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ON THE GENETIC FECUNDITY AND RESILIENCE OF THE FEMALE SEX

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Annotation. Objective. The genetic resistance of females of natural animal species to adverse environmental factors seems to reduce the likelihood of the emergence of new traits through females and ensures the stability of the species.

Material methodology. The objects of biomonitoring were natural species of vertebrates: lake frog 2 n - 26; steppe tortoise, 2 n - 50; tree sparrow; Wild Mouse 2 n - 40. The animals were caught in two ecologically different areas, where various types of pesticides have been intensively used for many years and where pesticides were not used. A total of 112 frogs (62 from the more polluted and 50 from the less polluted zone), 84 (56-28) turtles, 42 (28-14) sparrows and 326 (205-115) mice were examined. **Results.** In each family of wild mice caught in the Pakhtakor district, from 1 to 3 offspring were observed. 39 out of 98 families had one offspring, 45 had 2 offspring, and only 12 had 3 offspring. Thus, it is more common to have 2 offspring in families.

In the Zaamin Nature Reserve, 2-3 times more offspring were observed in the families of wild mice than in the Pakhtakor district, and no families with one offspring were found. Families with even 6 offspring were observed. The small number of offspring in wild mice of the Pakhtakor district is apparently due to dominant lethal mutations caused in mice contaminated with pesticides.

Introduction

According to the literature, fertility and stability of the female sex have been determined in various animal species, both natural and laboratory species. The genetic resistance of females of natural animal species to adverse environmental factors seems to reduce the likelihood of the emergence of new traits through females and ensures the stability of the species. We study the fertility and resistance of various vertebrate species living in cotton fields.

Material methodology

The objects of biomonitoring were natural species of vertebrates: lake frog (Rana ridibunda) 2 n - 26; steppe tortoise (Testudo horsfieldl), 2 n - 50; tree sparrow (Passer nontans); Wild Mouse (Mus musoulues) 2 n - 40. The animals were caught in two ecologically different areas, where various types of pesticides have been intensively used for many years (Jizzakh region, Pakhtakor district - more polluted) and where pesticides were not used (Jizzakh region, Zaminsky reserve - less polluted). A total of 112 frogs (62 from the more polluted and 50 from the less polluted zone), 84 (56-28) turtles, 42 (28-14) sparrows and 326 (205-115) mice were examined.

Wild mice were captured for 8 years using the method we developed (1). In wild mice, the number of polyploid cells in the bone marrow, the sex ratio in mature animals, and the number of offspring (under the age of 1 month) in individual families were determined. To study the level of spontaneous mutation in wild mice kept in a vivarium, they were divided into 3 groups. The mice of the first group were slaughtered immediately after being brought from the fields. Animals of the second and third groups were kept in the usual conditions of the vivarium and slaughtered after 2 and 5 months. after capture. To account for chromosome aberrations in metaphase, preparations from bone marrow cells were prepared according to the generally accepted method [2].

Results and discussion.

In each family of wild mice caught in the Pakhtakor district, from 1 to 3 offspring were observed. 39 out of 98 families had one offspring, 45 had 2 offspring, and only 12 had 3 offspring. Thus, it is more common to have 2 offspring in families.

In the Zaamin Nature Reserve, 2-3 times more offspring were observed in the families of wild mice than in the Pakhtakor district, and no families with one offspring were found. Families with even 6 offspring were observed. Of the 85 families studied, only 2 families had 2 offspring, 30 families had 3 offspring, 36 families had 4 offspring, 15 families had 5 offspring, and 2 families had 6 offspring. Consequently, there were 2-3 times more offspring in the families of mice in the Zaamin Reserve than in the Pakhtakor district. It should be noted that similar works have not been found in the literature available to us.

The small number of offspring in wild mice of the Pakhtakor district is apparently due to dominant lethal mutations caused in mice contaminated with pesticides. The data of our experiments showed that magnesium chlorate and Actellic, as an environmental pollutant, when administered once and repeatedly (3 months) to laboratory mice, induce dominant lethal mutations that cause embryo mortality both

before and after implantation. The decrease in the number of offspring per family in mice from contaminated areas is probably due to the death of embryos, among which a larger number were male, since they are less resistant to adverse environmental factors than females. Thus, pesticides as an environmental factor can markedly affect the level of spontaneous mutation of the genetic structure, the abundance and stability of the species.

However, living organisms can resist mutagenic environmental factors and selection pressures in a variety of ways. The possibility of a reparation system in the process of adaptation of organisms to changing environmental factors has been well studied. However, the genetic protection of wild fauna living in places where air, water and soil are intensively polluted with various types of pesticides is not well understood.

The total mitotic index of bone marrow cells in wild mice was 3 to 6 times greater (5.83 to 9.53) than in laboratory mice (1.70). It is especially high in animals of the first group (9.53). In the third group, this index remained high (5.83) compared to the laboratory animals.

Changes in the frequency of chromosome aberration in wild mice when kept in a vivarium.

Timing of slaughter After Capture	Number Studied		Metaphases with reconstructions		PCE with microkernels (per 9,000 cell)		Correlation Polychromatofil erythrocytes to mature	Mitotic index
	Animals	Metaphase	Number	%	Number	%		
Immediately after capture	17	158	37	Wild Mouse 2.34±0.38	920	10.22±0.31 AM	0.21±0.04	9.53±0.15
After 2 months	17	160	21	1.31± 0.28	420	4.66±0.52	0.48±0.057	6.08±0.12
After 5 months	16	142	14	0.98±0.26 Lab Mouse	169	1.88±0.35	0.74±0.06	5.83±0.49
	14	145	3	0.62±0.20	170	1.97±0.36	0.70±0.03	1.70±0.04

The results of the experiments showed that the number of cells with chromosome rearrangements and polychromatophilic erythrocytes with micronuclei in the bone marrow of wild mice caught in cotton fields is 4-5 times higher than in laboratory mice. The increased rate of chromosome mutations in wild mice is not related to their species specificity. For example, wild mice caught in the protected area were found to have 3-4 times fewer chromosome rearrangements. The results of the studies also indicate that when mice are kept in a vivarium, the level of chromosome aberrations decreases to the level of laboratory mice (Table 40).

The 4-5-fold increase in the number of chromosome rearrangements and polychromatophilic erythrocytes with micronuclei in wild mice compared to laboratory mice once again convinces us that pesticides as environmental pollutants, getting into the body of animals through the food chain, can affect the genetic apparatus and increase the spontaneous level of mutations.

However, the number of cells with chromosome rearrangements in bone marrow cells in wild mice does not correspond to the number of cells with micronuclei. There are almost 2 times more such cells than cells with chromosome rearrangements. This is explained by the fact that when observing chromosome rearrangements, we did not take into account aneuploid cells. It is known that large micronuclei are the whole chromosome. Among polychromatophilic erythrocytes, cells with large micronuclei were often found.

The pesticides used also seem to have a toxic effect on the body of wild mice, since they showed a decrease in the mitotic activity of erythroblasts even after 2 months. after capture. Only after 5 months. The number of polychromatophilic red blood cells was restored to normal levels. The high level of the mitotic index in wild mice is probably due to the fact that instead of abnormal cells, normal cells are intensively formed in the bone marrow.

The decrease in the incidence of chromosome aberrations in wild mice when kept in a vivarium appears to be due to the elimination of damaged cells. It is known that mutant cells of the body undergo selection in the process of their functioning and reproduction, as a result of which elimination occurs. The processes of elimination of chromosomal mutations are more complex and diverse in their mechanisms.

The observation of a change in the sex ratio towards females seems to be associated with the different vitality of the male and female sexes. Many male animals have a higher metabolic rate and less resistance to adverse environmental factors, which leads to a decrease in their numbers. This may also be due to the occurrence of a recessive lethal mutation in the sex chromosome, since in a homozygous state in the heterozygous sex, such a mutation leads to death.

Resistance to environmental factors, i.e. pesticides, found in females is apparently the result of genetic change and is inherited by natural selection. As a rule, this process is very slow in warm-blooded animals, while in cold-blooded animals the rate of generation is accelerated. A large number of generations among warm-blooded animals is usually characteristic of rodents, so wild mice are genetically adapted to the action of pesticides.

Thus, to the action of harmful environmental factors, including pesticides, certain defense mechanisms are developed in the body of animals. These mechanisms gradually become hereditary traits and are easily fixed by natural selection. By applying various types of pesticides, including pesticides, man significantly accelerates natural selection.

According to the literature, the resistance of the female sex has been proven in various species of animals, both natural and laboratory, for example, in the pine vole - to endrin, in the common vole - to rotindan, in rabbits - to mitalnitrophos. The genetic resistance of females of natural animal species to adverse environmental factors seems to reduce the likelihood of the emergence of new traits through females and ensures the stability of the species.

Genetic resistance of female sex has also been observed in the study of sex ratios in humans. The shift in favour of girls at birth and later in life is associated with their greater vitality compared to boys. This is due to the presence of diploidy on X chromosomes in girls. Recessive mutations that weaken viability occur when a single chromosome is present in boys. In girls, these mutations, as a rule, are in a heterozygous state and have not shown developmental shifts. Boys, as a hemizygous sex, exhibit new mutations obtained from heterozygous mothers, which leads to a weakening of their viability in ordinary, and even more so in extreme conditions.

It is known that about half of children with trisomy syndrome on the 18th pair of chromosomes live up to 2 months, 1/3 - up to 3 months. And only 1-2% - up to an older age. Girls with trisomy on the 18th pair of chromosomes can live up to 10.5 years. It should be noted that girls are more common among patients with trisomy (3:1), which reflects the possible increased intrauterine mortality of boys.

As you know, among Muslims, a daughter gets married and leaves her father’s house. In the groom’s house, new people and unusual conditions appear. Girls have been obeying this since the dawn of time. Our ancestors, even before the advent of genetics, seem to have noticed the resilience of the female sex.

LITERATURE

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