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# RED-EARED TURTLE - A PET OR A SOURCE OF DISEASE?

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The article discusses the specifics of keeping Trachemys scripta elegans (Reptilia, Testudines). The morphometric features of the carapace measurements of males and females were studied, and the main morphological differences of the mosaic of carapace scutes of the red-eared turtle in Odessa were analyzed.

It was found that the morpho-atomic features and the percentage of the studied reptiles that had external morphological signs of common diseases indicate a good adaptation of Trachemys scripta elegans (Reptilia, Testudines) to the ecological conditions of Odesa. The morphometric features of Trachemys scripta elegans, Odesa, correspond to the general species data, and the presence of a carapace with an asymmetric mosaic of scutes is a rare phenomenon.

**Keywords:** morphology, morphometric features of the red-eared turtle, shell, maintenance, diseases.

## STATEMENT OF THE PROBLEM, ANALYSIS OF CURRENT RESEARCH

The red-nosed turtle is a pet that until recently was considered an exotic animal. Trachemys scripta elegans (Reptilia, Testudines), currently extremely widespread on many continents of the globe. In natural conditions, the red-eared creeper lives in small bodies of water with a low, marshy bank [1, 2].

**Fig. 1.** Turtles in the conditions of a closed small pond.

The place of origin of this species is Central America, the east of the United States and the northeastern region of Mexico. The ability of this species of turtle to survive in swampy water conditions, low temperatures and unpretentiousness to food contributed to their rapid spread far beyond the natural range [2, 3].

Currently, pet owners prefer this particular reptile due to its unique body shape, small size, long life span, undemanding to food, widespread opinion about ease of care, and the optionality of daily communication with a pet [1,4].

However, there are several significant restrictions regarding housing, feeding and care conditions:

- the length of the shell of the red-eared creeper can reach more than 40 cm, with an average weight of 3.2 kg [6, 7], so it is necessary to create specific conditions of keeping. Myths about undemanding turtles complicate the life of the latter, and with improper care cause a slow death. Therefore, it is necessary to have a 200-liter aquaterrarium, ultraviolet and warming lamps, special soil and a powerful filter.

**Fig. 2.** Male and female Trachemys scripta elegans (Reptilia, Testudines).

The female is larger, has well-developed jaws and a short tail. Red-nosed turtles are reptiles and predators, so they need a specific diet. In addition, due to its omnivorousness, the red-eared turtle (slider) is an ideal opportunistic reptile, since it feeds on almost all invertebrates (shrimps, molluscs, crabs, snails), insects, vertebrates (fish, rodents, frogs, lizards, birds, snakes), and some aquatic plants (ferns, algae, seeds). Therefore, it is necessary to add calcium, vitamins, etc. to the rations.

Feces of the red-eared turtle appear in the aqua terrarium every day, and they stink. Because of this, a powerful filter is needed, and regular cleaning, which combines changing the water, cleaning the floor, washing the glass, etc. Sometimes reptiles, irritated by intrusive attention, can bite a caring owner, so it is better to just watch the turtles. Under the right conditions, turtles can live 40-50 years, which is both a minus and a plus. Turtles, like all living creatures, get sick, so you need to look for a special veterinarian - herpetologist for your pet.

It is this fact that gives relevance to our research, and first of all, it is necessary to highlight the morphological features and the most common diseases of the red-eared turtle.

**PURPOSE OF RESEARCH:** to study the issue of morbidity of various etiologies and to determine the peculiarities of the morphometric parameters of the shell of red-eared turtles in Odessa.

## MATERIALS AND RESEARCH METHODS

- Analytical method (analysis of literary sources on non-contagious, infectious and invasive diseases of red-eared turtles);
- parametric method (the number of individuals of different sexes in different halos of existence);
- clinical method (general examination, behavioral reflexes);
- laboratory method (weighing and morphological measurements);
- biometric method (digital data processing);
- biostatistical method (information technologies, computer programs).

The object of the study was the peculiarities of the morphometric parameters of the shell of red-eared turtles living in the reservoirs of the Peremogy Arboretum, Dyukivskyi Park in Odesa, and the coastal zone (along 1 km) of the Khadzhibey estuary located at a distance of 9.5 km from the city of Odesa, as well as non-infectious, infectious and invasive diseases of the above reptiles.

In the first experiment, which studied the number of individuals of different sexes in different areas of existence and the prevalence of diseases, 125 adult turtles of the "Peremoga" Arboretum, 17 turtles of the "Dyukivskyi Park" of Odesa and 22 representatives living in the coastal zone of the Khadzhibey Estuary were involved.

Differences in the location of shields on the carapace, morphological variations between males and females were registered.

The second experiment was conducted on six adult freshwater turtles Trachemys scripta elegans (red-eared slider).

The weight of the turtles was measured using laboratory scales. Morphometry included measurements of total carapace and plastron length, total width, and height using calipers (1.00 mm and 0.1 mm resolution, respectively) and a flexible tape ruler (1.00 mm resolution) for straight and curved measurements, respectively.

During the second experiment to determine the general morphometric features, the test turtles were placed on a flat table, and photos of the back (carapace), side, abdomen (plastron) and front (head) were taken using an Android digital camera.

The obtained data of carapace measurements using a measuring tape were statically analyzed and expressed as mean ± SD using Microsoft Office Excel 2010, and are shown in table (1).

The experimental turtles were selected in the coastal zone (along 1 km) of the Khadzhibey estuary located at a distance of 9.5 km from the city of Odesa.

All six animals were transported to the anatomical laboratory of OSAU in travel cages for pets.

After quarantine for 2 days, morphometric measurements were carried out and anomalies and injuries were detected.

During the experiment, the turtles were kept in a fenced area with sand and stones. They were given appropriate food (cucumbers, carrots, lettuce, commercial pellets for cats and dogs, small fish).

After the research, all turtles were returned to their natural habitat.

Experiments were conducted in accordance with the rules adopted by the European Convention for the Protection of Vertebrate Animals, which are used for experimental and other scientific purposes (Strasbourg, 1986), "General ethical principles of animal experiments", adopted by the First National Congress of Bioethics (Kyiv, 2001), in accordance with Article 26 of the Law of Ukraine No. 3447-15 "On the Protection of Animals from Cruelty" as amended on October 16, 2012 and Directive 86/609/E EC.

## RESEARCH RESULTS

Red-nosed turtles are susceptible to non-communicable diseases that occur due to poor housing conditions and to pathogenic infections that can be transmitted in various ways, so they are a constant object of concern and observation for veterinary medicine specialists [1, 3, 8].

**Fig. 3**. Non-flowing reservoir, free-flying birds - ways of transmission of pathogenic infections for turtles.

Diseases of non-infectious etiology are often diagnosed: abnormal beak. Clinical signs: distorted growth of the beak due to an unbalanced diet. Treatment is surgical beak trimming [9, 14].

Mechanical damage to the carapace is also common. Clinical signs: mechanical damage to the carapace and plastron. In these cases, the wound is thoroughly washed with an antiseptic solution with the addition of an antibiotic, after which the shell is fixed with surgical wire or screws. After surgery, postoperative therapy must be prescribed [15, 16].

Deformation and rotting of the shell due to unbalanced and unnatural nutrition, as well as widespread disease. Clinical signs: depression, refusal to feed, immobility of the turtle in the presence of damage, foci with pus and softening of the shell. For treatment, you should use symptomatic therapy and change the diet.

Abscesses, which are the result of various traumatic injuries against the background of poor feeding, look like pus-filled subcutaneous bumps on the turtle's body. They arise as a result of slaughter, wounds, bites of other animals, and unbalanced feeding. Treatment: surgically remove pus from the wound. In the future, postoperative therapy is used [10, 17].

Clogging of the esophagus, stomach or intestines occurs as a result of turtles swallowing sand, stones, twigs and other small foreign objects due to unbalanced and unnatural food. Clinical signs can be depression and refusal to feed, sometimes intestinal obstruction. Such an animal can only be treated surgically, therefore, for the prevention of this disease, it is important to balance the feed and equip the aquaterrarium with a solid, uniform surface.

Prolapse of the oviduct, cloaca, bladder or colon is usually possible due to hypodynamia against the background of eating disorders. Treatment is also surgical, with a long postoperative period [8, 9, 11].

Infectious inflammations, congenital and traumatic damage to the eyes due to improper maintenance and poor feeding often occur in this species of turtles. Causes of eye infections: Aeromonas hydrophyla, Bacillus sp., Proteus vulgaris, Pseudomonas sp., i Staphylococcus aureus. Non-infectious conjunctivitis occurs as a result of hypovitaminosis A. In its chronic form, it is manifested by inflammation of the cornea, accumulation of pus in the lacrimal ducts, blockage of the ducts, and the formation of tumors [4, 12, 13].

The clinical manifestation of infectious and non-infectious eye diseases is manifested by refusal to feed, depression, reluctance to move. Treatment should be after confirmation of the diagnosis in the laboratory conditions of the veterinary clinic. Eye drops with antibiotics and vitamin complexes are used. During treatment, it is desirable to force-feed the turtle [14].

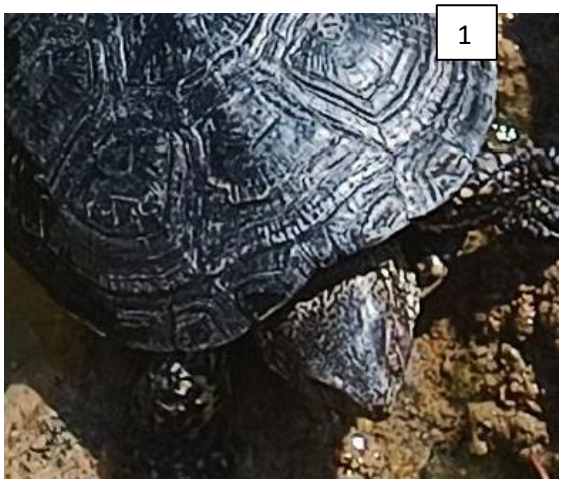
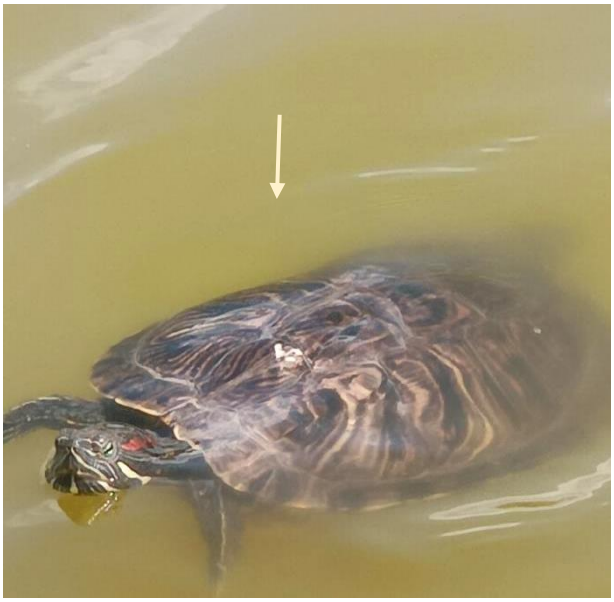



**Fig. 4.** Inflammation of the left eye of a red-eared turtle.

The most common disease of the respiratory tract of turtles is pneumonia. In red-eared turtles, when there is a lack of vitamins A and D in the diet, and in improper housing conditions (draughts, insufficient ventilation and low temperature), pneumonia occurs. Diseases of the respiratory tract also develop against the background of stress, crowding, hypothermia, lack of food, which often happens during transportation. First, "wet" pneumonia occurs (stage I), with an acute course and a high mortality rate. "Wet" pneumonia can progress to the II stage, the so-called "dry" or "purulent" one. The clinical manifestation of pneumonia is a respiratory syndrome that combines difficult breathing with an open mouth with a whistling sound, wheezing, mucus in the oral cavity, and mucus bubbles in the nasal passages. When swimming, the affected part of the lung lifts the corresponding side of the turtle up. The diagnosis must be confirmed by radiography. Treatment symptomatic with the use of antibiotics [14].

Not the last place among the diseases of turtles is occupied by mycobacteriosis, which causes Mycobacterium, which pollute water bodies [10]. Turtles without clinical manifestations of mycobacteriosis can be carriers Mycobac-terium, and pose a threat to humans.



The causative agent accumulates not only in water and food, but also on the soil where turtles live, so mycobacteria are localized in the area of the eyes, on the skin of the limbs, tail, and on the shell [11].

**Fig. 5.** Signs of dermatosis (white spots on the turtle's shell*)*

Turtles suffering from mycobacteriosis are depressed, refuse food, and slowly lose weight. There are swellings of the joints of the hind limbs, inflammation and swelling of the tail [10, 11, 15].

Due to improper housing conditions and poor feeding. red-eared turtles can suffer from dermatomycosis, which is clinically manifested by the presence of white spots on the shell, inflammation, ulcers, wounds, abscesses and even necrosis of soft tissues, to which bones and shell are added very quickly. However, such pathogens as Onygenales, Aphanoascella galapagosensis, Fusarium incarnatum, Fusarium pallidoroseum, Mucorales affect only the carapace and skin. Usually, the above type of pathogen is cultivated in the soil. With this type of mycoses, the carapace tissue is deformed and thinned, erosions, ulcers, delamination and perforation occur [11, 13, 14, 16].

Therefore, having the gender data of the morphometric features of the red-eared turtle, it is possible to pre-estimate the risks of disease in the population of the selected areola, without the use of special and laboratory tests.

During life, red-eared turtles constantly change the morphological, physiological and density characteristics of the shell, which consists of abdominal and dorsal shields. The plastron, or abdominal shield, was formed from the abdominal ribs and elements of the abdominal girdle. Cutaneous ossifications on the back, fused with the spinous processes of the spine and ribs, form the dorsal shield - the carapace. The bony base of the carapace is covered with epidermal shields. These shields grow independently, annual concentric rings are formed on them. The seams between the shields are not symmetrical, they are arranged randomly, which provides additional strength of the shell. There are usually 38 shields on the carapace and 16 on the plastron.

There are generally described morphoanatomical characteristics of the carapace, but the features of representatives of the reservoirs of the Arboretum "Peremoga", "Dyukivskyi Park" in Odesa and the coastal zone of the Khadzhibey estuary have not been studied.

**Fig. 6**. Symmetrical arrangement of shields on the carapace

The carapace of young turtles is bright green, with age it darkens to a dark olive color with possible variations of yellow and black stripes. The plastron is dark in color with black spots. Physiologically, the carapace is hard to the touch. The plastron contains large shields, which are a derivative of the skin, separated by narrow keratinized furrows. Shields form a unique mosaic for each individual.

Violations of the symmetry of the mosaic of scutes on the turtle shell are usually congenital. Such changes can affect the reduction of strength and the occurrence of shell deformation at any age. If the conditions of keeping and feeding turtles deteriorate, then the asymmetry of the shell will determine the development of the pathological process, since it arises as a result of the pathology of the connection of the elements of the skeleton in the shell. Morphological defects of the plastron and carapace can negatively affect the turtle's survival due to a violation of thermoregulation, in which the shell also participates [9, 10].

**Fig. 7.** Asymmetric arrangement of shields on the carapace (an additional central shield is visible.

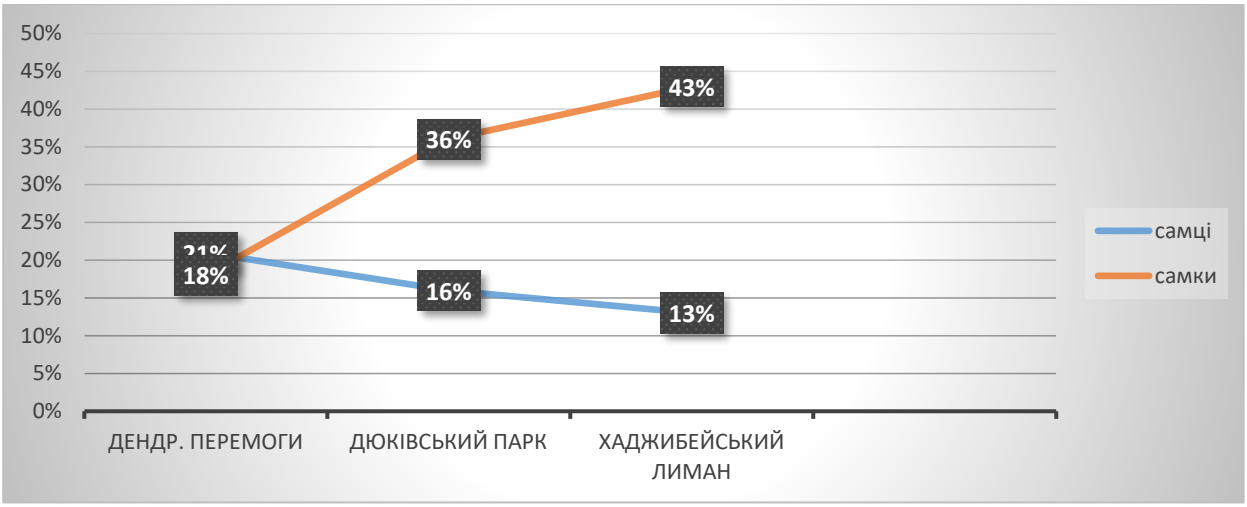



**Fig. 8.** I experiment. Gender features of the distribution of Trachemys scripta elegans (Reptilia, Testudines) with morphological features of diseased reptiles.

The data in Fig. 7 indicate a small percentage of reptiles that have morphological features characteristic of sick animals. Thus, 21.3% of males and 18.2% of females of red-eared turtles of the Peremohy Arboretum had an asymmetric shell and external morphological signs of diseases. In Dyukiv Park, 16.6% of males and 36.3% of females, and in Khadzhibey estuary, 12.5% of males and 42.8% of females had morphological signs of common diseases of red-eared turtles. The above data indicate the existing risks of the spread of the disease among the populations of the studied habitats of red-eared turtles.The outer covering of the body of the red-eared turtle is represented by a heart-shaped dorsoventrally compressed brown shell, divided into the upper part - the carapace, and the lower part - the plastron. The dome-shaped plastron consists of several bony shields, which are completely symmetrically fused. Each shield of the carapace and plastron has an annular pattern of keratinized rings (annuli) that provide strength and integrity. As a protective mechanism, the head and short neck are retracted into the carapace.The outer covering of the body of the red-eared turtle is represented by a heart-shaped dorsoventrally compressed brown shell, divided into the upper part - the carapace, and the lower part - the plastron. The dome-shaped plastron consists of several bony shields, which are completely symmetrically fused. Each shield of the carapace and plastron has an annular pattern of keratinized rings (Annuli) that provide strength and integrity. As a protective mechanism, the head and short neck are retracted into the carapace.

Table 1. **General morphometric features Trachemys scripta elegans**

| *2 Experiment:*<br>*General morphometric features Trachemys scripta elegans* | | | | | | |
|---|---|---|---|---|---|---|
| *male* | | | | *female* | | |
| Place | Peremoga Arboretum park | Dyukiv park | Khadzhibey estuary | Peremoga Arboretum park | Dyukiv park | Khadzhibey estuary |
| weight | 2,6±0,1 | 2,5±0,01 | 2,4±0,2 | 3,3±0,3 | 3,8±0,04 | 3,6±0,1 |
| carapace length | 28,6±0,4 | 27,3±0,6 | 26,9±0,8 | 30,8±0,9 | 32,1±0,3 | 30±0,2 |
| plastron length | 30,8±0,1 | 31,5±0,1 | 29±0,2 | 37,1±0,3 | 38,2±0,04 | 35,4±0,1 |
| carapace height | 8,9±0,3 | 7,5±0,1 | 6,8±0,9 | 9,3±0,3 | 8,5±0,7 | 10±0,4 |
| Number with asy-mmetry shields | 1 | - | 1 | - | - | 1 |

According to the data in Table No. 1, 1.6% of the male red-eared turtles of the Peremohy Arboretum had a shell with an asymmetric mosaic. In Dyukiv Park, 4.5% of males, and 5.8% of females in Khadzhibey Estuary, had similar morphological and anatomical features of the carapace mosaic.

## CONCLUSIONS

1. Trachemys scripta elegans (Reptilia, Testudines) successfully adapted to the ecological conditions of the city of Odesa, as evidenced by the morpho-atomic features and the percentage of reptiles with external morphological signs of diseases.
2. Morphometric features Trachemys scripta elegans Odessa, correspond to general species data, and the presence of a carapace with an asymmetric mosaic of shields is a rare phenomenon.

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## ЧЕРВОНОВУХА ЧЕРЕПАХА – ДОМАШНІЙ УЛЮБЛЕНЕЦЬ ЧИ ЖДЕРЕЛО ЗАХВОРЮВАНЬ?

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У статті розкрите питання особливостей утримання Trachemys scripta elegans (Reptilia, Testudines). Вивчені морфометричні особливості промірів панцира самців та самок, проаналізовані основні морфологічні відмінності мозайки щитків панцира червоновухої черепахи м. Одеси.

З'ясовано, що морфо-атомічні особливості та відсоток досліджених рептилій які мали зовнішні морфологічні ознаки поширених захворювань, свідчать про гарну пристосованість Trachemys scripta elegans (Reptilia, Testudines) до екологічних умов м. Одеса. Морфометричні особливості Trachemys scripta elegans м. Одеса, відповідні до загальних видових даних, а наявність панцира з асиметричною мозаїкою щитків - є малопоширеним явищем.

**Ключові слова:** морфологія, морфометричні особливості червоновуха черепаха, панцир, утримання, захворювання.