

# First report of a cutaneous and shell mycosis in an Ouachita Map Turtle (*Graptemys ouachitensis*, Cagle, 1953) by *Fusarium solani*



A. Garcês\*, H. Fernandes, D. Salinas, R. Lopes, A. Silva, F. Sampaio, D. Duque and P. Brilhante-Simões

## Abstract

An adult Ouachita Map Turtle (*Graptemys ouachitensis*) was presented for consultation with multifocal, erosive and ulcerative lesions, multiple fissures on the plastron and shell, and dermatitis on the members and head. Samples of shell scrapings were collected for routine microbial culturing

and *Fusarium solani* was isolated from the samples. To the author's knowledge, this is the first reported case of *F. solani* associated with cutaneous and shell mycosis in this turtle species.

**Key words:** *Graptemys ouachitensis*; reptiles; fungi; dermatitis; *Fusarium solani*

## Case report

Reptiles have more widely become family pets in recent years (Nardoni et al., 2012). Turtles make up a large share portion of this population since they are easy to acquire in animal shops and their popularity has risen largely because of media influence, with movies and cartoons such as Teenage Mutant

Ninja Turtle (Nardoni et al., 2012). The Ouachita Map Turtle (*Graptemys ouachitensis*, Cagle, 1953) is an endemic semi-aquatic turtle species from the United States that is quite common among turtle keepers worldwide. They belong to the *Emydidae* family. Morphologically, the carapace is

Andrea GARCÊS\*, DVM, PhD, (Corresponding author, e-mail: andreamvg@gmail.com), Instituto Politécnico de Viseu, Escola Superior Agrária de Viseu, Campus Politécnico, 3504-510 Viseu, Portugal, Cooperativa de Ensino Superior Politécnico e Universitário, CRL – CESPU, R. Central Gandra, Gandra, Portugal, CITAB – University of Trás-os-Montes and Alto Douro, Quinta de Prados, Vila Real, Portugal; Helder FERNANDES, DVM, Clínica Veterinária Das Taipas Lda, Braga, Portugal; Delys SALINAS, INNO – Veterinary Laboratory, R. Cândido de Sousa Braga, Portugal; Ricardo LOPES, DVM, Cooperativa de Ensino Superior Politécnico e Universitário, CRL – CESPU, R. Central Gandra, Gandra, Portugal, INNO – Veterinary Laboratory, R. Cândido de Sousa Braga, Portugal; Augusto SILVA, DVM, Filipe SAMPAIO, DVM, Daniela DUQUÊ, DVM, INNO – Veterinary Laboratory, R. Cândido de Sousa, Braga, Portugal; Paula BRILHANTE-SIMÕES, DVM, Cooperativa de Ensino Superior Politécnico e Universitário, CRL – CESPU, R. Central Gandra, Gandra, Portugal

characterised by an olive to dark brown colouration, light yellowish markings with dark borders, and a row of low vertebral spines that is serrated on the posterior rim. The plastron is creamy to yellow in colour and has a pattern of dark lines and swirls. The body colour is greyish brown to blackish and is marked with yellowish stripes, and the head has light yellow spots in the eyes and jaw.

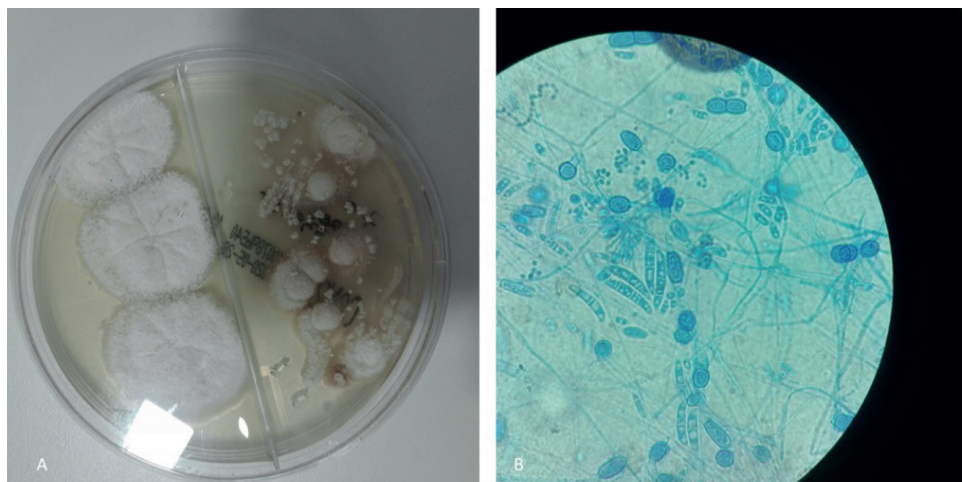
Turtles in captivity are prone to superficial, deep and systemic mycoses. Usually, these infections are a consequence of inadequate management, such as inappropriate terrariums, temperature, moisture, deficient nutrition, lack of UV light and poor water hygiene (Nardoni et al., 2012). The main affected system is the integumentary system and the etiologic agents usually are soil-inhabiting fungi (Cabañes et al., 1997; Schumacher, 2003). *Fusarium* species are common soil saprophyte and plant pathogens, that have been reported as pathogenic in some animals, including reptile species, particular-

ly sea turtles (Cabañes et al., 1997; Cafarchia et al., 2020). This agent has been reported as the cause of cutaneous hyalohyphomycosis in the loggerhead sea turtle (*Caretta caretta* L.) (Nardoni et al., 2012), abscess in a Kemp's Ridley Sea Turtle (*Lepidochelys kempii*) (Williams et al., 2012) and shell mycosis in a group of Hermann's tortoises (*Testudo hermanni*) (Nardoni et al., 2012). In this short communication, the authors describe cutaneous and shell mycosis in an Ouachita Map Turtle (*G. ouachitensis*, Cagle, 1953) by *Fusarium solani*.

In May 2021, an adult Ouachita Map Turtle (*Graptemys ouachitensis*) was presented for consultation with multifocal, erosive and ulcerative lesions, multiple fissures on the plastron and shell, and dermatitis on the members and head. One ulcer on the dorsal part of the shell was 3 cm in diameter and the shell was destroyed, exposing the internal organs, with the presence of a yellowed mucoïd exudate. The posterior left member also presented deep ulceration and the tail was amputated (Figure 1).



**Figure 1.** A, B, C – ulceration of the dorsal scutes with perforation of the shell and presence of a yellowed mucoïd exudate; D – ulceration of the plastron; E- amputation of the tail; F – ulceration in the posterior members.



**Figure 2.** A – Fungal colonies with a diameter of 64–70 mm, white in colour, slightly flaky, loose, viscous and cottony; B - Characteristic macroconidia of *F. solani*.

Samples of shell scrapings and exudates were collected for routine microbiological culture. The samples were inoculated on Sabouraud Dextrose Agar (BioMérieux, France) at 25°C for mycological culture and on Blood and MacConkey Agar (BioMérieux, France) at 35°C for aerobic bacteriological culture. On the fungal plates, fungal colonies developed with a diameter of 64–70 mm, white in colour, slightly flaky, loose, viscous and cottony. Micromorphology observation using Lactophenol Cotton Blue stain (Merck, Germany) showed an abundance of elongated monophialids with kidney-oval microconidia and macroconidia, robust, thick-walled and generally cylindrical, with parallel dorsal and ventral surfaces (between 3-5) for most of its length (Figure 2). The fungus was identified as *Fusarium solani*, based on to its macroscopic and microscopic morphological characteristics. In the bacterial culture, the bacteria *Micrococcus luteus* and *Raoultella planticola* were isolated using the VITEK2Compact® system (BioMérieux, France).

Unfortunately, the animal was euthanised due to the severity of the lesions, and it

was impossible to perform a *post-mortem* examination or collect more samples. The lesions observed in this case were comparable with cases reported in sea turtles of skin mycoses by *Fusarium* spp. (Cabañes et al., 1997; Nardoni et al., 2012). In this case, the bacteria isolated were considered contaminants or opportunistic secondary infections due to the presence of the fungi. *Micrococcus luteus* and *Raoultella planticola* can be found in the environment and are rarely pathogenic (Li et al., 2019). The origin of this opportunistic infection is unknown, though inadequate management was likely responsible for the immunosuppressive state, with subsequent development of the mycotic infection due to the presence of *F. solani* in the tank and its opportunistic behaviour (Williams et al., 2012; Sáenz et al., 2020).

To the author's knowledge, this is the first reported case of *F. solani* associated with cutaneous and shell mycosis in *G. ouachitensis*. Cases of *Fusarium solani* associated with skin lesions have never been reported in this species. This case indicates that *Fusarium* spp. should be included as a possible aetiology in the differential diagnosis of skin lesions, not

only in *G. ouachitensis* but also in other species of pet turtles.

## References

- BROWN, A. D., K. TEMPLE-MILLER, W. M. ROOSENBURG and M. M. WHITE (2012): Mitochondrial DNA Variation in the Ouachita Map Turtle. *Copeia*, 2, 301-306. 10.1643/CH-11-009
- CABAÑES, F. J., J. M. ALONSO, G. CASTELLÁ, F. ALEGRE, M. DOMINGO and S. PONT (1997): Cutaneous hyalohyphomycosis caused by *Fusarium solani* in a loggerhead sea turtle (*Caretta caretta* L.). *J. Clin. Microbiol.* 35, 3343-3345. 10.1128/jcm.35.12.3343-3345.1997
- CAFARCHIA, C., R. PARADIES, L. A. FIGUEREDO, R. IATTA, S. DESANTIS, A. V. F. DI BELLO and A. D. VAN DIEPENINGEN (2020): *Fusarium* spp. in Loggerhead Sea Turtles (*Caretta caretta*): From Colonization to Infection. *Vet. Pathol.* 57, 139-146. 10.1177/0300985819880347
- LI, J., A. L. LUSHER, J. M. ROTCHELL, S. DEUDERO, A. TURRA, I. L. N. BRATE and H. SHI (2019): Using mussel as a global bioindicator of coastal microplastic pollution. *Environ. Pollut.* 244, 522-533. 10.1016/j.envpol.2018.10.032
- NARDONI, S., LUNGONELLI, P., PAPINI, R., MUGNAINI, L., MANCIANTI, F. (2012): Shell mycosis in a group of Hermann's tortoises (*Testudo hermanni*). *Vet. Rec. Open.* 170, 76-76. 10.1136/vr.100261
- SÁENZ, V. C. ALVAREZ-MORENO, P. L. PAPE, S. RESTREPO, J. GUARRO and A. M. C. RAMÍREZ (2020): A One Health Perspective to Recognize *Fusarium* as Important in Clinical Practice. *J. Fungi.* 6, 235. 10.3390/jof6040235
- SCHUMACHER, J. (2003). Fungal diseases of reptiles. *Vet. Clin. North Am. Exot. Anim. Pract.* 6, 327-335. 10.1016/s1094-9194(03)00013-6
- WILLIAMS, S. R., M. A. SIMS, L. ROTH-JOHNSON and B. WICKES (2012): Surgical removal of an abscess associated with *Fusarium solani* from a kemp's ridley sea turtle (*Lepidochelys kempii*). *J. Zoo Wildl. Med.* 43, 402-406. 10.1638/2011-0102.1

## Prvo izvješće o mikozi kože i oklopa u *Graptemys ouachitensis* kornjače, (Ouachita Map, Cagle, 1953.) gljivicom *Fusarium solani*

Andreia GARCÉS, DVM, PhD, Instituto Politécnico de Viseu, Escola Superior Agrária de Viseu, Campus Politécnico, 3504-510 Viseu, Portugal, Cooperativa de Ensino Superior Politécnico e Universitário, CRL – CESPU, R. Central Gandra, Gandra, Portugal, CITAB – University of Trás-os-Montes and Alto Douro, Quinta de Prados, Vila Real, Portugal; Helder FERNANDES, DVM, Clínica Veterinária Das Taipas Lda, Braga Portugal; Delsy SALINAS, INNO – Veterinary Laboratory, R. Cândido de Sousa Braga, Portugal; Ricardo LOPES, DVM, Cooperativa de Ensino Superior Politécnico e Universitário, CRL – CESPU, R. Central Gandra, Gandra, Portugal, INNO – Veterinary Laboratory, R. Cândido de Sousa Braga, Portugal; Augusto SILVA, DVM, Filipe SAMPAIO, DVM, Daniela DUQUE, DVM, INNO – Veterinary Laboratory, R. Cândido de Sousa, Braga, Portugal; Paula BRILHANTE-SIMÕES, DVM, Cooperativa de Ensino Superior Politécnico e Universitário, CRL -CESPU, R. Central Gandra, Gandra, Portugal

Odrasla *Graptemys ouachitensis* kornjača donesena je na pregled s multifokalnim, erozivnim i ulcerativnim lezijama, višestrukim pukotinama na plastronu i oklopu i dermatitisom na udovima i glavi. Prikupljeni su uzorci strugotina oklopa za rutinsku mikrobiološku

kulturu. Iz uzoraka je izolirana *Fusarium solani*. Prema našim saznanjima, ovo je prvi prijavljeni slučaj *F. solani* povezan s mikozi kože i oklopa ove vrste kornjača.

**Glavne riječi:** *Graptemys ouachitensis*, gmazovi, gljivice, dermatitis, *Fusarium solani*