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## Opisthotonus, torticollis and mortality in a breeding colony of *Anolis* sp. lizards

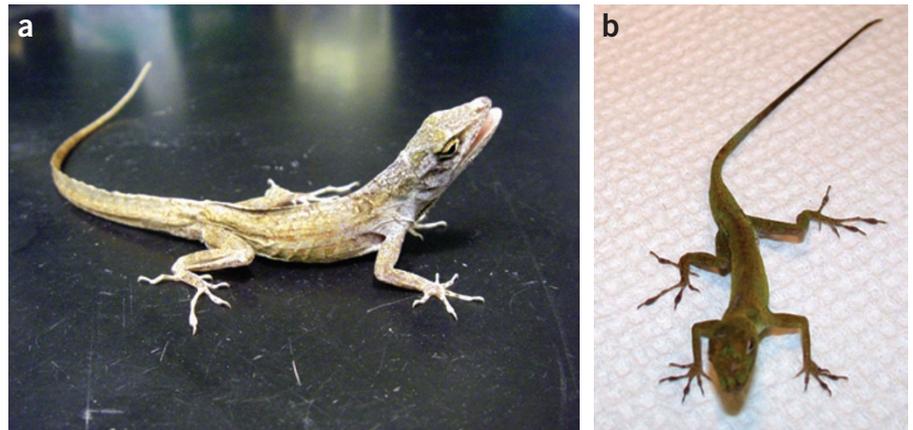
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Anoles are typically small (3–7 in long), arboreal, insectivorous lizards found throughout the southeastern US, the Caribbean and various other regions of the western world. Approximately 300 species have been described, half of which dwell on Caribbean islands. The word 'anole' comes from the French *anolis*, from Arawak, an indigenous language of the Lesser Antilles.

Several adult anoles over 1 y of age representing the species *Anolis sagrei*, *A. cristatellus*, *A. grahami*, *A. lineatopus* and *A. evermanni* presented with abnormal body postures that included torticollis and opisthotonus. Affected anoles often died within 24 h.

The anoles had been wild-caught in the Greater Antilles and Bahamas by the investigators who were researching the evolution of genetic covariance structure in repeated radiations of Caribbean *Anolis*<sup>1</sup>. The repeated evolution of similar ecomorphs of Caribbean *Anolis* provided an opportunity to investigate the extent to which evolutionary change is dictated by genetic constraints versus the extent to which selection can modify genetic architecture. The project involved captive breeding of at least eight species of *Anolis* representing three common ecomorphs from three different lineages.

Captured anoles were maintained for at least 4 months in a breeding colony under an approved animal protocol at the University of Virginia. The investigators had not introduced any new animals into the colony for the 4 months preceding our observations of neurological signs and ensuing death in some lizards. The animals were maintained



**FIGURE 1** | Abnormal body postures in anole lizards. (a) Opisthotonus in *Anolis sagrei*. (b) Torticollis in *Anolis evermanni*.

in an environment of high humidity (~80% in cage, 55–65% ambient room humidity), with a room temperature of 82 °F during the light phase and 75 °F during the dark phase, and a 12-h:12-h light:dark cycle. Animals were caged in polycarbonate plastic boxes or containers lined with removable all-weather carpet. Each cage contained a wooden perch, a plant (genus *Coleus*) and a hammock for basking, as well as an ultraviolet light mounted across the top of the cage. Daily misting of the interior of the cages with deionized water provided droplets of drinking water and helped raise the cage humidity. The lizards were fed daily with either crickets raised on T-Rex Calcium Plus Food for Crickets (T-Rex Products, Chula Vista, CA) or other insects. All live insect food had been dusted with Herptivite Multivitamin and Rep-Cal Calcium with Vitamin D3, phosphorus-free (T-Rex Products).

On clinical examination, the affected anoles presented with a reluctance to move, tremors of the distal appendages and postural distortion of the axial skeleton, including hyperextension (Fig. 1a) or twisting and serpentine distortion (Fig. 1b). Because of the acute onset of these presentations in multiple individuals, the differential diagnosis included infectious disease, metabolic disease, nutritional deficiency and toxicosis. Gross necropsy of affected lizards was unremarkable with the exception of gout affecting multiple joints. Microscopic and bacteriologic evaluations were not done.

What do you think is the cause of the problems? Is it infectious, metabolic, toxic or nutritional? How would you investigate? How would you treat it?

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**What's your diagnosis?**

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