonomy of the tropical Monocotyledon families Heliconiaceae and Marantaceae.

Doc Per Sundberg

Doc of Zoology, presently at the Department of Zoology, University of Gothenburg. His current research interests are phylogenetic systematics of nemerteans (phylum Nemertea) and phylogenetic aspects on the evolution of warning colouration in nemerteans. He holts a special research position in Phylogenetic Zoological Systematics at the Swedish Natural Science Research Council.