Підсрібник Адиппа *Argynnis adippe* (8 особин). В Україні поширений повсюдно за винятком південних безлісних ділянок степової зони. Побачити його можна переважно на лісових галявинах та просіках, на півдні в ярах, на степових схилах.

Перлівець таволжаний, Іно *Brenthis ino* (2 особини). В Україні поширений повсюдно, крім безлісних ділянок степової зони. Побачити можна на луках та лісових болотах.

Слід зазначити, що всі ідентифіковані нами види поширені повсюдно або локально на території України і населяють різноманітні відкриті й екотонні біотопи, луки, лісові узлісся, галявини і просіки, чагарники, а також сади та присадибні ділянки, парки і сквери, поля, пустирі й ін.

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MUTATION PROCESSES IN THE *DROSOPHILA MELANOGASTER* POPULATION UNDER THE ACTION OF TITANIUM NANOPARTICLES

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Nanoparticles are parts or materials that have a size on the nanometer scale (one billionth of five meters). These parts can have

different shapes (spherical, curved, lamellar, etc.) and can be made of different chemical materials (metals, oxides, polymers, composites, etc.). Nanoparticles are particles or materials with a size in nanometers, which gives them unique properties. They have a high potential for application in various spheres of human life, in particular in medicine, and they are effective [2]. However, it is important to demonstrate the toxic and mutagenic effect of some nanoparticles, which limits their effective use in medicine. For example, the mutagenic effect of nanoparticles of titanium, nickel and taium requires additional research. Mutations, which are persistent changes in the genotype, pose certain challenges to potential but also carry evolutionary weight [3].

The purpose of our study was to study the dependence of quantitative indicators of mutations in the population of *D. melanogaster* on the action of titanium nanoparticles.

The experimental study of the mutagenic effect of titanium nanoparticles involved the selection of the most suitable test object, the determination of the composition of the living environment for the development of test organisms, as well as the development of the methodology and plan for conducting this study. A pure line of *D. melanogaster* of the Canton S line was chosen as a test object for the analysis of the mutagenic effect of the investigated nanoparticles. The corresponding population groups of test organisms represented the wild type of *D. melanogaster* with dominant manifestations of the main ones: body color, eye color, wing shape. The mentioned pure lines of *D. melanogaster* of the Canton S line were maintained on the basis of the Department of Biology of the Chernihiv Collegium National University named after T. G. Shevchenko. The experiment was conducted from June to December 2023.

The study of the mutagenic effect of titanium nanoparticles was carried out separately for higher (0.01 g/cm^3) and lower (0.001 g/cm^3) concentrations. Approximately 650 sexually mature D. melanogaster plants of the Canton S line were used for the experiment. To analyze the characteristics of inheritance of mutational changes, mutation carriers were analyzed in the first and second generations.

Preliminary analysis of the identified mutations allows us to establish how certain concentrations of nanoparticles affect the ontogenesis of *D. melanogaster* individuals. It is worth noting that the

mutagenic effect of different concentrations can be different, and in some cases it may not even be. We consider the features of these mutations among individuals of *D. melanogaster* in different generations in more detail. As before, the control group was separated to distinguish mutational changes from modification ones. The absence of changes in the phenotype of *D. melanogaster* individuals of the first and second generations of the virus indicates that the detected phenotypic changes are caused by the mutagenic effects of nanoparticles themselves, and not by other environmental factors [4]. The hereditary nature of these changes is confirmed by similar changes in different generations. Considering the specific phenotypic manifestations of individual mutations, it can be noted that the mutagenic effect of titanium nanoparticles is manifested, in particular, in the reduction of the size of the wings, the increase in the length of the proboscis, and the appearance of additional antennae.

The obtained data on the excellent number of individuals of different conditions in the first and second generations under the influence of the analyzed concentrations of the tested titanium nanoparticles were subjected to statistical methods. The use of the non-parametric Mann-Whitney U-test confirmed that the number of individuals of different sexes in the first and second generations is statistically different under the influence of titanium nanoparticles in concentrations of 0.01 g/cm^3 and 0.001 g/cm^3.

To distinguish mutational changes from modification ones, we separately analyzed the control group, in which the development medium did not contain the studied nanoparticles [1]. Detection of white mutations in individuals of the first and second generations in the control group of diseases about the hereditary nature of other changes that were expressed in individuals that developed in the presence of the studied nanoparticles [5]. Also, a significant deviation was found in the ratio of individuals of different conditions in the experimental groups from a statistically significant disease about the possible lethal effect of mutations that arose as a result of the presence of the studied nanoparticles in the environment, on individuals of a certain condition (in our case, male).

The processing of the results of the practical research made it possible to note a number of features. The absence of mutations in individuals of the first and second generations of the control group

testifies to the hereditary (mutational) nature of other detected changes in individuals whose development occurred under the conditions of the effect of the studied nanoparticles. The detected significant deviation of the ratio of individuals of different sexes in the experimental groups from the statistically reliable one indicates the possible lethal effect of mutations caused by the presence of the studied nanoparticles in the environment on individuals of a certain gender (in our case, male). Titanium particles have the greatest mutagenic effect among the studied nanoparticles (mutations are detected if even small concentrations of the corresponding nanoparticles are present in the development environment).

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NEW GREGARINES SPECIES (APICOMPLEXA: EUGREGARINIDA) OF DARKLING BEETLES IN STEPPE DNIPRO REGION.

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Gregarines (Gregarinasina: Apicomplexa) are unicellular organisms that live in the body cavities of numerous aquatic and terrestrial invertebrates, primarily in their digestive systems. The nature of the relationship between gregarines and their hosts is still not fully understood: some researchers consider them parasites that put pressure on the host population, while others define them as endobionts [1]. This issue still requires further research. Today, the scientific literature focuses primarily on faunal studies of gregarines. There are numerous references to gregarines, known from millipedes, ground and darkling beetles, dragonflies, crickets, cockroaches, crustaceans, earthworms, mollusks, echinoderms and other terrestrial, freshwater and marine organisms [2].

Compared to other parts of the world, data on the gregarine fauna of Ukraine is rather fragmentary. Since a significant part of our country is located within the steppe and forest-steppe zones, the darkling beetles (Tenebrionidae: Coleoptera) play a significant role in its entomofauna. There are numerous evidences of gregarines living in the body of beetles from this family, and some gregarine families (e.g. Stylocephalidae) are known only from darkling beetles. Gregarines are found in the digestive tracts of dozens of species of darkling beetles living in Southern, Western and Central Europe, Asia Minor and Central Asia, the Hindustan Peninsula, Indochina and the New World. As for Eastern Europe, there are only a few references from Bulgaria, and most Eastern European gregarines have been described from the entrails of ground beetles [3].

The lack of data on gregarines from the Ukrainian fauna actually prompted us to conduct the relevant research. The aim of our