**Venom Module – Assessment Questions**

**Short-answer questions:**

1. What is venom?
	* A mix of natural toxins that is traumatically introduced. Typically for prey capture or defense
2. What are the major linages of venomous snakes?
	* Viperidae, Elapidae, Colubridae
3. What type of fang is exhibited by vipers?
	* Solenoglyphous
4. What type of fang is exhibited by elapids?
	* Proteroglyphous
5. What type of fang is exhibited by Colubrids?
	* Opisthoglyphous
6. What is the term for traits that have gained new functions that differ from their original function shaped by natural selection?
	* exaptation

**Multiple choice questions:**

1. Which of the following is **not** evidence that diet is a selection pressure acting on venom
	1. More complex venoms are associated with more phylogenetically complex diets
	2. Higher toxicity to invertebrate prey among species that eat more invertebrates
	3. Venom toxins with taxonomic specificity (i.e. affect one specific taxonomic group)
	4. **Geographic neurotoxic and hemotoxic venom variation in some lineages**
2. Which of the following is **not** a mechanism that contributes to functional variation in venoms?
	1. Differential gene expression
	2. **Phenotypic plasticity**
	3. Gene duplications and losses
	4. Changes in gene sequence
3. Which of the following is characteristic of a low-pressure venom system?
	1. Highly mobile fangs
	2. Sit-and-wait predation style
	3. Extremely large venom glands
	4. **Bite-and-chew behavior**
4. Which of the following is not evidence of convergent evolution in venomous reptiles?
	1. **Homologous toxins in identified in the Toxicofera clade**
	2. The thick-body, fast-strike speed, and sit-and-wait predation style of the death adder
	3. “Spitting” behavior in African and Asian spitting cobras
	4. Front fangs in Viperidae and Elapidae
5. Which of the following might be a selective advantage immediately following a venom gene duplication?
	1. Selection to preserve the sequence of both venom gene copies
	2. The loss of maladaptive “junk” DNA
	3. **An increase in expression of the venom gene**
	4. The ability to express each venom gene copy at a different time
6. Which of the following contributes to the disproportion burden of snakebite on rural and impoverished communities?
	1. Effective local snakebite remedies
	2. **Short self-life of antivenoms**
	3. Close proximity of numerous medical facilities
	4. Low cost of antivenom production
7. Which of the following is **not** evidence of venom being a valuable resource to venomous species?
	1. **Expression of diverse venom toxins**
	2. Venom metering
	3. Defensive behaviors
	4. Dry bites

**Check all that apply:**

1. Which of the following lineages show evidence of being venomous?
	1. Crocodilians
	2. Testudines
	3. **Snakes**
	4. **Lizards**
	5. Tuatara
	6. **Frogs**
	7. **Caecilians**
	8. Salamanders
2. Which of the following groups have a high-pressure venom system and highly mobile fangs?
	1. **Vipers (Viperidae)**
	2. Coral Snakes (Elapidae)
	3. **Stiletto Snakes (Atractaspis)**
	4. Boomslangs (Colubridae)
	5. Gila Monsters (Helodermatidae)
3. Which of the following is true of front-fangs in vipers and elapids
	1. They are connected to different jaw bones
	2. **They arose from opistoglyphous ancestors**
	3. **They evolved convergently**
	4. They migrate from the inside to the outside during development

**Extended eesponse questions:**

1. What evidence suggests that venom may have arisen early in the Toxicofera clade? What evidence argues against considering all Toxicoferan lineages as “venomous”?
2. Diet is considered a primary selective pressure for the evolution of venom. What evidence suggests that diets exert selection on snake venoms?
3. What are the primary genetic mechanisms that contribute to variation in snake venoms?