

# Difficult Dermatologic Diagnosis

This feature is being sponsored by the American College of Veterinary Dermatology. Readers are invited to submit contributions, which should include: (1) a brief description of the case (150-500 words); (2) good-contrast glossy photographs, 5 by 7 in (color photographs will be accommodated without charge when color is deemed pivotal to the diagnosis), with internal scale marker for photomicrographs or electron micrographs; (3) a brief discussion of the abnormality that emphasizes differential diagnosis and prognosis and not prevalence and treatment.

Send comments and photographs to Dr. Peter J. Ihrke, Veterinary Medical Teaching Hospital, University of California, Davis, CA 95616, or Dr. Stephen D. White, Department of Clinical Sciences, College of Veterinary Medicine and Biomedical Sciences, Colorado State University, Fort Collins, CO 80523.

**E**ight, 2-week-old wood turtles (*Clemmys insculpta*), with a 2-day history of rapidly developing papular skin lesions, were presented for necropsy. Each turtle had multiple 1- to 3-mm raised, tan, cutaneous papules and plaques on the head and extremities (Fig 1). Initial treatment for a suspected bacterial skin disease had consisted of addition of a broad-spectrum antibiotic<sup>a</sup> to the water in the habitat and single topical application of a povidone-iodine solution<sup>b</sup> to each turtle. Twelve to 18 hours after initiation of treatment, the turtles had developed dyspnea and lethargy and subsequently died.

## Differential Diagnosis

Potential causes of the cutaneous lesions included parasitic dermatosis, cutaneous or systemic viral, bacterial, or mycotic infection (including

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The authors thank Dr. Elliot R. Jacobson, Department of Small Animal Clinical Sciences, University of Florida, for technical assistance.

<sup>a</sup>Maracyn and Maracyn Two, Mardel Laboratories Inc, Glendale Heights, Ill.

<sup>b</sup>Betadine solution, The Purdue Frederick Co, Norwalk, Conn.

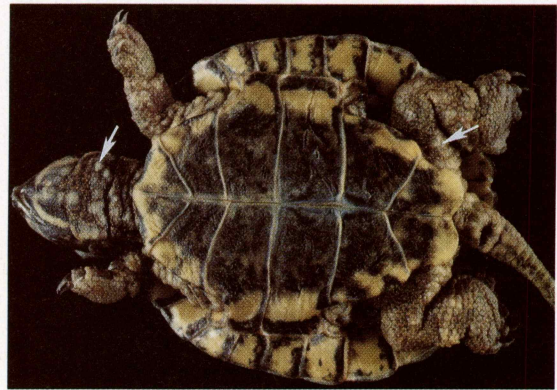


Figure 1—Ventral surface of a hatchling wood turtle (*Clemmys insculpta*, size, 4 to 5 cm in diameter) with multiple raised cutaneous plaques on the ventral aspect of the neck and limbs (arrows).

septicemic, cutaneous ulcerative disease [SCUD]), chemical intoxication, or physical trauma. Systemic infection, bacterial toxemia, treatment-induced toxicosis, or severe tissue water or ionic imbalance were considered likely as the cause of death. Representative specimens of skin and internal organs were obtained and processed for histologic examination. Liver and lungs were submitted for bacteriologic culture, and skin specimens were obtained for mycologic evaluation.

## Laboratory Findings

*Mucor* sp was isolated from the skin. Less than 50 colony-forming units (CFU) of *Flavobacterium meningosepticum* and <5 CFU of *Citrobacter freundii* were isolated from the liver. Multiple species of Enterobacteriaceae, considered contaminants, were isolated from the lungs. *Salmonella* sp, a common cause of septicemia in chelonians, was not isolated from any tissues.

On histologic examination, the epidermis and less frequently, the superficial portion of the dermis contained anastomosing, loosely woven to densely packed, branching, nonseptate fungal hyphae, measuring between 4 and 9  $\mu$ m wide, consistent with organisms of the class Phycomycetes. The epidermis in these areas had focally discrete to broadly coalescing zones of necrosis, generally in-

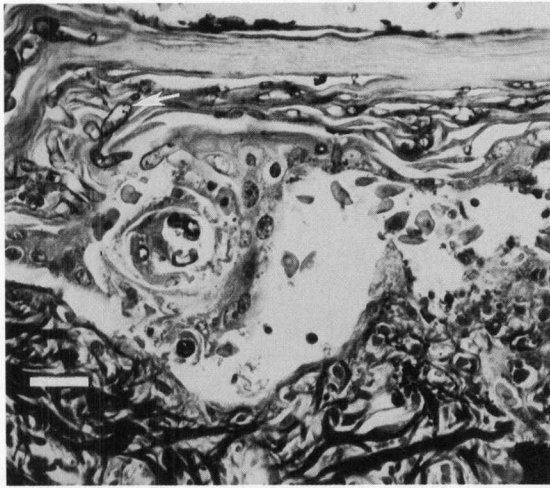


Figure 2—Histologic section of skin from the ventral aspect of the neck of an affected turtle. The basal layer of the epidermis is necrotic; the dermal/epidermal cleft contains erythrocytes and cell debris. Numerous broad fungal hyphae are aggregated adjacent to the necrotic epidermis (arrow). Gomori's methenamine silver/H&E stain; bar = 40  $\mu$ m.

volving the stratum spinosum, but multifocally extending through all layers (Fig 2). The subjacent portion of the dermis had focal collagen degeneration, mild superficial inflammatory response consisting of heterophils and a few macrophages, and foci of hemorrhage. Cleaving at the dermal/epidermal junction and diffuse separation of dermal collagen fibers were prevalent at the sites of extensive fungal proliferation. Large numbers of rod-shaped and coccoid bacteria were observed on the surfaces of intact and necrotic skin. All other tissues were devoid of noticeable histologic alterations.

### Interpretation

Death of these turtles was believed to be associated with widespread cutaneous mucormycosis. Diffuse epidermal necrosis could have resulted in loss of the keratinized barrier, resulting in dehydration, loss or dilution of essential ions, or the potential entry of microbial or toxic agents into the body.

Of the multitude of differential causes for the cutaneous lesions in this case, most were ruled out on the basis of lack of supportive history and lack of microbiologic, or histopathologic confirmation. Parasitic dermatosis was an unlikely diagnosis because the turtles were initially collected prior to hatching, maintained in a controlled environment, and did not have histologic lesions suggestive of cutaneous parasitic infestation. Viral pathogens were also not identified in these turtles. The condition known as SCUD, which initiates as epidermal ulceration progressing to involve multiple visceral organs, has been associated with *Citrobacter freundii* infection (isolated in limited numbers from the liver in this case).<sup>1,2</sup> Although the cutaneous lesions were grossly similar to those of SCUD, the histologic pattern of epidermal ulceration and necrosis was different and necrosis of other visceral organs was

lacking. Other systemic bacterial infections with cutaneous manifestations were considered unlikely, again because of lack of visceral lesions. Chemical or traumatic injury was not completely ruled out as an inciting cause of the cutaneous lesions. Of 10 turtles originally harvested from the nest, 1 died at hatching and another was isolated individually in an outdoor enclosure soon after hatching (reported to be in good health at 8 to 10 weeks of age). All 8 of the turtles housed together developed similar lesions and died rapidly, suggesting a possible common source of fungal organisms within the habitat. Environmentally induced injury to the stratum corneum may have allowed the fungal organisms to become established.

Bacterial toxemia or toxic reaction to treatment could not be completely ruled out as a cause of death. The abundant cutaneous bacterial organisms identified histologically may have produced toxins in sufficient amounts, readily absorbed through the injured skin, to be fatal to these turtles. To our knowledge, the safety of many antibiotics and antiseptics that may be used in turtles has not been established; as such, adverse reaction to the therapeutic agents used may have been involved in the death of these turtles.

Most cases of reptilian mycotic disease are systemic or secondary to another pathogen.<sup>3</sup> Known predisposing factors involved in development of cutaneous mycotic disease in reptiles include stress, poor nutrition, and captivity in an improperly or poorly maintained habitat. In this case, other pathogens or predisposing factors were not identified. *Mucor* sp isolated from the skin of reptiles, including chelonians, is usually considered a result of specimen contamination; however, histologic evaluation of the skin confirmed the pathogenicity of *Mucor* sp in these turtles. Primary cutaneous mucormycosis has been reported in hatchling soft-shelled turtles in Florida.<sup>4</sup> The signalment and microbiologic and histologic features of that case were similar to those reported here. Treatment with malachite green appeared to eliminate further losses in the Florida turtles.

*Clemmys insculpta* is an uncommon semi-aquatic turtle and a protected species in Michigan. The turtles of this report had been collected from a natural nesting site and were being raised for eventual release back to the wild. Despite the care given, the death losses attributable to this condition were nearly 100%.

### References

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