

The Rufford Foundation

Final Report

Congratulations on the completion of your project that was supported by The Rufford Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other format. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to jane@rufford.org.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Andriy Novikov
Project title	Monkshoods in Gorgany Mts. (Ukrainian Carpathians): Biogeographical and conservation approach
RSG reference	21313-2
Reporting period	01.05.2017 – 31.05.2018
Amount of grant	4421 £
Your email address	novikoffav@gmail.com
Date of this report	08.05.2018

1. Please indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
To prepare the cadastre and GPS-based map of distribution of all <i>Aconitum</i> taxa in Gorgany Mts.				<p>My research confirmed presence of 11 instead of suggested nine taxa of the genus <i>Aconitum</i> in Gorgany region, including <i>A. firmum</i> subsp. <i>fissurae</i> (VU), <i>A. × czarnohorensis</i> (VU), <i>A. × nanum</i> (VU), <i>A. bucovinense</i> (EN), <i>A. × gayeri</i> (LC), <i>A. degenii</i> subsp. <i>degenii</i> var. <i>intermedium</i> (LC), <i>A. degenii</i> subsp. <i>degenii</i> f. <i>degenii</i> (LC), <i>A. × cammarum</i> (LC), <i>A. lasiocarpum</i> subsp. <i>lasiocarpum</i> (VU), <i>A. moldavicum</i> subsp. <i>moldavicum</i> (LC), and <i>A. moldavicum</i> subsp. <i>hosteanum</i> (LC). Presence of two other species mentioned in publications for the Gorgany Mts. (<i>A. anthora</i> and <i>A. variegatum</i>) was not confirmed. For all discovered taxa the GPS-based maps and databases were prepared and freely available from phytomorphology.org to the public. Moreover, I have found specific population of <i>A. lasiocarpum</i> with gemmules and wild individuals of <i>A. × cammarum</i> that probably were before treated as <i>A. variegatum</i>, so this can explain numerous wrong citations of <i>A. variegatum</i> from Gorgany.</p>
To investigate abundance, size and current condition of <i>Aconitum</i> populations in Gorgany Mts.				<p>Totally I have discovered and evaluated 22 localities with aconites in Gorgany Mts. For all of them the population parameters, ecological conditions, vegetation structure and classification were realised and databased. This data allowed evaluating the general condition and threats of aconites in Gorgany. Threat categories for all investigated taxa were provided in accordance to IUCN criteria. As a general conclusion after the last years of studies it was decided to concentrate in future my attention on high-mountain taxa, because the most of threatened <i>Aconitum</i> taxa are represented in high elevations. The only</p>

			<p>interest for further investigations taxon in low elevations is <i>A. lasiocarpum</i>. Of course, in Ukrainian Carpathians there are also two rare subspecies of <i>A. moldavicum</i> (subsp. <i>simonkaianum</i> and subsp. <i>porcii</i>), which also grow in low altitudes, but these taxa occur on the edge of their distribution in limited area near the border with Romania, and require special individual attention. Most of observed populations were in good condition, but few of them are in real danger due to overgrowing by shrubs and intensive destroy by locals, who believe that these poisonous plants are harmful to the cattle.</p>
<p>To describe and analyze plant communities in which monkshoods interact</p>			<p>Vegetation descriptions by Braun-Blanquet were made for all 22 discovered sites. I did not find some special associations representing aconites in Gorgany. Here these plants taking a part in many different plant communities and looks like they have no special preferences. For example, one of the most abundant species <i>A. degenii</i> can participate in eight different associations (<i>Adenostyletum alliariae</i>, <i>Ranunculo platanifolii-Adenostyletum alliariae</i>, <i>Fagion sylvaticae</i>, <i>Rubetum idaei</i>, <i>Caricetum brizoidis</i>, <i>Arunco-Doronicetum austriaci</i>, <i>Stellario nemorum - Alnetum glutinosa</i>, <i>Chaerophylletum aromaticum</i>), while <i>A. moldavicum</i> occur in six associations (<i>Adenostyletum alliariae</i>, <i>Fagion sylvaticae</i>, <i>Rubetum idaei</i>, <i>Arunco - Doronicetum austriaci</i>, <i>Stellario nemorum - Alnetum glutinosa</i>, and <i>Chaerophylletum aromaticum</i>). So, I can conclude that associations are not limiting the distribution of aconites, either we need to provide different kind of analysis.</p>
<p>To analyze environment conditions (air temperature, air humidity, illumination, soil moisture, soil temperature, soil pH, and wind</p>			<p>For all localities ecological the complex of factors was analysed. In 2017, the protocol of investigation was updated and now is more precise. I had found that my evaluations of soil moisture, illumination and wind speed are artificial and strongly relate from daytime, weather conditions etc. So I decided to introduce 10-point scales of Elenberg. All ecological data collected in</p>

<p>speed) and suppressing factors for the localities of threatened <i>Aconitum</i> species in Gorgany Mts.</p>			<p>2015 will be converted in accordance to these scales. As well as I have updated soil analysis. From dry soil samples, the pH and content of total nitrogen (N), available phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg) and organic carbon (C) will be additionally measured in laboratory conditions for samples of 2015 and 2017. This will allow better understanding ecological preferences of the aconites. For all localities I analysed suppressing factors and found that main of them are deforestation, trampling by tourists, destruction by locals and overgrowing by shrubs. Now I started a work on the paper based on the results from field expeditions. Cluster Analysis, Multidimensional Scaling, and Canonical Correspondence Analysis (CCA) and PAST software will be applied for statistical analysis of obtained results and will be represented in this paper.</p>
<p>To develop the on-line database on Scratchpads platform, representing the most comprehensive and contemporary data on taxonomy, distribution, endemism, populations characteristics, threats, literature for monkshoods of Ukrainian Carpathians</p>			<p>I gathered my knowledge on the genus <i>Aconitum</i> on the website https://phytomorphology.org/aconitum-x-nanum/ and also I shared this information through the Facebook. However I did not use a Scratchpads platform as it was stated, because currently it is in stagnation and there is a high risk that this platform will disappear in close future. From other side, my webpage phytomorphology.org is better indexing by search engines and is also perfect for distribution of such information, so there no lost in quality. This webpage at the moment contains the information about ecological preferences, general distribution in Ukrainian Carpathians, distribution in Chornohora and Gorgany, as well as threats of aconites. It will be updated and completed with literature, photos and new chorological/ecological information during my future investigations of the genus <i>Aconitum</i> in Ukrainian Carpathians.</p>
<p>To devise and provide instructions for</p>			<p>I have gathered main and crucial information on possible threats and ways of <i>Aconitum</i> protection in Ukrainian</p>

<p>optimal conservation of endangered monkshoods in Gorgany Mts. to relevant nature conservation organizations</p>			<p>Carpathians in 2015 and completed it now with new data. I shared this information with colleagues during the Ukrainian Rufford Small Grants Conference “From monitoring to implementation” (23rd-25th April 2018), as well as in personal communications with employees of Carpathian Biosphere Reserve and Gorgany Reserve. This information also was represented on meetings of scientific board of the State Natural History Museum NAS of Ukraine and will be also represented in future paper. In general, main conclusion is that most of population of the rare aconites are in stable condition and require not so much active operations (reintroduction, changes in hydro regime etc.) as much protection from further destruction by human. If there will be no further destructive influence of human, these populations most likely will survive and will exist in proper conditions for the years. Perhaps, they need conservation, our control and monitoring.</p>
<p>To publish and distribute for free the color booklet with self-painting part, which will acquaint wide public, especially youth, with monkshoods</p>			<p>I have prepared the coloring booklet for children with rare plants of Ukrainian Carpathians, in particular with aconites. My previous experience showed that most of children do not like to read so much, so this year I decided to concentrate on illustrations and enhance the interactive aspect. So together with Mariia Sup-Novikova we developed the colouring booklet with three types of illustrations – standard outlined, dot-to-dot and with symbolic squares. Near the each of the plant we indicated its Latin name and short description. This booklet together with other print products was distributed during the several events, in particular during the Children Book Fair in Lviv (10th-13th May 2018), L.O. Krasynikova Biological Tournament in Kharkiv (8th-9th May 2018), as well as at the Ukrainian Catholic University and at the State Natural History Museum NAS of Ukraine. These booklets are also distributed in personal manner, on requests. In the future I am planning to support different biological events by</p>

			<p>providing the booklets, posters and game as prizes or sharing materials of the conferences. I declared to print 1000 booklets, however I decided to use the paper of better quality and instead of small format I applied huge format 24 x 34 cm, therefore I printed just 500 booklets.</p>
<p>To publish and distribute for free posters with rare monkshoods of Ukrainian Carpathians</p>			<p>I planned to prepare one type of poster and publish it in 1000 copies, however later I decided to prepare six different posters corresponding to six species of threatened monkshoods. Each of these six posters I printed in 200 copies, so in total I printed 1200 posters instead of 1000. Moreover, together with Mariia Sup-Novikova we made these posters more attractive – we prepare the watercolor drawings of the aconites and printed them on special watercolor paper. These posters were distributed on the Children Book Fair in Lviv (10th-13th May 2018), L.O. Krasynikova Biological Tournament in Kharkiv (8th-9th May 2018), as well as in the Ukrainian Catholic University, America House in Kyiv and the State Natural History Museum NAS of Ukraine.</p>
<p>To develop, print and distribute special card game with rare plants (especially from genus Aconitum) of Ukrainian Carpathians, factors of pressure, and ways of protections, which, I hope, will attract attention of public to problems of nature conservation in Carpathians</p>			<p>The game was successfully developed and seems to be the most attractive for the public, because just in the first month after publication we distributed already 100 examples of the game and people contacting me all the time to get the game for their children. I even developed a Facebook community for the game Botobattle (https://www.facebook.com/Botobattle/).</p> <p>At the beginning I planned that the game will contain 36 cards, however later, together with Mariia Sup-Novikova, we significantly developed the structure and mechanics of the game. So in final version it contains 112 cards, special designed box, as well as printed manual, counters and dices inside. The game consists of two different card sets (blue and yellow) with 20 cards of factors, 30 cards of plants and six cards of vegetation belts each. The game was firstly represented to public at the</p>

				<p>Ukrainian Catholic University on 8th-10th March 2019, after that it was distributed on the Children Book Fair in Lviv (10th-13th May 2018), L.O. Krasynikova Biological Tournament in Kharkiv (8th-9th May 2018), on the Geekosphaera#4 tournament in Lutsk (28th-30th April 2018), Tavern HearthStone Tournament (14th May 2018), as well as in the Ukrainian Catholic University and the State Natural History Museum NAS of Ukraine. This game was also represented to the public on small event in Kyiv on 14th April 2018. We shared the game on different other events and distributed it already in whole Ukraine. Ukrainian social company Dyvovyzhni (http://dyvovyzhni.org/) mentioned our game Botobattle among the three best eco-events of the year in Ukraine.</p>
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2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

There were several difficulties, which were solved during the project. First of all, there was a big problem with getting to the destination when I went to collect material in the field. In my previous project it was not so obvious because there is better transportation, but Gorgany are much more difficult to reach. In many cases I used two or three different transports just to get to the starting point and sometimes I spent about 2 days to begin my field research. This came better when my father bought an old off-road car for my expeditions, so the second part of the field season I used it. The second issue was that Scratchpads was downed and was not working anymore, as I expected, so I decided to use independent hosting to distribute the information in the web. Next issue was related with obtaining of objective measurements of ecological parameters, because in many cases weather in mountains is unpredicted and you never know when it will be the rain or drought. So it is real challenge to get comparable data even gathered with precise equipment.

It was a reason why I developed updated protocol for the field descriptions and introduced Elenberg's scales in it. My previous analyses of the soil samples (moisture and pH) did not showed any good discrimination or correlation results, therefore in this year I also introduced additional parameters of the soil, which should be analysed. Finally, when I planned to publish the game I did not take into account that the game needs also manuals, boxes, dices, promo posters, boxes for transportation etc. So there was a challenge to print all these supported materials in frames of the budget, but it was solved in the way of finding of cheaper print-house.

3. Briefly describe the three most important outcomes of your project.

1. This was a continuation of my first project dealing with monkshoods of Chornogora Mts. Here I extended the research area to the new territory, which was unstudied for the years. All taxa of the genus *Aconitum* were evaluated in accordance with IUCN criteria and, more important, we can assume that *A. variegatum* is not growing in the Gorgany Mts. The maps of distribution for all discovered taxa were prepared, and now it is much easier to make biogeographical studies in this region.
2. The public effect of the game Botobattle was really unexpected, it made a local furore. In fact, this is my first experience when I have no need to go to the public to share the printed materials, because people themselves asking me to share the game and even waiting for continuation and extension of the game to lowland territories.
3. Generally, my studies showed that there is not so much need to investigate sub-montane territories since most of *Aconitum* species distributed there are not threatened and even successfully participate in destructive and ruderal communities. The only exception is *A. lasiocarpum*, which has quite limited and unclear up to date distribution in Ukrainian Carpathians. The other exception is two hybridogenic subspecies of *A. moldavicum*, which must be evaluated in more precise because in Ukraine they are on the limit of their natural area.

4. Briefly describe the involvement of local communities and how they have benefitted from the project (if relevant).

The local community was actively involved in the project. We made an accent on young people and their parents, therefore we made the game, colouring booklet and watercolour posters, which were distributed during the several events and on request through the Facebook. Children were involved in the game during the Children Book Fair; youths were also involved in the game at the Ukrainian Catholic University and during other events such as Geekosphera#3 and #4. Playing this game people learn about threatened plants of Ukrainian Carpathians, factors destroying them and actions that help to protect them. Many people were so impressed by the game that returned to us and wanted to play the game in next days and invited us to come to different events and represent the game and speak about the rare plants there. Not all people that were attracted are living the Gorgany region, but many of them like tourism and therefore they also are our target audience. I believe that the main task and maybe easiest task is to prevent destruction of rare plants, therefore it is very important to come to young people who will make our environment tomorrow.

5. Are there any plans to continue this work?

I am planning to extend my research to other areas of Ukrainian Carpathians, but with accent on high-mountain taxa of the genus *Aconitum* (i.e. Svydovets, Polonynas, and Marmarosh Mts.). I am also planning to involve in my studies functional traits and, when all the data on chorology will be collected, to provide barrier analysis. For long-term monitoring, I want to apply data loggers, which

probably will help to reveal unknown ecological factors. Moreover, there is an idea to establish a local seed bank to preserve the seeds of rare monkshoods and other rare plants of Ukrainian Carpathians.

6. How do you plan to share the results of your work with others?

All results are represented on the webpage <https://phytomorphology.org/aconitum-x-nanum/> and will be updated in respect to new obtained data. On the same website there is also distributed my book from the first project. The printed materials are actively distributed on different events, as prizes on conferences and tournaments, in our State Natural History Museum, as well as on request through the social media. Scientific outcomes after detailed analysis will be published in Modern Phytomorphology or other peer-reviewed journals and will be freely available for scientific community. Particularly the obtained results will be applied for other relevant studies, for example for analysis of distribution endemic plants in Ukrainian Carpathians.

7. Timescale: Over what period was The Rufford Foundation grant used? How does this compare to the anticipated or actual length of the project?

The grant was realised in relation with the project schedule – it was started on 1st May 2017 and ended on the 31st May 2018, so in total it took 13 months. Beside the fact that some of equipment has been bought earlier (in January 2017, just after receiving of the money), the main part of the project started in time. The project schedule was strongly related to the vegetation period of monkshoods, but elaboration of the collected material and data took much more time than I expected. So it would be great to make next project longer.

8. Budget: Please provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used.

Exchange rate fluctuated during the grant period, but I converted money almost immediately after receiving, so applied rate is just as declared in project proposal – 31.9. However after all I had received on my bank account 4930.22 Euros, what is about 4304.08 £ sterling.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Field expeditions	500	557	-57	At the Project Proposal I indicated 4-5 expeditions, but I made 6 trips by trains/buses and 4 more trips by car. Also I bought some relevant equipment and materials like maps, dry-bags, first aid

				<p>supplements, batteries, waterproof spray, tips for my tracking sticks etc. Therefore this item of the budget was slightly exceeded but recovered from other positions of the budget.</p>
Canon EF 100mm f 2.8L Macro IS USM lens	871	733	+138	<p>The price of the lens and supporting equipment (extension tubes, protection filter, lens hood) was significantly lower, therefore I used saved money to recover extra expenses for printing materials and to buy power bank for further expeditions, as well as for the tickets to the Rufford Conference in Kharkiv and for presentation of the project and the game in Kyiv.</p>
Tatonka Cape Men (2 pcs.)	122	62	+60	<p>Instead of Tatonka I have bought cheaper capes. As a result I even saved money for the field expeditions.</p>
Tatonka Bison 90 Black backpack	340	267	+73	<p>Instead of declared backpack I have found better and professional version of backpack (Tatonka Yukon Ultra EXP 1404 Trekking Rucksack 90 Litre Black) on the sale on Amazon. Surprisingly, this professional backpack was even cheaper, but, unfortunately, much heavier and not very good for use in the field. Additionally to the backpack I have bought the rain cover. Saved money I use to recover extra expenses for printing materials.</p>
Design and publication of booklets (1000 pcs.)	975	545	+430	<p>I published just 500 examples of the colouring booklets because I applied bigger format (24 x 34 cm) and better paper, but even in this situation I saved money to recover extra expenses for other printing materials.</p>
Design and printing of card game (1000 sets)	1223	1826	-603	<p>The expenses on the game were much higher than I expected, because at the beginning I did not plan to make colourful boxes</p>

				for the game, also I did not expected that there will be need for other supporting materials, instructions, promo posters, rent of the space on the book fair, shipping and transportation of the printed materials from the print house to the store etc. Here I also included expenses on the train for presentation of the project and distribution of the materials in Kyiv and Kharkiv. But these extra expenses were recovered by my savings from other budget positions.
Printing of posters (1000 pcs.)	110	202	-92	The total price of posters was much higher because I printed more posters (1200 instead of 1000) on quality watercolour paper.
Falcon tubes and zipper bags for raw material (100 pcs.)	30		+30	I did not buy tubes and zippers because I found them in my lab for free. Saved money I used to cover extra expenses on printing materials.
Website hosting (3 years)	150	119	+31	Website hosting was cheaper than I expected, so I saved some money on it.
Technical assistance for website developing (1-3 times)	100	110	-10	I have paid for fulfilling of the website, its current technical assistance and further technical support, so it should work properly at least next 3 years as it was declared.
Totals	4421	4421		

9. Looking ahead, what do you feel are the important next steps?

I believe that the most important is to continue monitoring of discovered populations of threatened *Aconitum* taxa and to extend the investigation area to other regions of Ukrainian Carpathians. From other side, I also sure that we need to attract more public awareness, so I hope to continue the distribution of the printed materials, as well as to organise lectures, seminars and other meetings with locals. If speak strictly, it looks that now it is more important to concentrate the attention on high-mountain *Aconitum* taxa, to involve new techniques of analysis of their populations and also to implement obtained data in regional, country and international Red Lists. Already

today I started the cooperation with IUCN, so I hope that my knowledge will help them to improve recent data on monkshoods from Ukrainian Carpathians.

10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did The Rufford Foundation receive any publicity during the course of your work?

Yes, Rufford logo was used in proper locations on all printed materials, as well as on the promotional banners showed on the Children Book Fair. In my future paper representing the results of this study I also will indicate that it was supported by The Rufford Foundation. The Rufford Foundation received publicity during my presentations, and during all of the events organized in the frames of this project. The Rufford Foundation also will receive public attention with all distributed printed materials. I personally recommended The Rufford Foundation to my colleagues and mentioned it many times in my communications with colleagues in Ukraine and abroad.

11. Please provide a full list of all the members of your team and briefly what was their role in the project.

I am PhD, **Andriy Novikov** (formerly known as Andrew Novikoff) is the only official member of the project. I am working on position of junior research scientist at the Department of Biosystematics and Evolution of the State Natural History Museum NAS of Ukraine. I did the most of the work by myself. In particular, I realized all field work, including collection of soil and plant material, as well as description of vegetation and gathering of the ecological and population data. I also worked with databasing and prepared the GPS based maps by myself. I have a good experience in taxonomical and chorological investigations on the genus *Aconitum* in Eastern Carpathians and good experience on the studies of Carpathian, which I applied during the realization of the recent project. I also asked MSc **Mariia Sup-Novikova**, who is not a member of a team, to help me during the part of field trips.

She is deeply experienced in mountain hiking and collecting of raw plant material. In particular, she helped me with photos during my expeditions, with developing of the game, design and layout of printed materials, as well as with work on website. The other person, who is also not a member of the team since he is employed at the commercial organization, but who helped me a lot during my expeditions, MSc **Olexiy Havrylov**. He assisted me in few field trips in 2017, in particular as a driver, as well as he helped me with game testing and developing.

12. Any other comments?

I would like to thank a lot to The Rufford Foundation for financial support of my project. Without your support in current economical situation in my country there were no chances to realise all this work. I hope that my outcomes will be fruitfully used by other scientists and regular people wanting to save our wild nature.