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PARASITES OF PANTHER CHAMELEONS (*FURCIFER PARDALIS*) GROWN IN CAPTIVITY AND BROUGHT FROM THE WILD

Stets O. V.

National University of Life and Environmental Sciences of Ukraine, Kyiv, Ukraine, e-mail: olya.stets@gmail.com

Summary. Reptile parasites imported from the wild differ from those grown in captivity. Thus, captive-grown reptiles tolerate the process of disadaptation better than imported wild animals, even under proper conditions of keeping and feeding. It should be noted that determining the origin of reptiles is sometimes difficult or impossible. For this, special methods are needed. In this regard, the purpose of research was to confirm or refute the theory, in reptiles from different places of residence, various parasites are found. We studied panther chameleons (*Furcifer pardalis*) imported from the wild and raised in captivity. To determine the parasites in the laboratory, methods of native smear, sequential washing and flotation were used. 10 species of intestinal parasites were found in panther chameleons imported from the wild, in particular Trematoda gen. sp. 1, *Tremaitoda* gen. sp. 2, Cestoda gen. sp., *Spinicauda freitasi* (Olfers, 1919), *Hexametra angusticaecoides* (Chabaud et Brygoo, 1960), Pharyngodonidae gen. sp., spirurates of the genus *Thubunaea* sp., larvae of the family Rhabdiasidae gen. sp., flagellates from the series Kinetoplastida gen. sp. and *Eimeria* sp, with prevalence 87.56%. In panther chameleons grown in captivity only Pharyngodonidae gen. sp. was found, prevalence was 94.05%. It is noted that under appropriate conditions of keeping and feeding in captive panther chameleons, a small number of parasites with a direct development cycle and their insignificant toxic effect on the body can develop

Keywords: intestinal parasites, panther chameleons, prevalence, invasion

Introduction. Reptiles are becoming more common in zoos and private collections. The incredible variety of them makes it possible to create terrariums with different biotopes. Some reptiles need arid terrariums with sand or, conversely, moist, dense vegetation, as well as rocky and water-filled bottoms. However, the problem is that not all reptiles can be purchased at pet stores or specialty nurseries (Vasil'ev, 2005).

Many species of reptiles are brought from the wildlife. Reptiles imported from the wild still have many different ailments. Most of these diseases are chronic. At the same time, chronic illnesses are exacerbated by the stress that occurs during trapping and transportation. Up to 60% of reptiles died during disadaptation (Cowan, 1980).

In Slovenia Rataj et al. (2011) found *Hexametra angusticaecoides* ascarids in Yemeni chameleons (*Chamaeleo calyptratus* Duméril et Bibron, 1851). In addition, these studies indicate a high infestation of snake parasites from the wild, in particular prevalence was 47.3%.

In Poland Okulewicz et al. (2015) also found *Parapharyngodon* sp., *Pharyngodon* sp., *Eimeria* sp., *Isospora* sp., *Nyctotherus* sp., *Balantidium* sp.

In the reptiles of the Kiev Zoo infection with nematodes (ascarids and oxyurises) was also observed, in particular in bearded agamas (*Pogona barbata*) with prevalence 53.6% (Dashchenko and Semenko, 2017).

It should also be noted that the capture of reptiles from the wild can also affect the ecology of the area, lead to population decline and even the extinction of the species itself. This is why it is forbidden in some countries to export endemic animals (Stoyanov and Stoyanova, 2018).

Reptiles that have been bred in captivity under appropriate conditions of retention have significantly fewer infectious diseases. Nor do they affect the number of animals in the wild. For sales, even abroad, it is legally easier to draw up captive reptile documents. In general, captive reptile farming is more profitable than catching, transporting and quarantining wild reptiles (Jacobson, 2007).

Most terrarium holders still want to get an animal that was bred in captivity. At the same time, there are not enough techniques to check the origin of reptiles. Parasitological research methods come to the rescue. It should be noted that the retention of reptiles in terrariums and the feeding of specially grown fodder facilities eliminates the possibility of transmitting a number of pathogens. Therefore, using parasitological studies can determine the origin of certain reptiles (Vasil'ev, 2005).

The purpose of the study is to confirm or refute the theory that different parasites are found in reptiles from different locations.

Material and methods. The studies were performed in the laboratory of the Department of Parasitology and Tropical Veterinary Medicine on Faculty of Veterinary Medicine of the National University of Life and Environmental Sciences of Ukraine (Kyiv, Ukraine) during 2016–2018. Fecal samples from panther chameleons (*Furcifer pardalis* Cuvier, 1829) were used. The reptiles were kept at the Nature Center 'Bion' (Kyiv, Ukraine).

Fecal samples were collected with tweezers, which were washed and disinfected in 70% alcohol after each sample was taken. The feces were placed in a disposable plastic

bag, signed and logged in to register primary studies. The test material was transported to the study site in a cold bag with a temperature of 4–9 °C. The studies were carried out on the day of fecal sampling and not later than three hours after their selection (Tret'yakov, Yevdokimov and Shabaev, 2006; Zajac and Conboy, 2012).

Each sample of reptile feces was investigated using the methods of native smear, sedimentation and flotation according to Fülleborn (Kotel'nikov, 1983). Data from three studies were summarized and analyzed. The identification of eggs, larvae and oocysts of the parasites was performed using atlases of Jacobson (2007), Vasil'ev (2005), Stoyanov and Stoyanova (2018).

646 panther chameleons were examined, among those 410 were imported from the wild and 236 were captive-bred, aged from 4 to 10 months (4–6 months — 152 and 6–10 months — 84 chameleons). 1938 laboratory tests were conducted.

Results and discussions. In the panther chameleons imported from the wild, 10 species of intestinal parasites were recorded, including two species of trematodes (Trematoda gen. sp. 1 and Trematoda gen. sp. 2), one species of cestodes (Cestoda gen. sp.), five nematode species (*Spinicauda freitasi* (Olfers, 1919), *Hexametra angusticaecoides* (Chabaud et Brygoo, 1960), Pharyngodonidae gen. sp., *Thubunaea* sp., and larvae Rhabdiasidae gen. sp.), flagellates from the series Kinetoplastida gen. sp. and oocysts of *Eimeria* sp.

According to the research, prevalence of invasion was 87.56%. The prevalence by various species of parasites in panther chameleons imported from the wild is shown in the Table.

Table — Prevalence of invasion in panther chameleons imported from the wild

Parasites	Prevalence, %
Trematoda gen. sp. 1	12.93
Trematoda gen. sp. 2	44.15
Cestoda gen. sp.	5.12
Spinicauda freitasi	35.12
Hexametra angustiaecoides	16.34
Pharyngodonidae gen. sp.	19.02
Thubunaea sp.	2.19
Rhabdiasidae gen. sp.	6.59
Kinetoplastida gen. sp.	18.78
Eimeria sp.	28.54

The most commonly recorded eggs were Trematoda gen. sp. 2. Slightly less eggs of *S. freitasi* and oocysts of *Eimeria* sp. were found. Eggs of Pharyngodonidae gen. sp. met less frequently. Very few flagellates Kinetoplastida gen. sp., *H. angustiaecoides* and Trematoda gen. sp. 1 were recorded. The larvae of the family Rhabdiasidae gen. sp., eggs of cestodes and spirurata of the genus *Thubunaea* sp. were rarely noted.

The causative agents of the intestinal invasion of the panther chameleons grown in captivity were only Pharyngodonidae gen. sp.

The prevalence of invasion by oxyurises in panther chameleons grown in captivity in the age group of 4–6 months is 68.42%, and in the age group of 6–10 months — 94.05%. Research shows that with age, the prevalence of invasion of panther chameleons grown in captivity increases.

The data obtained show that the prevalence of invasion in reptiles imported from the wild is lower than in those raised in captivity. Thus, in panther chameleons imported from the wild, it is 87.56%, in those grown in captivity — 94.05% for 6–10 months of their life. It should be noted that the toxic effect of oxygenates on the body panther chameleons is considered insignificant. At the same time, the pathogenic effect of the detected trematodes, nematodes and protozoa is much stronger (Vasil'ev, 2005).

It should also be noted that the prevalence of the invasion by the oxyurises of Pharyngodonidae gen. sp. reptiles imported from the wild are much lower (19.02%) than those grown in captivity (87.56%). This can be explained by the competition of parasites among themselves for the space and resources of the host organism (Jacobson, 2007).

Conclusions. Studies have shown that panther chameleons (*Furcifer pardalis*) imported from the wild are most often affected by Trematoda gen. sp. 2 (44.15%), *Spinicauda freitasi* (35.12%), *Eimeria* sp. (28.54%); slightly less oxyurises Pharyngodonidae gen. sp. (19.02%), flagellates Kinetoplastida gen. sp. (18.78%), *Hexametra angusticaecoides* (16.34%), Trematoda gen. sp. 1 (12.93%), Rhabdiasidae gen. sp. (6.59%), Cestoda gen. sp. (5.12%) and a little — *Thubunaea* sp. (2.19%). While panther chameleons, raised in captivity, are infected only with Pharyngodonidae gen. sp.

Therefore, under appropriate conditions of keeping and feeding, panther chameleons grown in captivity are infected by nematodes with a simple cycle of development and those that do not have a significant negative impact on the body. Parasites with a complex developmental cycle cannot infect these reptiles in a closed terrarium system. Therefore, researching reptiles on parasitic diseases can determine their origin.

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