“Education and biological diversity"

Novogurovsky open-pit mine quarrying is planned for ongoing 35-40 years, and its production site is a unique area for practical works carried out by students of various specialties. Taking these basic factors into consideration, we suggested a project, combining education and biological diversity and designed for the long-term perspective.

Heidelberg Cement Group in Russia mainly works with students of technical and mining branches. We suggest to extend this spectrum to include cooperation with students of biological, environmental and geological specialties and to involve universities interested to provide the permanent basis for such cooperation. We believe the company will benefit from involvement of active and perspective students, who will be interested in practical research activities on the quarry basis, while results of systematic long-term researches may be used to accumulate the information with regard to quarry biological diversity, environmental condition and ecosystem development, as well as for recultivation works to be carried out in future.

Project purpose: to prepare a plan for involvement of students of various specialties to practical research activities at the quarry territory, complex data acquisition and accumulation at single information resource.

The following goals have been determined in order to achieve the above purpose:

1) To inform students of the specialties of interest about the possibility to use the quarry as the basis for practical works and about the biological diversity support program existing at Heidelberg Cement quarries.
2) To discuss with the company management possibilities for practical works to be carried out by students (biologists, ecologists, geologists and paleontologists) at quarry territory, for the purpose of their scientific papers (course papers, graduate papers, etc.) as well as for studies of the environmental condition, biological diversity, paleontological activities, geological analysis and development of practical skills.
3) Collection and analysis of research results aimed to further recovery of the quarry.
4) Creation of the web-site acting as a single information resource, where results of scientific researches will be accumulated.
5) Creation of the company paleontological museum for findings made at the quarry territory.

Practical methods required for project implementation, are descibed below.

I. Information distribution.

We suggest the following measures to inform students of the possibility to use the quarry as the basis for practical works:

- ✓ Each university has information desks, where actual information is presented. We suggest to use posters, inviting students to use the production site as the basis for research activities, designed in the contest style and containing the required information including web-site address, which will most certainly attract the most active students, looking for realization capabilities.
- ✓ The same poster may be published in electronic format at web-sites of corresponding universities, which are visited by students almost on a daily basis.
- ✓ Presentations to be carried out at student meetings to inform students of the potential capabilities for cooperation.

✓ Involvement of lecturers to active cooperation with the company. In such a way, the lecturer may propose to students topics of course papers and graduate papers related to the quarry operaton (at the moment, there exist at least two reference papers based on the Novogurovsky quarry, written in frameqorks of the QLA contest as follows: "Research on the species composition of invertebrates at technogenically disturbed territory", "Plants recovering nitrogen and phosphorus compounds, emmitted in course of blasting operations").

✓ Active usage of social networks for information distribution (most popular in Russia - Vkontakte, Facebook, Odnoklassniki, etc.).

✓ To organize subject meetings for benchmarking and ideas exchange with various educational establishments, such as: "Tula regional environmental-biological student center".

✓ Creation of a video-report about the quarry landscape, its geology and soil characteristics, flora and fauna species composition, to demonstrate the site allocated for research activities to those interested without actual visit to the quarry.

II. Creation of the information web-site

Any presence of unauthorized persons at the quarry territory disturbs the production process in one or another way, that is why we assume reasonable to accumulate the information about completed researches at one information resource, which will also be available to new researchers. We suggest to create the web-site, where information, photos, diagrams and other visual aid and text materials will be presented in the structured form.

Index page of the site may contain the following information (fig. 1):

1. General information about the quarry: location and other static information + tabs with dynamic information, which will be subdivided into sections and continuously updated along with researches.
2. Photo gallery, where best photos will be presented.
3. Quarry layout, subdivided into mining areas, untouched areas and territories where mining works will start in the nearest future with approximate works start time. Functional zoning is very useful for planning of research activities and works origin in various areas.
4. Applications for apprenticeship, where a request may be filled for participation in research activities, including the purpose and methods of the paper to be created. In its turn, the company manager will review the applications and select the most perspective ones.

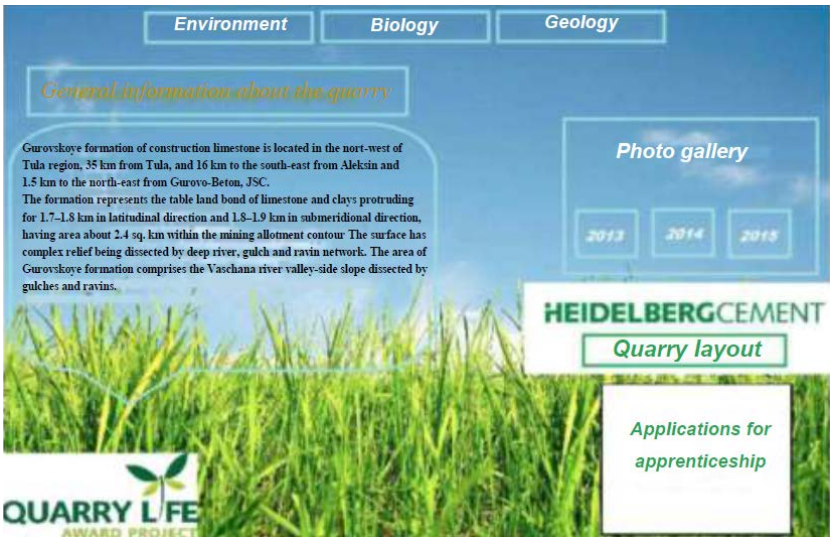


Fig. 1. *Index page of the site*

We suggest to make site tabs as follows:

- Biology tab, where information with regard to quarry flora, fauna and mushrooms will be presented.
- Environment tab, where information with regard to soil, water and air condition will be presented.
- Geology tab, where information with regard to area geological performance and paleontological researches will be presented.

We suggest to use these tabs to upload research papers of students, involved to practical activities at the quarry.

Let's review the web-page structure on the example of Biology tab. It has the following subsections: plants, animals, mushrooms. "Plants" subsection will contain information about the continuously amended list of species that may be found at the quarry territory (Fig. 2).

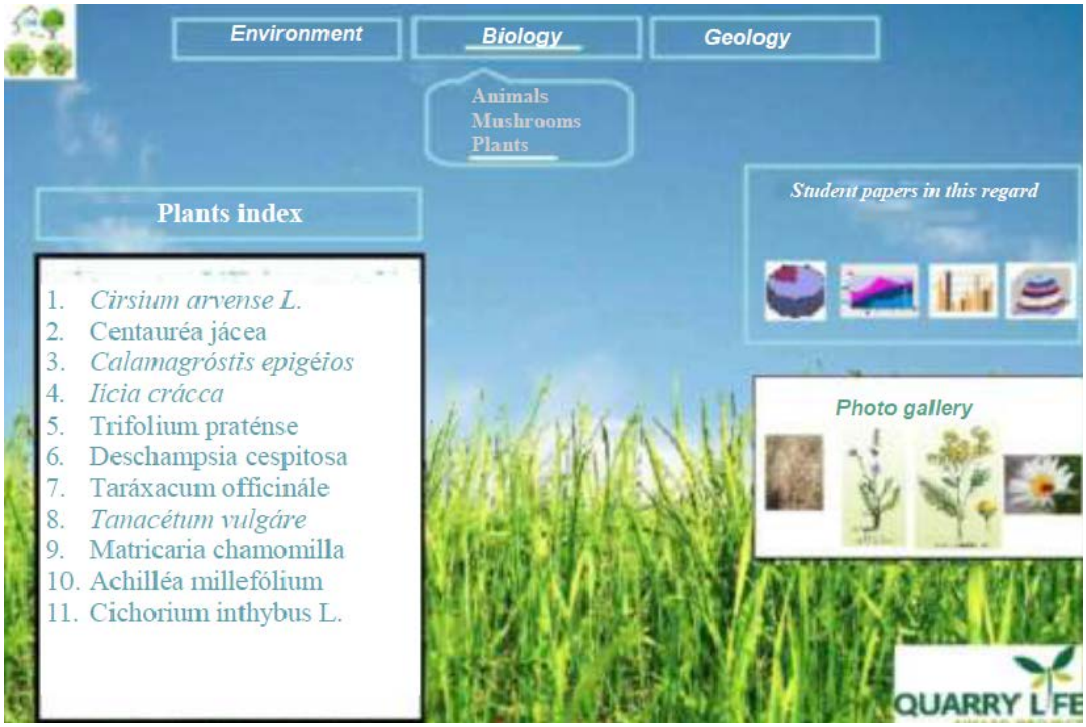


Fig. 2. *"Biology" section of the site, "Plants" subsection*

Click on the selected plant species will lead to the page, where detailed info with regard to this plant will be presented, including the name of the researcher, that has added the species data to the site (Fig. 3).

Fig. 3. *Selected species of plant*

III.Creation of ecological camping

The quarry has a huge territory, which includes, along with mining sites, the untouched areas. Such territories may be used for creation of annual ecological campings (1-2 days) for students familiarization with quarry territory, establishment of friendly relations and benchmarking.

Strategy for creation of ecological camping:

2) Formation of a team, that will be involved into camping creation, from among the students, company representative and volunteers.

3) Installation of the capming visible perimeter and informing quarry employees of the event to ensure safety.

4) Camping planning on the spot selected:

- Sleeping area. This area may be planned in various ways. Optimal way is to locate the tents in half-circle. That will allow for the camp to be visible from one point, that is especially important during the night time.
- Kitchen. The planning shall start with selection of the fire place. It is recommended to arrange the fire place made of bricks, that will minimize the damage made by the fire.
- Wash-rooms and lavatories. Optimal way is to bring the bio-lavatory.
- Installation of waste bins.

5) Preparation of the firewood, potable water, inventory (kitchen, household, etc.).

6) Planning of activities, aimed to two goals simultaneously - recreational and research.

IV. Creation of paleontological museum

The company has a good exanple for creation of the paleontological museum on the quarry basism which has been founded by Ivan Skuin at Shakh-Tau quarry. We suggest to create such a museum at Gurovo-Beton by joint effort of company employees and students. Based on the geological data, the quarry represents several archeological periods and well-preserved petrifaction specimens occur at site, which may become a good basis for the future

museum.

We suggest to start collection of such findings in the hall of Gurovo-Beton headquarters, and to install showcases, where discovered specimens will be presented, aimed to several goals, including demonstration of unindifferent attitude of the company to science, attraction of interested persons and in aesthetic purposes. To encourage employees and students, all the findings will be registered to the name and put into a special registration log. Each showpiece will have a record with discovery location for specialists to define its age. These data will contribute to the science in terms of evolution studies.

V. Biological diversity studies

To extend the knowledge with regard to biological diversity of the quarry, reveal the rate and speed of recovery succession at recultivated territories, for further planning and forecasting of recultivation processes and to define the environmental condition of the ecosystem, we recommend continuous execution of the following studies:

1. For definition of the environmental condition of the ecosystem we recommend sampling of soil, water and air. Sampling shall be carried out at fixed points, which will be marked on the map, presented at web site. To perform laboratory analysis of the soil (at university basis) for presence of cations and anions, detection of heavy metals and other potentially hazardous matters and to plot the dynamics. Analysis of the soil mechanical properties to make the conclusion with regard to plant species suitable for planting at this territory after recultivation. Air shall be analyzed for presence of organic matters and possible contamination. Water shall be analyzed for presence of cations and anions, suspended matters, pH and biota.

Observations will contribute to accumulation of statistic data with regard to area environment changes.

2. Studies of the invertebrate animals biological diversity at stone quarries and recultivated territories is one of the actual and perspective research topics. Knowledge obtained will contribute to recovery and preservation of biological diversity at technogenically disturbed territories, and will allow to formulate practical recommendations for optimisation of ecosystems.

Standard methods are assumed for collection and analysis of invertebrate animals:

- soil sampling;
- soil traps;
- mowing by means of a standard entomological butterfly net;
- determination of invertebrate animals specimens by comparators;
- statistical processing of initial data (specimen listing).

3. Biological diversity of vertebrate animals may be studied by means of observation of both animals themself and traces of animal activities, such as animal tracks on the ground, feed sites, presence and number of nests and hides. The type of the animal may be determined by its tracks. Observation may be carried out both by students and by employees. Data gathered may be registered at web site.

4. Biological recultivation – a peculiar kind of activity. It is defined by specificity of substrata on which the biocenosis is designed. At biological recultivation an important point is selection of the range of types depending on properties of a substratum. We suggest to allocate a trial platform, in the rekultiviruyemy territory (100x100 m), to fill up it with a layer of earth, 30-50 cm thick and more.

For afforestation of a platform it is expedient to use oligotrofny types, i.e. types soils, low-

exacting to fertility (for example, a pine ordinary, a birch warty, etc.). Improvement of growth of plants in adverse conditions requires existence of the symbiotic relations between wood plants (a pine, birches) and mikorizoobrazuyushchy mushrooms or between bean grassy types (a clover, a lucerne, the tributary, etc.) and klubenkovy bacteria.

To receive a grass cover, it is necessary to use the types of perennial plants capable quickly to form a dernina and to stop a deflation of substrata. Treat such views from cereals: fescue red, meadow grass meadow, kostrets bezosty, polevitsa white. From bean it is expedient to enter tributaries white and yellow – the biannual plants possessing good seed renewal.

The choice of the specified plants is caused by the following factors. For example, kostrets bezosty is characterized by high bioecological stability, possesses powerful root system, well detains moisture and is steady against a vymerzaniye; the tributary is chosen as the plant promoting accumulation of nitrogen in soils.

After 3 years it is possible to observe differentiation of specific structure and creation of a steady vegetable cover. Further the given territory the fauna starts occupying. As a result it is possible to reveal the types of flora and fauna which adapted to this district.

VI.Practical implementation of the project

1) To increase the interest to the project, we have organized the guided tour to the quarry (fig.4). Students were able to see all the production stages directly - from raw material production in the quarry to clinker burning in the furnace. After the meeting we have questioned the participants with regard to their ideas based on what have been observed, and the most interesting suggestions are presented in our project.

Fig. 4. *Guided tours to the quarry*

2) A brochure has been developed to inform the students (Fig.5). This brochure was used to distribute the project information among the students. The brochure included address of the pilot web site and contact e-mail.

Fig. 5. *Brochure*

3) Students of TGPU university to the name of L. Tolstoy have participated in the practical activities at the territory of the quarry, including collection of the initial data (Fig. 6) Results of these activities have been further analyzed and processed and the list of flora and fauna specimens has been created for the quarry.

Fig. 6 *Collection of initial materials*

The following species of invertebrates have been discovered:

- Dolycoris baccarum,
- Eurydema oleracea,
- Decticus verrucivorus,
- Aelia acuminata,
- Coreus marginatus,
- Adelphocoris lineolatus,
- Demetrias monostigma Sam.,
- Propylea quatuordecimpunctata Linnaeus,
- Coccinella septempunctata Linnaeus,
- Coccinella quinquepunctata L.,
- Pholidoptera cinerea,
- Rhagonycha fulva,
- Lema lichensis Voet,
- Gonepteryx rhamni,
- Pieris brassicae,
- Philaenus spumarius,
- Zygus pratensis,
- Zygus maritimus,
- Miridae - 3 species,
- Nabis ferus.

The following vertebral species have been observed:

- Capreolus capreolus (Fig. 7),
- Lepus timidus,
- Vulpes vulpes.

Fig. 7. *Track of the roedeer (Capreolus capreolus)*

The following species of plants have been discovered:

- Centaurea jacea,
- Deschampsia cespitosa,
- Calamagrostis epigeios,
- Tanacetum vulgare,
- Trifolium pratense,
- Vicia cracca,
- Cichorium inthybus L.,
- Taraxacum officinale,
- Matricaria chamomilla,
- Achillea millefolium,
- Cirsium arvense L.

3) The pilot site (http://gurovo-q.jimdo.com), has been created, where all the info about the quarry is presented along with the report based on the results of initial data processing.

In 2012 in frameworks of The Quarry Life Award contest in Russia, Professor, Doctor of Science A. Korotkova has performed the research of biological diversity of invertebrate animals of Novogurovsky quarry. The report based on the research was published at the web-site, to make it open to those interested in such researches.

4) An idea for creation of the paleontological museum has been further developed, and the stand has been created in the hall of Gurovo-Beton headquarters with paleontological findings discovered at the territory of Novogurovsky quarry (Fig. 8).

Fig. 8. *The stand with paleontologic finds*

Thus, interaction of the enterprise with higher educational institutions, on a constant basis, will allow to accumulate and systematize valuable knowledge which can be used further in the course of recultivation. And involvement of students of different specialties will allow to receive a full assessment about a condition of an ecosystem in general.

Attachments

Fig. 1. Personnel safety notification

Fig. 2. Acquaintance toproduction

Fig. 3. Acquaintance to production

Fig. 4. Consideration of fossil samples

Fig. 5. Gathering of invertebrates

Fig. 6. Gathering of invertebrates

Fig. 7. Gathering of invertebrates

Fig. 8. Description of flora

Fig. 9. Definition of accurate invertebrates

Some animal species (invertebrate and vertebral) found in the territory.

Eurydema oleracea L.- Pentatomidae family. The body of a bug flattened 5-7 mm long and 3-4 mm wide, black and brilliant. There is on 1 oval spot on the end of a guard and each wing sheath also a longitudinal strip on a perednespinka. Their color at all the young inspired bugs yellow and changes further on white or red. Color of a paunch thus changes with light gray on the black. E. oleracea develops in forest and forest-steppe zones usually in one, in more southern areas - in 2 generations a year. E. oleracea - олигофаг, connected with krestotsvetny plants. It eats mainly on their reproductive organs and in an increase cone zone. From the cultivated cultures the bug damages cabbage, a garden radish, a swede, turnip, a horse-radish, and also oil-bearing crops.

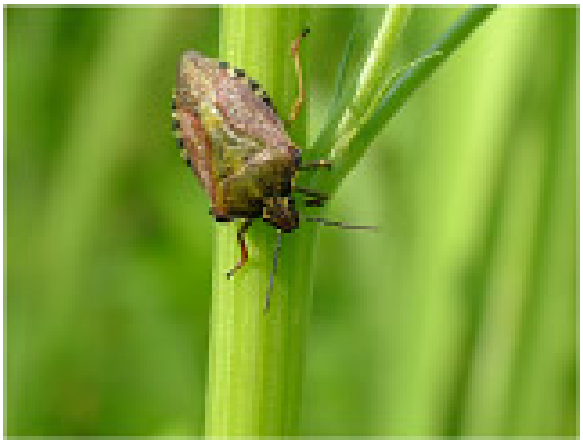
Lema melanopus – a bug of family of listoyed. A body up to 4 mm long, oblong and oval, greenish-blue with metal gloss; breast, hips and shins of feet the yellow-red; short moustaches and pads black. Adult bugs, and then their larvae, gnawing longitudinal strips on leaves, strongly damage shoots of barley, oats, solid and soft wheat.

Latin Elasmucha grisea – a species of bugs from family of wood shchitnik. Eat on various wood plants, including on a birch, an alder, a beech, a holly, a fir-tree, etc. Length of a body of an imago of 6,5-8,5 mm.

Coreus Marginatus - a species of bugs from Krayeviki's family. It is widespread in the territory of Europe. Up to 15 mm long. Coloring brown with bronze outflow. The top part of a paunch is painted in bright henna-red color and it is well noticeable when the bug flies. Usually meets on a sorrel, a rhubarb and other grassy plants. Prefers damp places for life.

Adelphocoris lineolatus – family gadflies (Miridae). An imago of 7,5-9 mm, chartreuse or light color, a point on hips, sometimes 3-4 spots on a perednespinka and two strips on a guard - black; a corium with poorly or strongly developed triangular brownish spot, a body from above in silvery hairs; short moustaches 4chlenikovye, a forward chlenik are 1/5 shorter than head width, the third, fourth and a top of the second chlenik - rusty-black the Wrecker long-term bean культур
It is widespread in the forest-steppe, places – in the steppe; causes damage to a lucerne, a cock's head, sometimes to the tributary, a clover, a lupine and other seed bean cultures.

Nabis ferus. To 8,5 mm in length. Light gray or brown. Meets among bushes and low herbs, and also on the earth. Eats plant louses, cicadas, bugs, flies. They can be met on grassy plants, is more rare on trees and bushes.



Dolycoris baccarum Linnaeus – Family of Shchitniki, up to 1,2 cm long. Pale gray or brownish. Body flat. Short moustaches with long chlenik. Tips надкрыльев lie the friend on the friend, between wing sheaths a triangular guard, a perednespinka trapezoid, a chlenisty hobotok will bend under a body. Emits odorous liquid.
The female postpones eggs for leaves in chessboard order until 50 pieces. In 10-12 days there are larvae which 5 times fade.
Lives on various herbs, trees and berry bushes (for example, on raspberry, currant, bilberry). Prefers a henbane and some other herbs, that are considered as the weed. Eat various herbs, trees and berry bushes.

Aelia cuminata L. – Class Insecta, Hemiptera group, Pentatomidae family, Pentatominae subfamily, sort Aelia. Oligofag - wreckers of grain crops.
Body of an adult bug of an ovoid form of gray-yellow color, 7-10 mm long. The side edges of the head and a perednespinka which aren't pointed; the head triangular, extended. The guard of a triangular form, covers no more than 2/3 paunches. Perednespinka with a cross vdavleniye and three longitudinal ribs. A genital segment of a male with deep cutting. Back and average hips on the lower surface before top with two large black points. Larvae are similar to adults of bugs, however the smaller size, are deprived of wings.
Develops on 85 types of fodder plants, mainly long-term cereal herbs. From cultural plants the winter and spring-sown field, a rye are preferred. Eats also on barley, oats. Bugs eat on leaves of plants on which at first there are decoloured spots, then leaves turn yellow. Damage at the stalk basis is especially dangerous: in this case withering and death of the central leaf is observed. The damaged plants lag behind in growth, look oppressed.

Rhagonycha fulva Scopoli – a bug from family of Myagkotelki (Cantharidae), up to 11 mm long, with soft wing sheaths. Wing sheaths henna-red, with dark tops covered with short hairs. Body reddish-orange. It is active during daylight hours. The bug is carnivorous and is fed with other insects who visit flowers, usually on the umbrella. Larvae also carnivorous. Habitats: Any habitat covered with vegetation. Meadow, the woods, gardens, waste grounds, in roadside vegetation, etc. Area: Europe. Russia.
Time of summer: May-September, depending on the region.

Philaenus spumarius – a polymorphic species of semi-coleopterous insects from family of cicadas-pennits (Aphrophoridae). The adult pennitsa meets from June to September. Adult insect 5-6 mm long, oblong form, yellowish-gray color; forward wings leathery, are krysheobrazno put along a body; the oral device kolyushche-sucking; hind legs of prygatelny type. Larva 3-5 mm long, the greenish yellow. The larvae shipped in the foamy weight allocated by them eat on the lower party of leaves and on escapes. As a result of it leaves become wrinkled, deformed, zavyaz – nedozrazvity. Duration of development of larvae makes 30-50 days. The appeared adult tsikadka not for long live on a lavender; they fly on various grassy plants where eat to the late

fall. Pennitsa the dribbling is widespread everywhere. Mnogoyadny wrecker. Damages a lavender real, wild strawberry, strawberry and many other cultures. Pennits the dribbling prefers the shaded, damp places.

Slepnyaki (Miridae family) – group bugs, or semi-coleoptera, family of a slepnyaka (Miridae). Small insects up to 11 mm long of chartreuse or brown color with gentle covers, an elongated and oval form. In gardens eat web pincers, plant louses, eggs a listovertok, a yablonny plodozhorka.

Decticus verrucivorus. The ordinary insects of meadows, fields and woods known to everyone on the chirring especially amicable and loud in sunny days. A body the pryamokrylykh extended, usually flattened from sides. Wings are most often put krovleobrazno, in a middle part lean one on another, forming a flat platform. At some the pryamokrylykh (crickets and a medvedok) a body wide and slightly flattened, and wings develop plainly one on another, partially covering a body as well from sides. The head the pryamokrylykh elongated and roundish, with the gnawing oral bodies directed down. Eyes and short moustaches are well developed. Breast and paunch the reinforced. The top wings leathery, lower webby, develop fanlikely under top. Hips of hind legs reinforced, usually prygatelny. Females of many types have acerate or acinaciform яйцеклад. Characteristic chirring is published as a result of friction of hind legs about leathery forward wings or forward wings the friend about the friend. At the pryamokrylykh there are also auditory organs perceiving a sound. On these sounds males and females find each other during reproduction.

Propylea quatuordecimpunctata L.
At this ladybug very changeable drawing on wing sheaths. As a rule, it represents ten-fourteen black rectangular spots. The spots which are about a seam надкрыльев merge among themselves. Sometimes spots are increased and, apparently, that wing sheaths of a cow absolutely black, but happens and vice versa - spots very small and it seems that a cow yellow. But on perednespinka at any form of spots it is possible to make out the large, black spot reminding a crown in a form. Eats insects whom looks for on bushes and semi-bushes. In length reaches 5-7 mm.
Lives in the territory of Europe (except Northern Europe) and the European part of Russia (except Far North).

Coccinella septempunctata L.
The ladybug is known to everyone. Its shape is very characteristic and recognizable. Wing sheaths brightly red with black spots, - on three on each wing sheath and one the general prishchitkovy. From below a bug black, his perednespinka also black with two whitish spots. Epimera of a zadnegruda black. Length is 7-9 mm.
Especially gardeners love a cow, after all she eats the most dangerous wreckers of plants - plant louses and shchitovka, and on 60 pieces a day! The scared ladybug emits from joints of the feet badly the smelling liquid - so it is protected from birds and other predators. One female is capable to postpone until 700 eggs for the life, usually for plants among colonies of a plant louse and as a rule, small small groups to 50 pieces. Doll black, motionless. Development from egg to an adult bug proceeds about a month. Cows during the summer give two generations.
The area of distribution is wide. It is Europe, Asia and North Africa, it is partially acclimatized in North America. During the prewinter period bugs can gather in big congestions, being guided by a smell, in foliage on edges of the wood or under stones in mountains, usually on the southern warmed-up slopes.

Coccinella quinquepuncta-ta L. — predator of yablonny and pear deaf adders. The adult cow under fallen leaves winters. At the end of April — in May bugs leave wintering places. Females postpone eggs within more than one and a half months layings. Отродившиеся larvae, as well as adult bugs, hishchnichat, eating larvae of deaf adders. Prefer to occupy pear gardens. One five-dot cow eats more than 1800 larvae of a pear deaf adder in one and a half months of life.

Capreólus capreólus – an artiodactyl animal of family the olenevykh (Cervidae). Have the small sizes: length is up to 135 cm, height is from 70 to 95 cm. Roes live in various deciduous and mixed woods, the exception is made by only a dark-coniferous taiga. These animals can be met in thickets of a bush and a reed at coast of the steppe rivers and lakes. And also roes meet on hillsides on which they rise to the Alpine meadows by height of 3500 meters above sea level. As a rule, roes form congestions from 25 to 40 individuals on 1000 hectares though, depending on habitat conditions, on such square can exist from 3 to 100 heads of roes. Roes in a warm season prefer grassy forages and low shrubs, and late fall

and in the winter – escapes and leaves of deciduous trees and bushes, and also krupnostebelny herbs.

Lepus timidus — a mammal of a genus of hares of group the zaytseobraznykh. Large hare: length of a body of adult animals from 44 to 65 cm, occasionally reaching 74 cm; body weight is 1,6 — 4,5 kg. The average sizes decrease from the northwest by the southeast. The largest white hares live in the tundra of Western Siberia (to 5,5 kg), the smallest in Yakutia and in the Far East (3 kg). Ears long (7,5 — 10 cm), but are much shorter, than at a hare. Tail usually entirely the white; rather short and roundish, 5 — 10,8 cm long. Paws rather wide; a foot, including small pillows of fingers, are covered with a dense brush of hair.

Vulpes vulpes — a predatory mammal of family of canids, the most widespread and largest type of a genus of foxes. Length of a body is 60 — 90 cm, a tail — 40 — 60 cm, weight — 6 — 10 kg. Coloring and the sizes of foxes are various in different districts. Generally, at advance to the north foxes become larger and light, to the south — small and more dimly painted. In northern areas and in mountains black-brown and other melanistichesky forms of coloring of foxes meet also more often. The most widespread color of a fox: bright red back, white belly, dark paws. Often foxes have brown strips on a spine and a shovel, similar to a cross. Common distinctive features: dark ears and white tip of a tail. Externally the fox represents an animal of the average size with a graceful trunk on low, thin paws, with the extended muzzle, sharp ears and a long fluffy tail.

The molt begins in February-March and comes to an end in the middle of the summer. At once after that at a fox starts growing winter fur in which she completely puts on by the boundary of November and December. Summer fur much more rare and short, winter — more dense and magnificent. Foxes differ in big ear sinks locators by means of which they catch sound vibrations.

Some species of plants found in the territory

Centauréa jácea - belongs to grassy perennials of family Slozhnotsvetny (Compositae). The plant with the lilac-purple inflorescences from below dressed by brownish-silvery scales has stalks up to 1 meter high. The stalk and leaves at a cornflower are covered with short hairs. The cornflower from the middle of June till September blossoms. Seeds ripen in brownish-brown shishechka - fruits-semyankakh. A cornflower - the good melliferous plant, insects collect nectar and pollen.

Deschampsia cespitosa – species of perennial grassy plants of a sort Lugovik of family Cereals or Myatlikovye (Poaceae),
Grows to 120 cm. The adult plant has an appearance of the dense hummock created by numerous sheet plates and stalks about 1 meter high. Leaves thin, long, often curtailed, pointed, are covered with the small thorns directed to a leaf top. An inflorescence – a whisk with small cones. The ripened seeds have no dormant period, often give plentiful self-sowing. Cones small (4-6 mm), on legs of different length, elongated and elliptic, flattened from sides, greenish-violet, brilliant, two - (is more rare than three-) floral. Stamens with purple-violet boots. Blossoms in June-July. Well develops on different types of soils, from lungs sandy, to the heavy clay. Maintains drying of the soil, but not bad lives and in boggy places.

Calamagróstis epigéios — perennial grassy plant; type of a sort Veynik, families Cereals. A plant 80-150 cm high with a long creeping rhizome. Leaves linear and broad-gage, bluish or greyish green, rigid, up to 1 cm wide. In a place of transition of a plate of a leaf to a vagina the filmy uvula up to 9 mm long is located. Flowers in the cones collected in the friable or squeezed whisks. A fruit – the extended zernovka, falls down together with pritsvetny cheshuyam. The whole summer blossoms, fruits ripen in August – September. It is widespread in the light woods, on cuttings down, edges, on

meadows and meadow steppes. On open places forms continuous thickets. Prefers sandy soils, but sometimes meets in crude bushes and at the edges of bogs. It is photophilous.

Tanacétum vulgáre - perennial grassy plant, standard type of a sort Pizhma Astrovye's families.
Plant with a strong camphor smell, to 150 cm of height, with a horizontal rhizome and thin shnurovidny lobes of roots. A stalk strong, upright, in an inflorescence the branched. Leaves next, plumose рассеченные on linearly-lantsetnye gear shares. The lower leaves on scapes, other sedentary, from above dark green, from below glaucous, seated by dot pieces of iron. Flower baskets roundish, flat, multiflowered, bright yellow, are collected on a top of a stalk and branches in dense shchitkovidny inflorescences. All flowers in baskets the tubular. A fruit - a small, oblong semyanka, on a bush of their one hundred thousands. Blossoms in July - August, fruits ripen in August - September. The tansy for the second year blossoms. Breeds vegetativno and seeds. Grows on dry and fresh sandy, loamy and clay soils in the light, mixed, broad-leaved woods, on edges, glades, along road roadsides. Pizhma has also medicinal value: broths of leaves use for treatment of wounds, for fight against intestinal parasites.

Trifolium pretense — plant from the sort Clover (Trifolium), families Bean (Fabaceae), subfamilies Papilionaceous (Faboideae).
Height of a plant is 15-60 cm. A stalk upright or ascending, trimmed the pressed hairs. Leaves ternate with the wide stipules narrowed in an awn, which half grew together with a scape, leaflets elliptic, almost smooth-edged, usually with white drawing in the form of a triangle. Flowers are collected in spherical heads. A nimbus papilionaceous, lilac-red (is more rare pale lilac or white), the cup with 10 veins trimmed. Blossoms since the end of May till fall. A fruit — a bean.
Grows on meadows, edges, glades. A warm and photophilous plant, undemanding to soils. It is widespread in Europe in areas with moderately humid climate.

Vícia crácca - perennial grassy plant, type of the sort Peas (Vicia) of Family Bean (Fabaceae). The bird vetch grows on meadows, fields, glades. Its weak stalk reaching in height of 30-120 cm is covered with thin hairs. Leaves plumose, from 7-12 time of leaflets and short moustaches. Blossoms from June to September. Flowers blue-violet or blue round which insects curl. After pollination there are fruits - small beans in which seeds - goroshinka start ripening. Pigeons very much like to eat these peas.
Plumose leaves at a bird vetch very interesting - they can develop or finish depending on force of solar lighting.
There is something interesting at a bird vetch and on roots - there in small outgrowths peculiar "apartments" for the microbes very useful to the soil and food of plants are located. These microbes can make surprising chemical work, taking from air and accumulating in itself nitrogen. From it outgrowths increase and turn into the klubenk filled with valuable substance.

Cichorium inthybus L. — biannual grassy plant of family Astrovy (Asteraceae). In a wild state it meets everywhere. At crops seeds to fall of the first year form the long root of white color in a form reminding carrots, and the socket of radical leaves. After disembarkation of roots in the spring of the second year branchy stalks up to 100 cm high are formed. Radical leaves large, and stem smaller. Blue flowers are collected in baskets in which by fall numerous small seeds are formed. A chicory fruit – a semyanka prismatic which has a cop from films. On one bush of chicory it is possible to collect 3–25 thousand seeds. Chicory blossoms in the summer, and fruits ripen since the end of summer to the middle of fall. It grows on a boundary, hills and along roads. In the medical purposes the plant is grown up in many countries.

Taráxacum officinále — the most known type of the sort Dandelion, family Astrovy (Asteraceae). Perennial grassy plant from family the slozhnotsvetnykh 5 — 30 cm high. Root system of rod type. Main root rather thick, usually vertical, low-branchy; the root neck woolly, is more rare the naked. All leaves to a rose - exact, 10 — 25 cm long, 1,5 — 5 cm wide. Flower arrows a little. They leafless, smooth,

hollow. All flowers reed, oboyepoly, yellow. Roots, stalks and leaves contain white lacteal juice. Fruits — light-brown or brownish semyanka; their expanded part 3 — 4 mm long, in the top half is covered with sharp hillocks with cops from simple rough hairs.
Blossoms in May — July; semyanka ripen approximately in a month after the beginning of blossoming. Repeated blossoming and fructification during the whole summer is quite often observed. In medicine use roots of a dandelion medicinal.
Lives usually in places with the broken natural vegetation, on the slabozadernennykh soils, especially near housing, on steam fields, young deposits. In these conditions quite often forms trade thickets, considerable on the area.

Matricaria chamomilla – annual grassy plant of the sort Camomile (Matricaria) of Family of Astrovye or Slozhnotsvetnye.
Stalk upright, branchy, ridge up to 20 - 60 cm high. Leaves next, sedentary, twice or three times plumose рассеченные on uzkolineyny, to width millimeter floor with the pointed threadlike shares. Baskets with white reed and with median yellow, very small tubular flowers, on long legs, sit one by one on the ends of branches. Petals at a camomile pharmaceutical are located horizontally or lowered down. A receptacle oblong and conic, inside hollow, naked, by the end of blossoming the extended. Mass blossoming - in June blossoms from May to September.

Leccinum scabrum – look spongy shlyapochnykh of mushrooms of a sort Lektsinum of Boletov' family
Grows from June to September in the mixed woods, mainly under birches, forming with them a mikoriza. A hat – to 20 cm, semi-spherical, later subauriculate, smooth, various coloring: gray, gray-brown, brown, dark brown.
The pulp white, dense, doesn't change coloring on a cut or slightly turns pink. Gimenofor whitish, with age grayish or brown with a small roundish time.
Sporous powder yellow-brownish. The leg light, is slightly thickened from top to bottom, to 20 cm, diameter – 1,5-3 cm, fibrous, with dark scales.

Achilléa millefólium - perennial grassy plant; type of the sort Achillea of Family Slozhnotsvetny.
Perennial grassy plant with the creeping shnurovidny rhizome and thin roots. A stalk upright, 10-80 cm high, above branched, at the basis of odrevesnevshiya. Leaves next, lanceolate, peristorassechenny, with the located segments numerous remotely; radical leaves form sockets. Flowers are collected in small (3–4 mm) the baskets forming difficult shchitkovidny inflorescences at top of a stalk and its branchings. Regional flowers reed, pestichny, white, are more rare the pinkish; the median — tubular, bisexual, yellow. Blossoms from May to September. A fruit — a semyanka.

Cirsium arvense L. - families Asteraceae.
Dvudomny plant up to 160 cm high. Has the powerful root system consisting of very long rod root and lateral roots. The rod root goes deep vertically down on depth of 2-4 m and more. Stalk upright, furrowed, quite often pautinisty, branchy. Leaves next, almost sedentary, in an outline oblong ланцетные, quite rigid. Sheet plates integral, vyemchato-gear or plumose and bladed, at the edges the prickly. Flowers same-sex, red-violet, in the baskets collected in a shchitkovidno-panicled inflorescence. A fruit - a semyanka with a short meeting from plumose hairs, oblong, from sides slightly squeezed and poorly curved, to the basis narrowed, and on a top truncated with the ring roller in a place of subsidence of a short meeting. Blossoms from June to late fall. Breeds seeds and vegetativno. Vegetative reproduction comes mainly from the root system (root young growth and root pieces) located in a subarable layer. Very plastic look in the ecological relation. Grows бодяк on fields, waste grounds, pastures, at roads and about housing. Prefers deeply cultivated, systematically processed and fertile soils, heavy on mechanical structure and provided with mineral nitrogen. Malicious and most difficult uneradicable weed of field cultures, kitchen gardens and gardens.