CIS as a successor of the Soviet Union: who is financially responsible for the uranium waste storage sites in Kyrgyzstan?

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As the Second World War came to an end and the Cold War just started, the Soviet Union was faced with a problematic necessity of the nuclear weapons' production. Indeed, the Soviet Empire was in the extreme need of such weapons since their possession was viewed as an only guarantee of peaceful relations between USSR and United States. Exactly in that period the Soviet Union started its intensive exploitation of the large radioactive ore deposits (basically, uranium and radium), located on the territory of the present-day Kyrgyzstan. Throughout the post-war *cold* period and right up to mid-80s Kyrgyzstan had been one of the leading producers of uranium in the Soviet Union. In fact, the first Soviet atomic bomb was produced using Kyrgyz uranium. In the intense arms race with United States there was no time to concern oneself with environmental and demographic protection of the exploited territory, unfortunately. The role of the Kyrgyz ASSR (Kyrgyz Autonomous Soviet Socialist Republic) was to provide raw materials, concurrently being a conveniently remote place to treat foreign radioactive ores (imported from Eastern Germany and Czechoslovakia) and serving as a burial place for their wastes. Creating an enormous amount of the radioactive wastes, the uranium and radium ore deposits were located in immediate proximity to highly populated areas; in the basins of transboundary rivers; and in the seismic-active regions of the Republic. As it could be legitimately assumed, the Soviet Union was not deeply obsessed with the environmental peculiarities of the treated area and did not give a damn to its protection, being solely interested in the maximization of the uranium extraction. In 1991, immediately after the Soviet Union's dissolution, the Russian Federation officially proclaimed itself its successor. Consequently, it was Russia that received the bigger part of a huge military potential (particularly, nuclear one) of its predecessor, including the nuclear weapons' arsenal. Yet, the newly independent Kyrgyz Republic was left alone with an enormous amount of uranium waste, which was extracted on the Kyrgyz territory to produce these nuclear armaments. As a consequence of the Soviet policy, uranium waste storage sites represent a direct danger to the environment of present-day Kyrgyzstan. Therefore, Russia as the official successor of the Soviet Empire should help the Kyrgyz Republic to deal with this costly and extensive problem. These environmental issues serve as a basis for the given work. In turn, research will be primarily concentrated on several the most problematic radioactive waste storage sites – namely, the *Mailuu-Suu*, *Kadji-Say*, *Kara-Balta*, and *Ak-Tuz* uranium storages. Today, Kyrgyzstan has 50 radioactive waste storage sites, located throughout its territory and contained altogether about 300 million tons of wastes. In general, it could be suggested that the financial responsibility could be delegated to (1) the Kyrgyz government; (2) the Central Asian Community; (3) Russia. It is clear with the first instance, the Kyrgyz government, as it ought to deal with the environmental problems of its country. The situation is more sophisticated and arguable in terms of second and third instance – namely, the Central Asian Community and, particularly, Russia. This paper is designed to prove not only the necessity for their involvement, but rather their responsibility for the present-day situation with the Kyrgyz storage sites. As regards the other Central Asian States, it is in their interests since they are under immediate threat of being affected. Concerning Russia, it is rather a moral right to demand its assistance than a legally legitimate one.

All information, related to uranium, its extraction and further utilization was totally classified and only revealed after the Soviet Union's dissolution. Only in 1994 did the Kyrgyz public become acquainted with the truly poor environmental conditions of the newly fledged Republic. Yet, no radically efficient measures had been undertaken during the following 6 years of Kyrgyz independence. Consequently, it has become apparent that Kyrgyzstan is not able to solve its problems because of the lack of resources. Even the preliminary monitoring of the radiation conditions in the most endangered areas indicates a cost approximately US $ 3-5 million. For instance, the sanitation of the *Mailuu-Suu* complex is valued at about US $ 0.5-0.7 million per storage site, while there are 23 of them. The given research has presented a broad analysis of the current ecological situation in Kyrgyzstan, having revealed and described its most problematic and challenging cases. In addition, it has included a series of short interviews that have been conducted by the author in order to elucidate people's awareness about and attitude toward the present-day

grave conditions of the Kyrgyz environment - especially, in the case of radioactive wastes. Predominantly, the author's main objective was to prove the necessity for CIS's involvement and cooperation in dealing with Kyrgyz waste storages since Kyrgyz uranium served for the defense of the whole Soviet Empire.

Изучение адаптивного ответа у самок Drosophila melanogaster при действии γ-радиации

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Study of the adaptive response to γ-radiation in females of Drosophila melanogaster

The paper concerns the study on adaptive response in females of Drosophila melanogaster at different oogenesis stages using the test of dominant lethal mutations. The radio-adaptive response was revealed at the stage of mature oocytes (stage 14-7) the exposed γ-rays. An adaptive response is directly related with the repair system DNA operation.

Возрастающее загрязнение окружающей среды веществами антропогенного происхождения, в частности радиоактивными отходами, делает все более актуальной задачу выяснения отдельных биологических эффектов, индуцированных облучением. Реакции организма на действие ионизирующего излучения многообразны. Феномен адаптивного ответа (АО) является проявлением адаптивной реакции живых организмов на действие ионизирующей радиации в малых дозах. Формирование АО сопровождается повышением устойчивости тест-объекта к высоким (повреждающим (ПД)) дозам генотоксического агента после предварительного действия его низких (адаптивных (АД)) доз. Временной интервал между воздействиями, как правило, составляет несколько часов [3].

Реакция адаптивного ответа обнаружена на лимфоцитах человека и кролика, клетках китайского хомячка, при облучении клеток костного мозга и сперматоцитов мышей, а также на растительных объектах и у микроорганизмов [3,4]. Однако явление АО у насекомых исследовано недостаточно.

Мы учитывали актуальность проблемы адаптации организмов, поэтому поставили перед собой цель проанализировать адаптивный ответ по тесту доминантных летальных мутаций (ДЛМ) у самок дрозофилы на разных стадиях оогенеза.

В качестве объекта исследования была использована линия Canton-S Drosophila melanogaster. 3-5-дневных виргинных самок данной линии предварительно облучали АД, равной 0,2 Гр, и через 4,5-5 часов ПД, равной 2 Гр; 5 Гр. На контрольных женских особей дрозофилы одноразово воздействовали γ-квантами в дозе 2,2 Гр; 5 Гр. Облученных самок индивидуально скрещивали с самцами.

Стадии оогенеза определяли методом последовательных яйцекладок [1]. Яйца, которые самки откладывали в течение первых двух дней, в момент воздействия находились на стадии 14-7 ооцитов. Яйца, отложенные в течение следующих двух дней, — на стадии 7-1 ооцита. В последующие дни самки откладывали яйца, бывшие в момент воздействия оогониями. В связи с тем, что оогонии дрозофилы практически нечувствительны к любым повреждающим факторам [2], в эксперименте анализировали только первые две кладки.

γ-облучение зрелых ооцитов (стадия 14-7 ооцитов) Drosophila melanogaster в АД (0,2 Гр) делает их устойчивыми к возникновению ДЛМ последующими ПД γ-радиации. Согласно результатам исследования наблюдались достоверные различия между вариантами с фракционированным и одноразовым облучением по эмбриональной (0,2+2Гр и 2,2 Гр; 0,2+5 Гр и 5 Гр), постэмбриональной (0,2+2 Гр и 2,2 Гр) и суммарной летальности (0,2+2Гр и 2,2 Гр; 0,2+5 Гр и 5 Гр). Это можно объяснить работой репарационных систем в ооцитах, которые находятся на разных стадиях гаметогенеза. Предполагается, что в процессе эволюции выработалось приспособление — дифференциальная работа систем репарации ДНК, – обеспечивающее относительное постоянство генотипа зрелых клеток.