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Differentiation of Reptilian Parasites & Pseudoparasites

Reptiles are hosts to a variety of parasites, many of which can be recognized by the clinician who is able to identify mammalian parasites.

Examination Basics

As with mammals, you should apply your basic knowledge of light microscopy techniques when examining the feces of reptiles. Direct wet mounts, flotation concentration, and stained smears all are useful in parasite detection. When viewing a slide, adjust the focus and intensity of light to enhance different features. A micrometer is helpful, and you should remain mindful of the level of magnification. A few basic features of ova and cysts may be observed and recorded to help sort your findings into categories; some common features are listed in the **Table** (page 32).

Identification Difficulties

Many kinds of protozoal cysts are impossible to differentiate in the typical clinical practice setting. With metazoan parasites in a single life stage, clinicians may have difficulty identifying below the level of family or genus. Other parasites, however, are host-specific and can be readily identified from a single observation.

In practice, the precise identification of a parasite may be less important than determining if the organism in question is likely to be a pathogen, if it is likely to have a direct or indirect life cycle, if it responds to chemotherapeutics, and what sanitation is appropriate to prevent its spread or reinfestation.

Treatment

If treatment is necessary, antiparasitic drugs alone are insufficient. Nutritional support and fluid therapy are critical, and antibiotic therapy to prevent severe gastroenteritis may be warranted, depending on the condition of the patient. A thorough review of hygiene practices, food sources, and quarantine procedures should always accompany a diagnosis of parasitic disease.

The pictures presented are of regularly occurring parasites and pseudoparasites. Choose from the listed organisms; each description corresponds with only one picture. See page 30 for answers.

_____ AMOEBA TROPHOZOITE; BEARDED DRAGON

_____ COCCIDIA; BEARDED DRAGON

_____ COCCIDIA; WESTERN DIAMONDBACK RATTLESNAKE

_____ CRICKET EGG; BEARDED DRAGON

_____ *CRYPTOSPORIDIUM SERPENTIS*; EASTERN INDIGO SNAKE

_____ LIZARD MITE OVUM; GREEN IGUANA

_____ MOUSE OXYURID OVUM; WESTERN DIAMONDBACK RATTLESNAKE

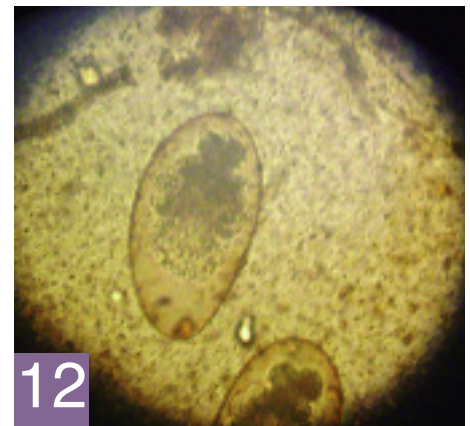
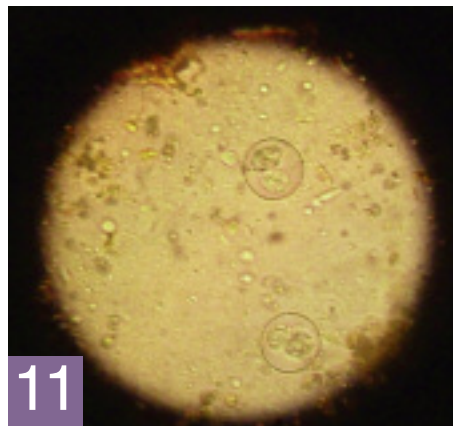
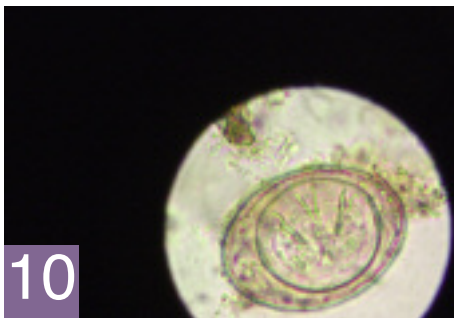
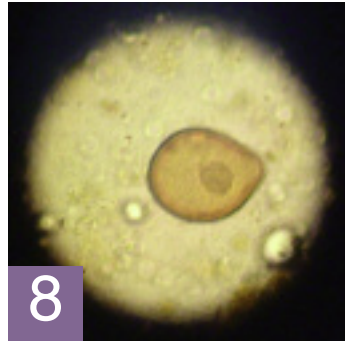
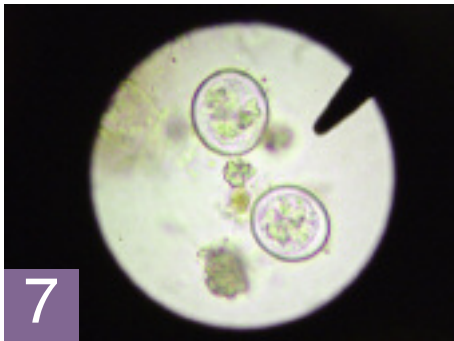
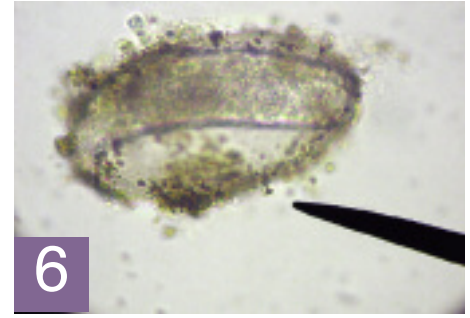
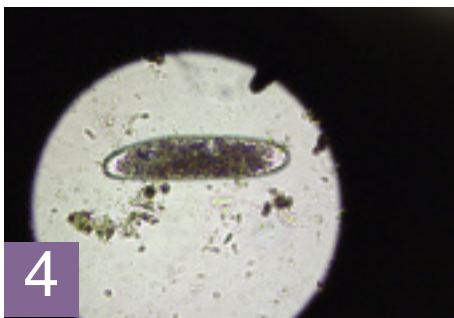
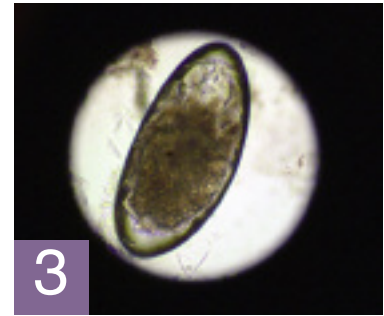
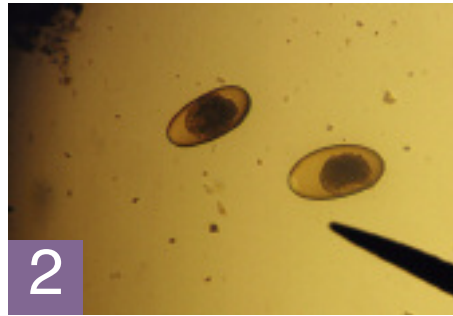
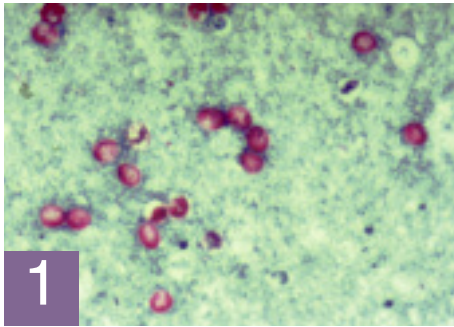
_____ *NYCTOTHERUS* CYST; BEARDED DRAGON

_____ OXYURID OVUM; DESERT TORTOISE

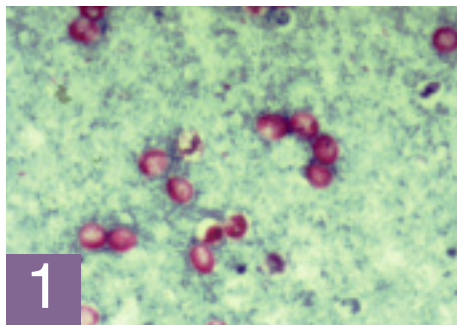
_____ OXYURID OVUM, EMBRYONATED; RUSSIAN TORTOISE

_____ OXYURID OVUM; RUSSIAN TORTOISE

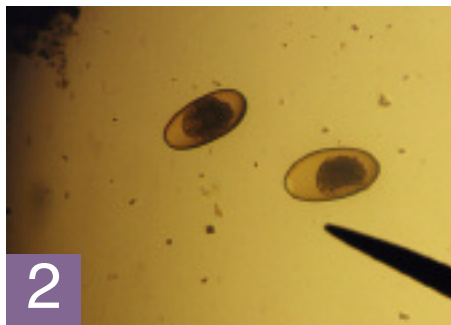
_____ TAPEWORM OVUM; GRAND CANYON RATTLESNAKE



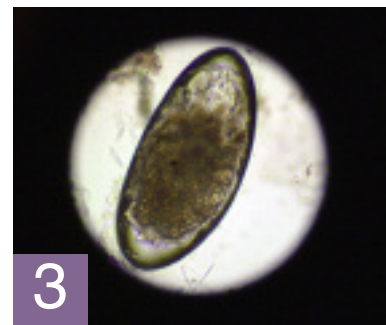
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1
***Cryptosporidium serpentis*; eastern indigo snake (*Drymarchon corais*)**
 This parasite may be readily confirmed through PCR tests, which are much more sensitive than acid-fast stains. *C. serpentis* causes gastric hypertrophy, resulting in regurgitation, weight loss, and death. At present, there is no effective treatment for this parasite in snakes, although hyperimmunized cow colostrum was effective in research trials at zoos. The organism is resistant to most common disinfectants but is killed by 5% to 10% ammonia, steam, and formalin. Supportive care, such as tube-feeding liquid diets that require minimal digestion in the stomach, treatment of secondary infections, and optimal husbandry, may keep some afflicted snakes alive for several years.
Acid-fast stain; original magnification, 1000×



2
Oxyurid ovum; Russian tortoise (*Testudo horsefieldi*)
 This nematode is generally considered a commensal at levels fewer than 5/LPF unless the tortoise is showing weight loss and unthriftiness. A clear cause and effect has yet to be demonstrated, and this increase may simply reflect other health concerns (eg, immunocompromise associated with stress). Treatment with fenbendazole (25–50 mg/kg PO Q 24 H for 3 days, repeated in 2–3 weeks) may reduce parasite levels and help restore balance to the gastrointestinal fauna.
Original magnification, 100×



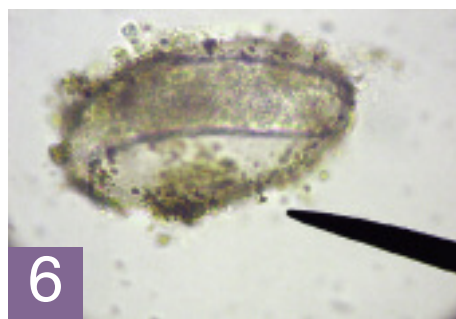
3
Lizard mite ovum; green iguana (*Iguana iguana*)
 These ova are actually ectoparasites found in the feces of iguanas that consume their own shed skin or have tongue-flicked other mite-infested iguanas. Various treatments are effective, such as ivermectin (0.2 mg/kg PO Q 7 D for 42 days; or 10 mg/L spray applied to iguana, allowed to air dry, and repeated weekly for 6 weeks), 0.29% fipronil (applied to body with damp gauze or cotton ball, allowed to air dry, then wiped off), and pyrethrin sprays approved for birds. Environmental sanitation and treatment is important to eliminate mites. Provent-a-Mite (pro-products.com) is a 0.5% permethrin spray that is specifically labeled for use in reptiles and can be used as an environmental residual acaricide. Ivermectin spray may be applied to the enclosure weekly. Up to 12 weeks may be needed to break the mite cycle.
Original magnification, 100×



4
Mouse oxyurid ovum; western diamondback rattlesnake (*Crotalus atrox*)
 These large ova are often mistaken for reptile parasites but are quite distinct from typical reptile oxyurids due to their large size and extreme elongation.
Original magnification, 40×

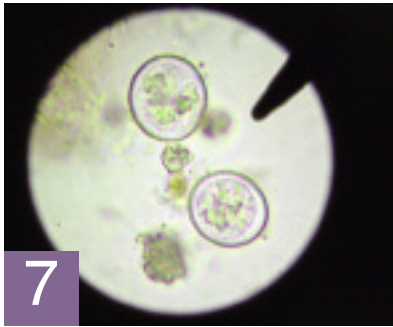


5
Amoeba trophozoite; bearded dragon (*Pogona vitticeps*)
 Note the multiple nuclei and amorphous shape. Circulating cytoplasm with moving organelles, streaming pseudopodia, and a flowing motion make this organism easy to identify as it moves around on a wet mount. Treatment varies depending on clinical signs. Long-term metronidazole (20 mg/kg PO Q 48 H for 20 days) targets trophozoites. With intractable cases, a cysticidal medication, such as iodoquinol (which is also effective against trophozoites), may be tried (50 mg/kg PO Q 24 H for 21 days). Short-term control of severe gastroenteritis (ie, high levels of WBCs and RBCs in fecal sample) may require metronidazole (25–50 mg/kg PO Q 24 H for 5–7 days).
Original magnification, 400×



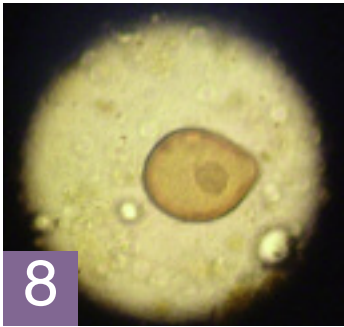
6
Oxyurid ovum, embryonated; Russian tortoise (*Testudo horsefieldi*)
 Once an oxyurid ovum has embryonated, it becomes sticky and may be coated with tiny particles. This often causes misidentification as another parasite. As with most reptile oxyurids, it is a commensal and not considered a health concern when found at low levels.
Original magnification, 400×

LPF = low power field; PCR = polymerase chain reaction; RBC = red blood cell; WBC = white blood cell



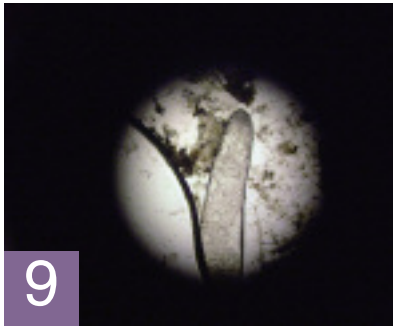
7

Coccidia (*Isospora* spp); western diamondback rattlesnake (*Crotalus atrox*)
 Coccidia are often found at low levels in apparently healthy wild snakes but may be associated with weight loss and unthriftiness in captives. Ponazuril (30 mg/kg PO Q 12 H for 2 days, then repeated in 3 weeks) appears effective in snakes. Occasionally, 30 mg/kg PO Q 24 H for 28 days is needed to treat an infested snake.
Original magnification, 400x



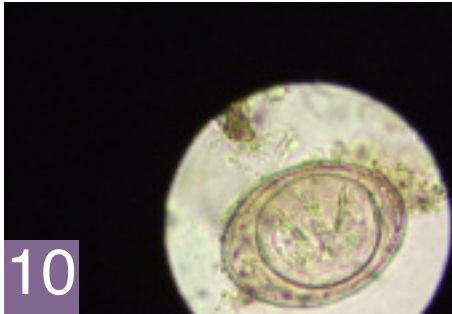
8

Nyctotherus cyst; bearded dragon (*Pogona vitticeps*)
 This ciliated parasite is often mistaken for a trematode ovum. In fresh samples, you may observe the organism moving around inside the cyst—a feature that is rarely observed in trematodes. It typically is considered a commensal and not treated.
Original magnification, 100x



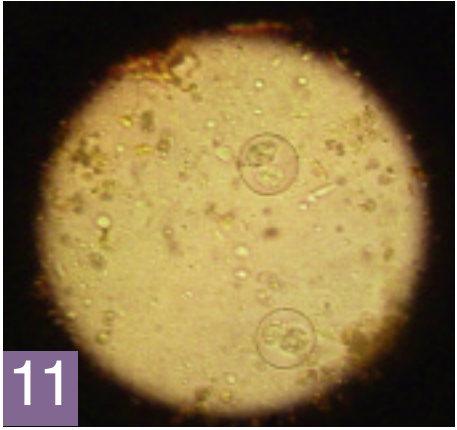
9

Cricket egg; bearded dragon (*Pogona vitticeps*)
 These eggs are visible without magnification and are often reported as worms or maggots. Occasionally, the presence of these eggs can indicate a problem with digestion, but more often it reflects overfeeding and a greedy dragon that has swallowed crickets with minimal chewing. Crickets that remain in a cage uneaten may also lay their eggs in reptile feces.
Original magnification, 40x



10

Tapeworm ovum; Grand Canyon rattlesnake (*Crotalus abyssus*)
 Some true snake parasites closely resemble the mouse tapeworm, *Hymenolepis nana*, which may be passed in the feces of rodent-eating species. Praziquantel (8–15 mg/kg PO or SC Q 3 weeks) is usually effective in eliminating infections. A topical formulation of praziquantel and emodepside (Profender; bayerdvm.com) has been effective against tapeworms and many nematodes. If available, feces from prey rodents may be examined to try to determine if the ovum detected is a parasite or pseudoparasite. If the rodents have identical ova, you may assume that the finding in the snake is a pseudoparasite. No treatment is necessary, but the feeder rodent colony may need management.
Original magnification, 400x



11

Coccidia (*Isospora amphiboluri*); bearded dragon (*Pogona vitticeps*)
 This is an extremely common pathogen associated with weight loss and unthriftiness in neonatal and juvenile bearded dragons, but it may also cause diarrhea, anorexia, and weight loss in stressed adults. Intractable with sulfa drug and trimethoprim-sulfamethoxazole therapy, it has been readily eliminated using ponazuril (30 mg/kg PO Q 12 H for 2 days, then repeated in 3 weeks. Occasionally, 30 mg/kg PO Q 24 hr for 28 days is needed to treat an infested group of juveniles.
Original magnification, 400x



12

Oxyurid ovum; desert tortoise (*Gopherus agassizii*)
 This nematode may be a parasite but is typically a commensal, doing no apparent harm when present at low levels (ie, 1–4/LPF). However, in some tortoises, ova can reach extremely high levels and are linked with weight loss and unthriftiness. A clear cause and effect has yet to be demonstrated; this increase may simply reflect other health concerns, such as an immunocompromised state associated with stress. Treatment with fenbendazole (20–50 mg/kg PO Q 24 H for 3 days, repeated in 2–3 weeks) may reduce levels and help restore balance to the gastrointestinal fauna.
Original magnification, 400x

NOTE: Drug dosages provided are empirical and have not been proven effective in all species of reptiles.

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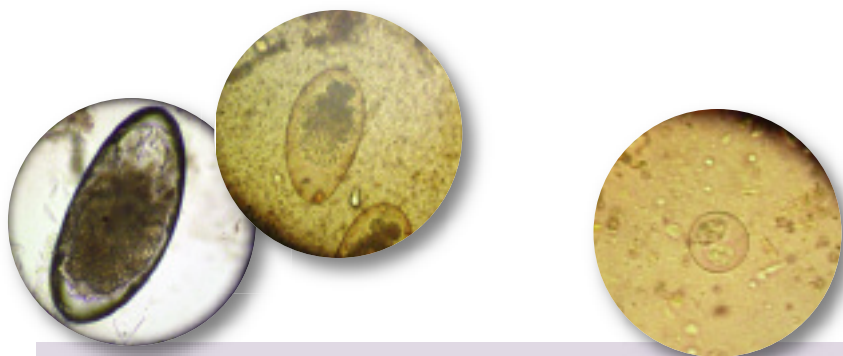
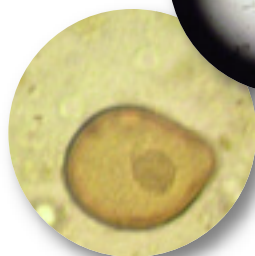
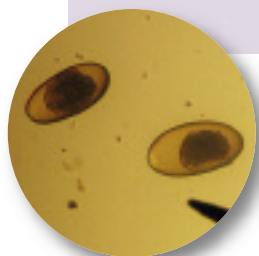
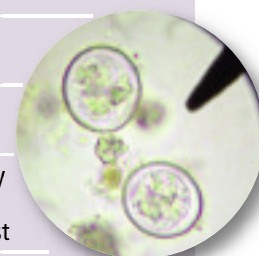


Table. Features of Parasite Ova or Cysts (light microscopy; unstained wet mount of feces)

Parasite	Color	Shape	Wall	Operculum	Internal Features	Motility
Amoeba	Colorless to golden brown	Round	Thin	No	Indistinct	None
Cestode	Colorless to gold	Oval to round	Thin	No	Oncosphere with up to 6 hooks	None
Ciliates	Colorless to gold, green, or brown	Ellipse, chicken egg, or round	Thin	Yes (in <i>Nyctotherus</i>)	Indistinct	Some may move within cyst
Coccidia	Clear	Ellipse or round	Thin	No	Sporocysts with sporozoites in most genera	None
Hookworm	Transparent	Football, ellipse, or round	Thin	No	Embryo or larva	Larva may move within ovum; free-living larvae often seen in stool
Pentastome	Colorless to gold	Chicken egg to football	Thin	None	4 hooks or legs	Larva may sometimes move legs within ovum
Pinworm	Gold to brown	Elongated ellipse to chicken egg	Moderate	No, but a small clear plug may be visible at one end	Indistinct	None
Roundworm	Transparent	Ellipse or round	Thin	No	Indistinct	None
Trematode	Gold to green or brown	Spindle, chicken egg, football, or round	Thin to moderate	Yes	Indistinct	None



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