



Inclusion Body Disease

Inclusion body disease (IBD) has been increasingly diagnosed in boas and pythons ("boids"). It is believed to be a retrovirus. The way it affects these two groups of snakes is slightly different but the long term effects are the same: the disease is terminal in those animals who exhibit symptoms of the disease.

Pythons, although their symptoms may be somewhat less, are just as affected as boas. There are asymptomatic carriers, so the fact that a boa or python within an infected collection does not show signs of the illness should not be taken to mean that it is immune to it. Boas are most associated with being asymptomatic carriers.

Signs of infection in boas include central nervous system disorders such as paralysis, being unable to right itself when turned over, "star-gazing", inability to strike or constrict. Other signs include chronic regurgitation, extreme weight loss, respiratory infections, and dysecdysis due to the inability to control body movements enough to rub off the old skin. The disease is rapidly fatal in young and juvenile boas, typified by rapid onset of flaccid paralysis.

In pythons, the disease progresses much more rapidly than in boas. Along with the above symptoms (excluding the chronic regurgitation), pythons also tend toward infectious stomatitis ("mouth rot"), heightened or exaggerated reflex responses, disorientation (which may be precipitated by the onset of central blindness) and loss of motor coordination.

What causes this disease? Intracytoplasmic eosinophilic inclusion bodies have been identified in the epithelial cells of the kidneys and pancreas. Neuronal degeneration and lesions form in the spinal cord and brain, and may be accompanied by myelin degeneration and nerve damage. Damage to the spleen is also found, with that organ being grossly atrophied and fibrosed. Electron microscopy has found that the organism falls into the retrovirus category.

The snake mite, *Ophionyssus natricis*, has been found in collections in which IBD has occurred but it is *not* implicated in all cases of infection.

As this has been identified as a viral entity, it may spread like a virus, through contact between infectious organisms (such as housing an infected snake with a previously healthy one) or through airborne aerosolized secretions, or by the keeper passing secretions from one snake or enclosure to another during the course of handling or cleaning (when strict quarantine and cleaning procedures are not followed).

There is at this time no treatment for the disease and, as it is at this time always

fatal and highly contagious, euthanasia is the course of action recommended. Even if the snake can be kept alive through supportive measures (hydration and force-feeding), the damage to the nerves, brain, spinal cord and internal organs is so great--and progressive--that life is only prolonged with an ever decreasing quality and increasing pain.

Due to the increasing incidence of this disease, it cannot be stated or urged strongly enough to QUARANTINE ALL NEW BOIDS upon acquisition for at least 3-6 months, and to take precautions when visiting other collections, pet stores and expos/swaps.

Sources

- Bennett, R. Avery. (1996) Neurology. In Reptile Medicine and Surgery.
 - Douglas Mader, DVM, ed. pp. 141-148. W.B. Saunders, Philadelphia PA.
 - Done, Lisa B. (1996). Postural Abnormalities. In Reptile Medicine and Surgery. Douglas Mader, DVM, ed. pp. 406-411. W.B. Saunders, Philadelphia PA.
 - Murray, Michael J. (1996) Pneumonia and Normal Respiratory Function. In Reptile Medicine and Surgery. Douglas Mader, DVM, ed. pp. 396-405 W.B. Saunders, Philadelphia PA.
 - Schumacher, Juergen, Elliott R. Jacobson, Bruce L. Homer, Jack M. Gaskin. (1994). Inclusion Body Disease in Boid Snakes. Journal of Zoo and Wildlife Medicine 25(4):51-524.
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Frequently asked questions:

Q: Can the disease be diagnosed in live snakes?

A: Yes...through blood testing ("For hematologic and plasma biochemical determinations, 0.6 ml of blood was placed in each of three microtainer tubes containing lithium heparin. All samples were submitted for hematological and plasma biochemical determinations within 30 min after collection. Whole blood examination included RBC, WBC, differential WBC, and determination of PCV, and Hb concentrations. Plasma biochemical analyses included determination of concentrations of sodium, potassium, chloride, carbon dioxide, urea nitrogen (BUN), creatinine, calcium, glucose, phosphorus, total bilirubin, cholesterol, uric acid, total protein, albumin, globulin, alkaline phosphatase, SGOT, SGPT. For comparative purposes, clinically affected boa constrictors were arbitrarily categorized as either acutely affected (<2 months following onset of signs) or chronically affected (2 months following onset).

Acutely affected snakes had leukocytosis, relative lymphocytosis, lower total protein

and globulin values, and significantly higher SGOT values than did chronically affected snakes.

Here's data on the acutely affected (n=6, out of a study group of 15; Schumacher, et al.)

RBC	0.7	+/- 0.1
Hemoglobin	7.6	1.2
PCV	22.3	4.1
WBC	13,733	6,639
Heterophils	19.7	13.3
Lymphocytes	46.8	20.5
Monocytes	3.8	2.4
Eosinophils	0.2	0.4
Basophils	3.2	6.4
Azurophils	23.3	7.4

To determine the actual presence or absence of inclusion bodies requires biopsies of organ tissue for analysis.

Q: How long in minimum/maximum is the lifespan of an individual who exhibits symptoms of the disease?

A: It is apparently fatal to all but the asymptomatic carriers. Time of death varies between individuals, and pythons tend to die faster than boas. Based on the research in the Schumacher article (quoted above for the blood values), some boas at least are hanging on for several months. Whether they should be allowed to hang on, in light of the very obvious distress and destruction of organs and CNS, is another matter...

Q: What are the living conditions of this virus - how will he react to heat or cold, what kind of disinfection works?...

A: At this point, they don't know. To quote Bennett: "No treatment has been shown to be successful for this viral disease. It may be mild in boas and may go undiagnosed. It is, therefore, best to prevent exposure of pythons to boas. Schumacher, in the same source (Mader) states: "At present there is no treatment. Strict quarantine procedures should be followed when introducing newly acquired snakes (especially boas) into an established collection. Once the disease has been diagnosed, euthanasia of affected snakes is the only way to prevent the infection from spreading." Schumacher states that snakes in public and private collections in

the U.S., Africa and Europe have been diagnosed with this disease. One of his references is the article I cited in above; the other is Schumacher, J: Atiologische und pathologische Untersuchungen uber die sog. EinschluBkorperchenerkrankung der Riesenschlangen (Boidae). Vet Med Diss (Munich), 1992.

*Kaplan, Melissa. 1995. Inclusion body disease. Available online:
<http://www.sonic.net/daltons/melissa/ibd.html>*

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