Letters to the Editor

In Response to How Not To Train Your Dragon: A Case of Komodo Dragon Bite, by Borek and Charlton

To the Editor:

We read with interest the article by Borek and Charlton¹ that described the uncomplicated lacerations that resulted from a Komodo monitor (*Varanus komodoensis*) bite. In their article, Borek and Charlton¹ document the mild local trauma induced by the described bite; bites from any varanid lizard, especially *V komodoensis*, are rarely formally documented, and thus the report has notable value. However, the authors then discuss the recent classification of these lizards as *venomous* without critically balancing the premature use of this term, or considering the current lack of sufficient evidence supporting the use of venom by *V komodoensis* in prey capture. It must be noted that the current, traditional, synthesized definition of venom with emphasis on snake venoms does not include any reference to possible medical effects in humans, as we are not natural prey or predators of venomous snakes (for a discussion of the definition of venom, see Weinstein et al²; Fry et al³; Jackson et al⁴; Weinstein et al⁵). Also, although Borek and Charlton¹ note the theoretical nature of the possible roles of varanid lizards' oral products, as asserted by some authors,^{3,6} they cited without critical consideration an arguably flawed published clinical report⁷ of a reportedly fatal outcome of a presumed envenomation by the Bengal monitor (*Varanus bengalensis*). That report has been challenged⁸ because it lacks essential information such as the verified identity of the envenoming animal and any biomedical or clinical information that supports the likelihood of a fatal bite delivered by a *V bengalensis*. The unfortunate victim in that report exhibited a clinical course very similar to that of a life-threatening envenoming by Russell's viper (*Daboia russelii*), a species that is a major cause of snakebite-inflicted morbidity and mortality in the region where the bite reportedly occurred.⁸

Furthermore, there is contentious research describing the presence of genes or their transcripts encoding toxins that are found in snake venoms, which may be expressed in oral secretions, in some squamate reptiles, including some monitor lizards (especially *V komodoensis*)⁹; however, there are no confirmed cases of clear envenoming associated with monitor bites, including by the Bengal monitor (*V bengalensis*).

The synthesized traditional consensus definition of venom is “a complex substance produced in a

specialized gland and delivered by an associated specialized apparatus that is deleterious to other organisms in a given dosage and is actively used in the subjugation and/or digestion of prey and/or in defense.”² Biological function—that is, how it is used—is a crucial defining factor that is the essence of the definition. Although the oft-repeated hypothesis of a role of oral, pathogenic bacteria in *V komodoensis* predation has no objective supporting evidence and is likely incorrect, there is likewise currently no clear evidence of a “venom” function; those advocating this function^{3,6} state that *V komodoensis* “seem incapable of bringing down an adult water buffalo” and assign as a proposed cause of death possible life-threatening sepsis in retreating, bitten buffalos that occurs as a consequence of extended submersion in fecally contaminated water.³ As we have opined elsewhere, given the most parsimonious evidence available, animals bitten by *V komodoensis* most likely succumb from massive blood loss and hypovolemic shock.² *V komodoensis* possess large, serrated teeth, and significant bites inflict serious damage to large blood vessels. There is no current evidence that *V komodoensis* bites cause coagulopathy or precipitous hypotension, aside from that associated with hypovolemic shock from trauma, in bitten prey animals. There is also no convincing evidence whether toxins detected in *V komodoensis* oral secretions might be delivered in volumes or concentrations significant enough to cause the death of a prey animal or produce medically significant effects in a bitten human.

Although not subjected to formal medical review, there have been one or two *V komodoensis* bites described that also featured uncomplicated, mild-to-moderate local effects resulting from physical trauma.¹⁰ Other varanid species (including *V bengalensis*) have been popular in private collections for many decades, with numerous bites occurring, and there are no reports, either in the scientific or medical literature, consistent with medically significant envenoming by this or any other monitor lizard species. We are aware of 2 anecdotal reports (see White and Weinstein⁸) describing nonspecific “toxic” effects after bites by the desert monitor, *Varanus griseus*; these reports do not, in our opinion, meet appropriate standards for peer-reviewed scientific or medical papers, nor can they be characterized as consistent with medically significant envenoming.

Finally, it should be noted that we are not claiming that envenoming by some varanid lizards could not happen. We are asserting the need for independent confirmation of

the biological function of purported “venom” before the term is applied, and careful documentation and verified confirmation of the envenoming animal’s identity before assigning a medically significant bite to any species for which there is no previous evidence for such. The patient bitten by a captive *V komodoensis* in the case documented by Borek and Charlton¹ experienced only mild, uncomplicated trauma. Any assignment of venomousness accompanied by suggested or implied medical significance carries serious and indelible medical, biological, and legal ramifications that cannot be ignored or dismissed, and so must be supported by substantial quality evidence.⁸ Currently, the implied venom functions of varanid oral secretions are not supported by available evidence, nor is the presumptive assignment of any clinical significance of varanid oral toxins or their transcripts.

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In Reply to Drs Weinstein and White

To the Editor:

We thank Drs Weinstein and White¹ for their interest in the article, “How not to train your dragon: a case of a Komodo dragon bite,”² and their thoughtful comments. We recognize that the use of the term *venomous* is controversial when referring to Komodo dragons (*Varanus komodoensis*). The aim of this article was to present a case report and give a brief review of the literature, including the theories involved in mortality after a Komodo dragon bite, which include trauma, sepsis, and a venom deposition theory. We note that despite the theory that envenoming may occur, no signs of envenoming occurred in our patient; despite the theory that wound infection and sepsis may occur, amoxicillin-clavulanate appeared to mitigate any potential infection in our case. Our patient did experience morbidity as a result of a direct traumatic injury from the bite.

We respectfully appreciate your insightful comments regarding the possible toxic effects of a Komodo dragon bite, which will hopefully help to further clarify the question and semantics of venom and envenoming. We agree that there is no definitive proof that a toxin is involved or that envenoming occurs in Komodo dragon bites, and look forward to further research in this area. Despite this controversy, we hope that clinicians will continue to report human cases of Komodo dragon bites to add to the available literature and the ability to care for our patients.

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Reference

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