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A case study of *Paecilomyces lilacinus* reported in Indian soft shelled turtle and red-eared slider

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Abstract
Paecilomyces lilacinus is a pathogenic fungus associated with white spots, lesions and shell rot in turtles. Indian soft shelled turtle and a red-eared slider, a semiaquatic turtle were presented to the Doctor dog animal hospital with white spots and shell rot on the carapace respectively After physical examination and laboratory analysis it was confirmed to be an infection caused by *Paecilomyces lilacinus.* Ketoconazole, Mupirocin and Enrofloxacin proved to be effective in treating fungal and secondary bacterial infection in turtles.

Keywords: *Paecilomyces lilacinus,* Indian soft shelled turtle, red-eared slider

Introduction
Most common diseases in turtles include hypovitaminosis A which occurs due to feeding exclusively on meat based diets rather than vegetables. Red puffy eyes and nasal discharges are some common symptoms of this disease**.** Abscess in turtles are also important and different from those in mammals as the pus in them is hard to drain. Metabolic bone disease which occurs due to hypocalcemia in chelonians affects the quality of shell and should be treated immediately. Round worm infestations are quite common in turtles hence antinematodals should be administered at regular intervals. Besides these in reptiles many fungal and bacterial infections occurs due to poor management and *P. lilacinus* is one such fungus which has been reported to cause disease in captive individuals due to poor water quality conditions, overcrowding and low temperatures (Maud Lafortune *et al.*, 2005) [3] (RK Jadhav *et al.*, 2020) [1]. *Paecilomyces lilacinus* is a ubiquitous fungus which is found in variety of habitats like soil, decomposing plant material, pasteurized food products, marine sediments, compost, insects, nematodes and rhizosphere of various plants. In the present study we are treating turtles which got affected due to *P. lilacinus* and bacterial infections secondary to this fungal infection.

Materials used
10% Potassium permanganate solution 2% copper sulphate solution Lactophenol Cotton blue Sand paper Mupirocin ointment Ketoconazole ointment Enrofloxacin 10% w/w.

Case history
In the present case study 3 months old Indian soft shelled turtle weighing 85g and a red-eared slider, a semiaquatic turtle aged 75 days bearing weight of 90g were presented to the Doctor dog animal hospital with white spots and shell rot on the carapace respectively with a history of off feeding since 2 days and showing respiratory signs.White spots are observed on the dorsal part of the shell in Indian soft-shelled turtle and crumbling shell lesions on carapace of red-eared slider indicating mixed fungal and bacterial infection (fig.1) and branching of blood vessels underneath the shell depicts bacterial infection. Lacto phenol cotton blue staining confirmed the causative organism is *Paecilomyces lilacinus* (fig.2.). It has been observed that both the turtles are preferring to float on the surface water with slight gasping which indicates respiratory system is involved. This might be due to secondary bacterial infection in lungs.

Fig 1: Turtles showing white spot and shell rot

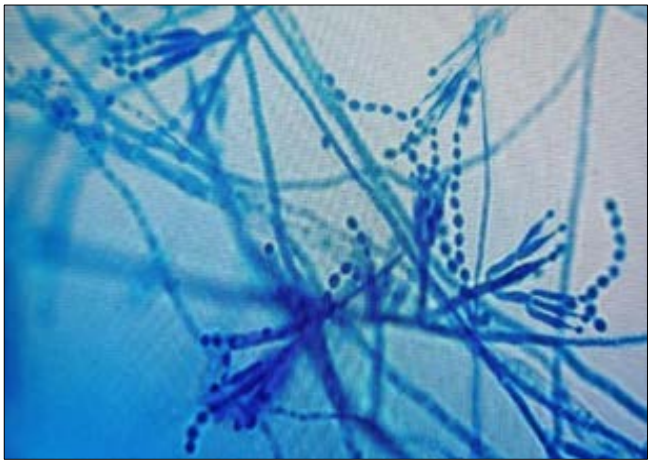

Fig 2: Lactophenol cotton blue staining

Fig 3: Turtles recovered completely after treatment

Treatment

The soft shelled turtle and red-eared slider were placed in 10% potassium permanganate solution for about 15min and the shell is sterilized using 5% betadine solution. The effected area on the carapace is thoroughly debrided with sand paper and 2% copper sulphate solution is applied on the diseased area to increase porosity. Enrofloxacin @5mg/ml dip treatment is given once in a day for a period of 10 days. After dip treatment mupirocin and ketoconazole ointment is applied twice a day for the same duration. Later on it had been advised to place a heat filament underneath the water for ambient temperature maintenance. Both the turtles recovered completely and regained food intake after successful treatment (fig.3).

Results and Discussions

In turtles shell is the primary defense against attack by predators or encounters with environmental stressors taking the major part of energy in its development (Polocavia *et al.*, 2008). White spots and shell rot are generally reported in soft shelled turtles due to poor management practices making it susceptible to fungal and bacterial infections under captivity conditions. In the present study turtles showed a good response to enrofloxacin dip treatment, followed by topical application of mupricion and ketoconazole ointments. Turtles recovered completely within a period of 10 days with the disappearance of white spots and shell lesions on the carapace having normal feeding activity. Later it was advised to maintain good water quality conditions with proper water exchange in captive conditions.

Similar results were observed by Sharun Khan *et al.*, 2019 [6] by treatment with enrofloxacin bath (5mg/L) for 30 minutes twice daily along with metronidazole orally at 50mg/kg body weight for 10 days for treating shell lesions in Red-eared slider. Using baths as the method of administration of antibiotics have an added advantage of reducing stress in animals. It also reduces the risk of overdosing the antibiotic (Sharun Khan *et al.*, 2019) [6]. Khan *et al.*, (2019) [2] treated white spots in a turtle with enrofloxacin bath and topical application of chlorhexidine gel for 7 days.

Conclusion

Ambient temperatures with regular water exchange are essential for proper management of turtles under captivity. Enrofloxacin and ketoconazole are proved to be effective therapeutic agents in treating white spots and shell rot in chelonians.

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