

## Contestant profile

▪ Contestant name:	<b>Yury Ermolaev</b>
▪ Contestant occupation:	Postgraduate
▪ University / Organisation	Tula State Pedagogical University named after L. Tolstoy
▪ E-mail:	
▪ Phone (incl. country code):	
▪ Number of people in your team:	<b>3</b>

## 1. Project overview

Title:	Ecological education in Gurovsky quarry
Contest:	Quarry Life Award 2016
Quarry name:	Gurovsky quarry
Prize category: (select all appropriate)	<input checked="" type="checkbox"/> Education and Raising Awareness <input type="checkbox"/> Habitat and Species Research <input type="checkbox"/> Biodiversity Management <input type="checkbox"/> Student Project <input type="checkbox"/> Beyond Quarry Borders

## Abstract (max 1 page)

The quarry and the adjacent territory make for a good experimental ground to raise environmental awareness among various social groups through studying biodiversity. By using the unique opportunity provided by HeidelbergCement we can observe and study biodiversity of the disturbed landscape. Considering these factors we purposed the following idea for the project: raising environmental awareness among various social groups (schoolchildren, students) through studying biodiversity and environmental features of Gurovsky Quarry.

In order to attract students to the study of the quarry biodiversity, we organized a trip for a group of students of the Faculty of Natural Sciences of the Tula State University, who were able to get acquainted with the biological characteristics of flora and fauna of the quarry in the framework of teaching and research practices. 53 students were studying biodiversity: conducted studies of water bodies, the insect fauna, avifauna. The collected material was determined within two weeks afterwards.

In order to attract schoolchildren to the study of the quarry the environmental lesson was held. During the lesson the schoolchildren of the Education center № 8 learnt the basic methods of biodiversity studying. They also collected herbarium to determine the species diversity of plants growing in the quarry.

During the research period we collected 284 invertebrate animals belonging to 2 classes, 7 orders and 25 species; 11 species of plants that belong to 6 families; in water bodies were discovered animals belonging to 3 classes, 7 orders and 11 species. Quarry vertebrates are represented by 7 species which belong to 5 orders and 4 classes.

In terms of our project 11 lessons dedicated to the biodiversity of the Gurovsky quarry for 438 schoolchildren of Education center №8 were made.

## Final report (max 9 pages)

The project was implemented within the period of May-August, 2016. During that period, we have surveyed the area in order to detect territories with various levels of man-made displacement; we have researched the flora and fauna of the quarry and the adjacent territory; also, we have researched bioecological features of various habitats.

Students of Tula State Pedagogical University named after L. Tolstoy and Educational Center № 8 of Tula were involved in studying biodiversity of the quarry and the adjacent territories.



Fig. 1 Students Tula State Pedagogical University, named after L. Tolstoy Fig. 2 Students of Educational Center No. 8 at the quarry practicing at the quarry.

The quarry biodiversity study started from trapping invertebrate animals. To trap animals that creep on the surface, we used Barber pitfall traps. (At selected biotope area, 10 trapping cups with the volume of 0.5 L are embedded in the ground in a straight line. The distance between adjacent trapping vessels is usually 2.5 m. The top edge of trapping vessels must be at the ground level and should not protrude. Inner edges of trapping vessels must be smooth, so the trapped insects could not get out. After installation, trapping vessels are filled with formaldehyde solution by one third of the volume).



Fig. 3, 4 Installation of Barber pitfall traps at the quarry.

To trap flying insects we used a sweep-net method.



Fig. 4 Collecting insects using a sweep-net method. Fig. 5 Determination of insects

The next step of our project was studying biodiversity of aquatic biotopes. Sampling was performed using a dip (hydrobiological) net. To get authentic information about water bodies, trapping of invertebrates was performed at several spots in different areas of the pond. Collection of aquatic animals was conducted at various depths of the pond: on the surface, in the water column and at the bottom of the pond.

All trapped invertebrates were put to tubes using tweezers and fixated in the formaldehyde solution.



Fig. 6,7 Sampling of invertebrates from the pond at the quarry

During research, we detected migrant aquatic biotope, which was formed in the northern part of the quarry as a result of flooding after heavy precipitation. Here, animals representing herpetofauna were found in the Barber pitfall traps.



Fig. 8,9 Detection of amphibians in the Barber pitfall traps.



To research vertebrate animals, we used the following methods:

1. Fixation of encounters. This is the simplest method of detecting relative occurrence of vertebrate animals. The method comes down to noticing all individual animals of all species encountered in various biotopes-during every regular tour.

2. Itinerary record keeping. Itinerary record keeping provides fuller information about diversity of animal species (for example, itinerary method – to obtain data about relative density of bird population in various biotopes, when they have insignificant mosaicism – by a limited number of observers).



Fig.10,11. Studying avifauna of the quarry

The flora of the quarry and the adjacent territory was researched according to field methods of researching vegetation: determining a plant down to the species on site and sampling of plants for herborization in order to specify taxonomical group of a plant.

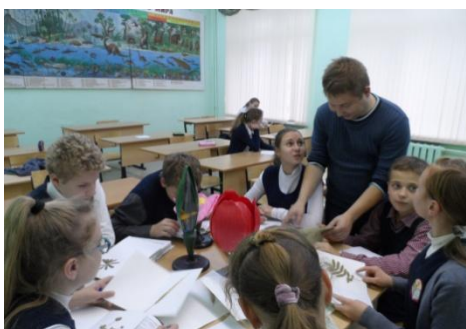


Fig. 12 Students of the Educational Center № 8 determining plants.

In order to attract pollinating insects and to improve protection of topsoil on the territory of the Grazing Project, we have created an experimental clover planting area. Why clover? Red clover improves soil structure. Besides, red clover improves life conditions for worms and soil microbes.



Fig. 13,14 Experimental clover planting area

#### Research results:

During research, we have collected 284 invertebrate animals related to two classes, seven orders and 25 species.

**Table 1 State of Invertebrate Animals of Gurovsky Quarry**

Animal Classes	Animal Orders	Animal Species
Arachnida	1. Opiliones	1. Opiliones
Insecta	1. Orthoptera	2. Gryllotalpa Gryllotalpa
		3. Psophus stridulus
		4. Tettigonia viridissima
	2. Coleoptera	5. Broscus cephalotes
		6. Melolonthinae
		7. Agriotes obscurus
		8. Byrrhus pilula
		9. Coccinella septempunctata
		10. Pterostichus niger
		11. Pterostichus melanarius
		12. Ophonus rufipes
		13. Harpalus griseus
		14. Carabus cansulatus
		15. Carabus coriaceus
		16. Carabus granulatus
		17. Silpha carinata
		18. Necrophorus vespilloides
		19. Nicrophorus vespillo
	3. Mecoptera	20. Panorpa communis
	4. Diptera	21. Sarcophagidae macquart
	5. Hymenoptera	22. Bombus hortorum
		23. Pompilidae
		24. Vespa germanica
	6. Hemiptera	25. Dolycoris baccarum

In the water bodies at the quarry we discovered animals related to three classes, seven orders and 11 species.

**Table 2. Data on the State of Fauna in the Water Bodies at the Quarry**

Animal Classes	Animal Orders	Animal Species
Arachnida	1. Acarina	1. Hydrachnidae
Insecta	2. Odonata	2. Odonata larvae
	3. Ephemeroptera	3. Ephemeroptera larvae
	4. Heteroptera	4. Gerris rufoscutatus
		5. Hemiptera
		6. Corixidae
		7. Cryptocerata
	5. Coleoptera	8. Dytiscus
	6. Diptera	9. Culex, Aedes larvae
Amphibia	7. Anura	10. Bufo viridis
		11. Bombina bombina

Vertebrate animals of the quarry are represented by seven species, which are related to five orders and four classes.

Animal Classes	Animal Orders	Animal Species
Amphibia	Anura	1. Bufo viridis
		2. Bombina bombina
Reptilia	Squamata	3. Lacerta agilis
Aves	Passeriformes	4. Delichon urbicum
		5. Passer domesticus
Mammalia	Rodentia	6. Apodemus agrarius
	Lagomorpha	7. Lepus europaeus

Vegetation of Gurovsky Quarry is represented by 11 species of plants, which are related to six families. The dominant species are the following plants: coltsfoot (Tussilago farfara), chamomile (Matricaria chamomilla), hare's-foot clover (Trifolium arvense).

**Table 3 Data on the State of Flora at the Quarry**

Plant Families	Plant Species
Asteraceae	1. Tussilago
	2. Matricaria chamomilla
	3. Senecio

	4. <i>Helichrysum arenarium</i>
	5. <i>Achillea</i>
Hypericaceae	6. <i>Hypericum perforatum</i>
Fabaceae	7. <i>Trifolium montanum</i>
	8. <i>Trifolium arvense</i>
Amaranthaceae	9. <i>Chenopodium foliosum</i>
Onagraceae	10. <i>Epilobium</i>
Ranunculaceae	11. <i>Thalictrum aquilegifolium</i>

Currently, preparation of the exposition about the state of flora and fauna at Gurovsky Quarry is undergoing in the Educational Center № 8 in Tula and Odoevsky Local History Museum, Odoevsky District, the Tula region. Students attending the Educational Center № 8 in Tula had classes dedicated to features of flora and fauna at Gurovsky Quarry. An article is being prepared to be published in one of the regional newspapers in order to raise awareness among population of the Tula Region about environmental state of Gurovsky Quarry and to approve the 'green image' of HeidelberCement. The end result of the work we have done is the quarry biodiversity map, which features numerous species of plants and animals that can be found in the quarry.



Ecological trails of Gurovsky quarry



Ecological trails of Gurovsky quarry the made by student of Educational Center № 8 Kozlova Anastasia

**To be kept and filled in at the end of your report**

<p><b>Project tags (select all appropriate):</b></p> <p>This will be use to classify your project in the project archive (that is also available online)</p>	
<p><b>Project focus:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Biodiversity management</li> <li><input type="checkbox"/> Cooperation programmes</li> <li><input checked="" type="checkbox"/> Education and Raising awareness</li> <li><input type="checkbox"/> Endangered and protected species</li> <li><input type="checkbox"/> Invasive species</li> <li><input type="checkbox"/> Landscape management - rehabilitation</li> <li><input type="checkbox"/> Rehabilitation</li> <li><input type="checkbox"/> Scientific research</li> <li><input type="checkbox"/> Soil management</li> <li><input type="checkbox"/> Urban ecology</li> <li><input type="checkbox"/> Water management</li> </ul> <p><b>Flora:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Conifers and cycads</li> <li><input type="checkbox"/> Ferns</li> <li><input checked="" type="checkbox"/> Flowering plants</li> <li><input type="checkbox"/> Fungi</li> <li><input type="checkbox"/> Mosses and liverworts</li> </ul> <p><b>Fauna:</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Amphibians</li> <li><input checked="" type="checkbox"/> Birds</li> <li><input checked="" type="checkbox"/> Dragonflies &amp; Butterflies</li> <li><input type="checkbox"/> Fish</li> <li><input checked="" type="checkbox"/> Mammals</li> <li><input type="checkbox"/> Reptiles</li> <li><input checked="" type="checkbox"/> Spiders</li> <li><input checked="" type="checkbox"/> Other insects</li> <li><input type="checkbox"/> Other species</li> </ul>	<p><b>Habitat:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Cave</li> <li><input type="checkbox"/> Cliffs</li> <li><input type="checkbox"/> Fields - crops/culture</li> <li><input type="checkbox"/> Forest</li> <li><input checked="" type="checkbox"/> Grassland</li> <li><input type="checkbox"/> Human settlement</li> <li><input type="checkbox"/> Open areas of rocky grounds</li> <li><input checked="" type="checkbox"/> Recreational areas</li> <li><input type="checkbox"/> Screes</li> <li><input type="checkbox"/> Shrubs &amp; groves</li> <li><input checked="" type="checkbox"/> Soil</li> <li><input checked="" type="checkbox"/> Wander biotopes</li> <li><input type="checkbox"/> Water bodies (flowing, standing)</li> <li><input type="checkbox"/> Wetland</li> </ul> <p><b>Stakeholders:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Authorities</li> <li><input checked="" type="checkbox"/> Local community</li> <li><input type="checkbox"/> NGOs</li> <li><input checked="" type="checkbox"/> Schools</li> <li><input checked="" type="checkbox"/> Universities</li> </ul>



**HEIDELBERG**CEMENT