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# Snake Venomics: Fundamentals, Recent Updates, and a Look to the Next Decade

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Affiliations

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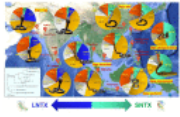
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## Abstract

Venomic research, powered by techniques adapted from proteomics, transcriptomics, and genomics, seeks to unravel the diversity and complexity of venom through which knowledge can be applied in the treatment of envenoming, biodiscovery, and conservation. Snake venom proteomics is most extensively studied, but the methods varied widely, creating a massive amount of information which complicates data comparison and interpretation. Advancement in mass spectrometry technology, accompanied by growing databases and sophisticated bioinformatic tools, has overcome earlier limitations of protein identification. The progress, however, remains challenged by limited accessibility to samples, non-standardized quantitative methods, and biased interpretation of -omic data. Next-generation sequencing (NGS) technologies enable high-throughput venom-gland transcriptomics and genomics, complementing venom proteomics by providing deeper insights into the structural diversity, differential expression, regulation and functional interaction of the toxin genes. Venomic tissue sampling is, however, difficult due to strict regulations on wildlife use and transfer of biological materials in some countries. Limited resources for techniques and funding are among other pertinent issues that impede the progress of venomics, particularly in less developed regions and for neglected species. Genuine collaboration between international researchers, due recognition of regional experts by global organizations (e.g., WHO), and improved distribution of research support, should be embraced.

**Keywords:** genomics; next-generation sequencing; protein decomplexation; proteomics; toxin; transcriptomics; venom.

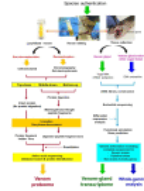
## Figures



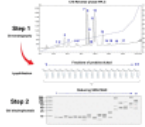
**Figure 3** Snake venom proteomes of selected...



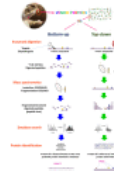
**Figure 1** Venomics: Advancing proteomic, transcriptomic, and...



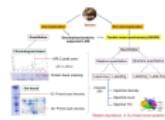
**Figure 2** Venomic workflow incorporating proteomics,



**Figure 4** A generic venom decomplexation strategy...



**Figure 5** Bottom-up and top-down proteomics in...



**Figure 6** Protein quantitation in snake venom...

**All figures (7)**

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