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BIOLOGICAL CONSEQUENCES OF THE CHERNOBYL DISASTER

Introduction. On April 25 and 26, 1986, the worst nuclear accident in history unfolded in what is now northern Ukraine as a reactor at a nuclear power plant exploded and burned. The explosion of one of the four nuclear reactors of the Chernobyl nuclear power plant on 26 April 1986 released huge amounts of radioactive elements into the atmosphere that polluted vast areas in adjacent continents. This catastrophic accident initiated involuntarily the largest-scale experiment to date about the effects of ionizing radiation on natural ecosystems. A wealth of studies on the consequences of radiation in Chernobyl have accumulated for more than two decades, revealing associations between levels of radiation and the abundance, distribution, life history and mutation rates of plants and animals [3,4,9].

Research material and methods research: the impact of the disaster on the surrounding forest and wildlife also remains an area of active research. In the immediate aftermath of the accident, an area of about four-square miles became known as the "Red Forest" because so many trees turned reddish-brown and died after absorbing high levels of radiation.

Today, the exclusion zone is eerily quiet, yet full of life. Though many trees have regrown, scientists have found evidence of elevated levels of cataracts and albinism, and lower rates of beneficial bacteria, among some wildlife species in the area in recent years. Yet, due to the exclusion of human activity around the shuttered power plant, the numbers of some wildlife have increased. In 2015, scientists estimated there were seven times more wolves in the exclusion zone than in nearby comparable reserves, thanks to humans' absence.

The effects of radiation on parasites, microorganisms: much less is known, however, about the radiation effects in *eukaryot*ic and *prokaryotic members* of the microbial communities [6].

The study of how radiation affects other *microbial eukaryotes is practically non-existent, despite the attention created by micro-fungi* in Chernobyl soils and nuclear power plant reactor ruins due to their radioresistant properties. The situation is not much better for *prokaryote*s. There are a number of studies related to the increase of *pathogenic bacteria* and viruses, including retroviruses, mostly in relation to human health [8].

In connection with the Chernobyl Nuclear Power Plant (ChNPP) accident and the negative ecological after-effects for biota in this zone the interest has arisen to radioresistant *bacteri*a, as to the most dynamic model of the given ecosystem, and to mechanisms which provide resistance of *bacteria* to ionizing radiation. The analysis of published data has shown that the radioresistant bacteria are not interrelated taxonomically and phylogenetically. The extreme radioresistant *bacteria* are represented by the *Deinococcus species*, which form a group phylogenetically close to the line Thermus-Meiothermus. Other radioresistant bacteria are the representatives of the genera *Rubrobacter, Methylobacterium, Kocuria, Bacill*us and some *archebacteria*. The extreme resistance of *D. radiodurans* to the DNA damaging factors is defined by 1) repair mechanisms which fundamentally differ from those in other *prokaryotes;* 2) ability to increase the efficiency of a standard set of the DNA repairing proteins [2].

In addition to sources related to the use of nuclear power plants, research centers and hospitals, ionizing radiation occurs naturally in certain deep-sea hydrothermal vents, and high levels of radioactivity have been measured in their associated biota [7].

These conditions select for organisms that are naturally resistant to high doses of ionizing radiation (up to 30 kGy), such as *Thermococcus gammatolerans* and other highly radioresistant archaea that have been isolated from the Guaymas basin in the Pacific and the Mid-Atlantic Ridge. Extreme desiccation and UV radiation can also select for organisms highly resistant to ionizing radiation.

This is not surprising, given that both can lead to similar effects on cellular macromolecules. UV radiation causes a variety of photochemical damages on DNA that, ultimately, may lead to mutations and to single or double strand breaks. These include, notably, the dimerization of adjacent pyrimidine bases, but also other lesions mainly derived from, specifically, UVA-derived oxidative damage. Similarly, ionizing radiation produces oxidative damage in DNA and proteins due to the generation of free radicals [1].

The most radioresistant organisms *Deinococcus* and *Rubrobacter* species are frequently retrieved from rocks and soils of cold and hot deserts Several species of these genera are resistant to other extreme conditions as well, being thermophilic or resisting alkaline conditions and solvents toxic for many other organisms. Thus, some *Rubrobacter* strains have been isolated from hot springs and wall paintings, where they are responsible for rosy discoloration. Many isolated strains are also resistant to ionizing radiation suggesting that organisms adapted to xenophile and UV-radiation are naturally adapted to cope with ionizing radiation as well [5].

Conclusion: the concept of adaptive radiation has come to mean many different things. To some researchers, it has been virtually synonymous with speciation. To others, it involves an association between overall diversification and adaptive changes in ecological and behavioral characters, as well as a high degree of homoplasious phenotypic change. *Parasitic organisms* are thought to be paradigm examples of adaptive evolution (Price 1980) and thus, by extension, good model systems for phylogenetic studies of adaptive radiations, exhibit a rich mosaic of evolutionary diversification in reproductive, developmental, and ecological characteristics.

Sources of literature and information.

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