



Discovery Of Human Antibodies Against Spitting Cobra Toxins

Bojsen-Møller, Laura; Lohse, Brian; Harrison, Robert; Casewell, Nicholas; Andersen, Mikael Rørdam; Laustsen, Andreas Hougaard

Publication date:
2016

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Bojsen-Møller, L., Lohse, B., Harrison, R., Casewell, N., Andersen, M. R., & Laustsen, A. H. (2016). *Discovery Of Human Antibodies Against Spitting Cobra Toxins*. Poster session presented at Symposium for Biological and Life Science Students 2016, Cambridge, United Kingdom.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

DISCOVERY OF HUMAN ANTIBODIES AGAINST SPITTING COBRA TOXINS

Laura Bojsen-Møller¹, Brian Lohse², Robert Harrison³, Nicholas Casewell³, Mikael R. Andersen¹, Andreas H. Laustsen¹

¹Department of Biotechnology and Biomedicine, Technical University of Denmark, Kgs. Lyngby, Denmark

²Department of Drug Design and Pharmacology, University of Copenhagen, Denmark

³Alistair Reid Venom Research Unit, Liverpool School of Tropical Medicine, Liverpool, United Kingdom

The Snakebite Challenge

Current snakebite envenoming treatment options consist of animal-derived antisera [1] and are associated with severe adverse reactions due to the heterologous nature of the animal-derived antibodies present in these antisera, and the presence of therapeutically irrelevant antibodies [2]. The African spitting cobras are among the most medically important snakes in sub-Saharan regions due to the severity of the clinical outcomes caused by their cytotoxic venom, which is derived from cytotoxins of the 3FTx toxin family and PLA₂ [3]. Here we report the results of our progress in identifying human antibodies targeting relevant toxins from the venom of the black-necked spitting cobra (*Naja nigricollis*).

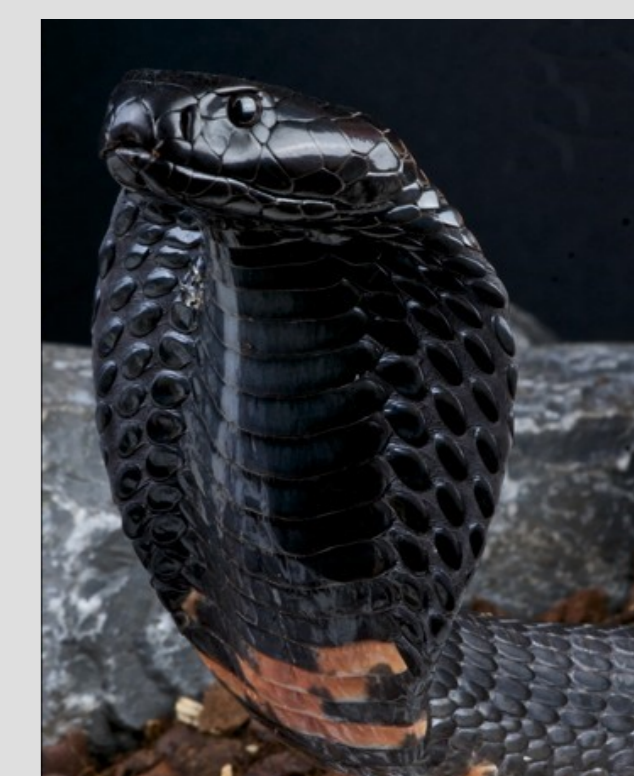


Fig. 1: *Naja nigricollis*

Selection of Medically Relevant Toxins

Selecting only medically relevant venom toxins for antibody discovery we avoid production of therapeutically irrelevant antibodies. Toxin fractionation was carried out with RP-HPLC.

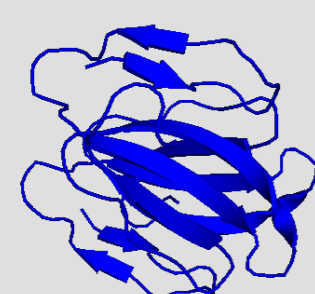


Fig. 2: 3FTx [4]

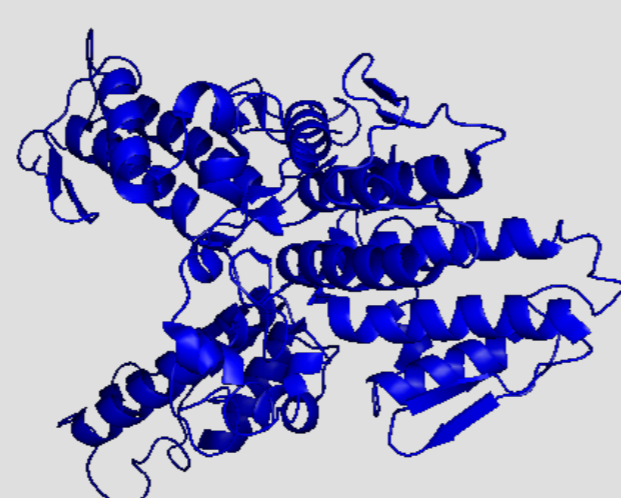
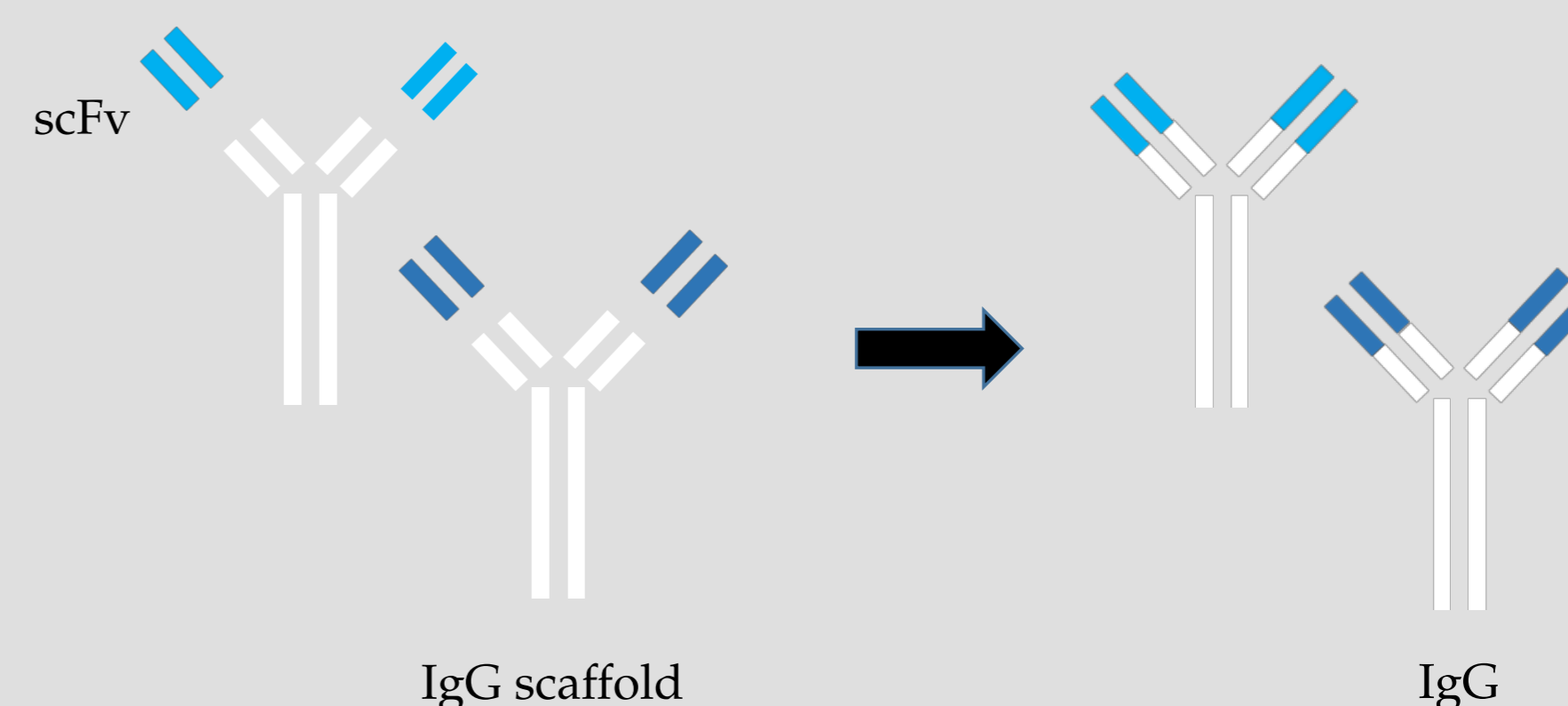
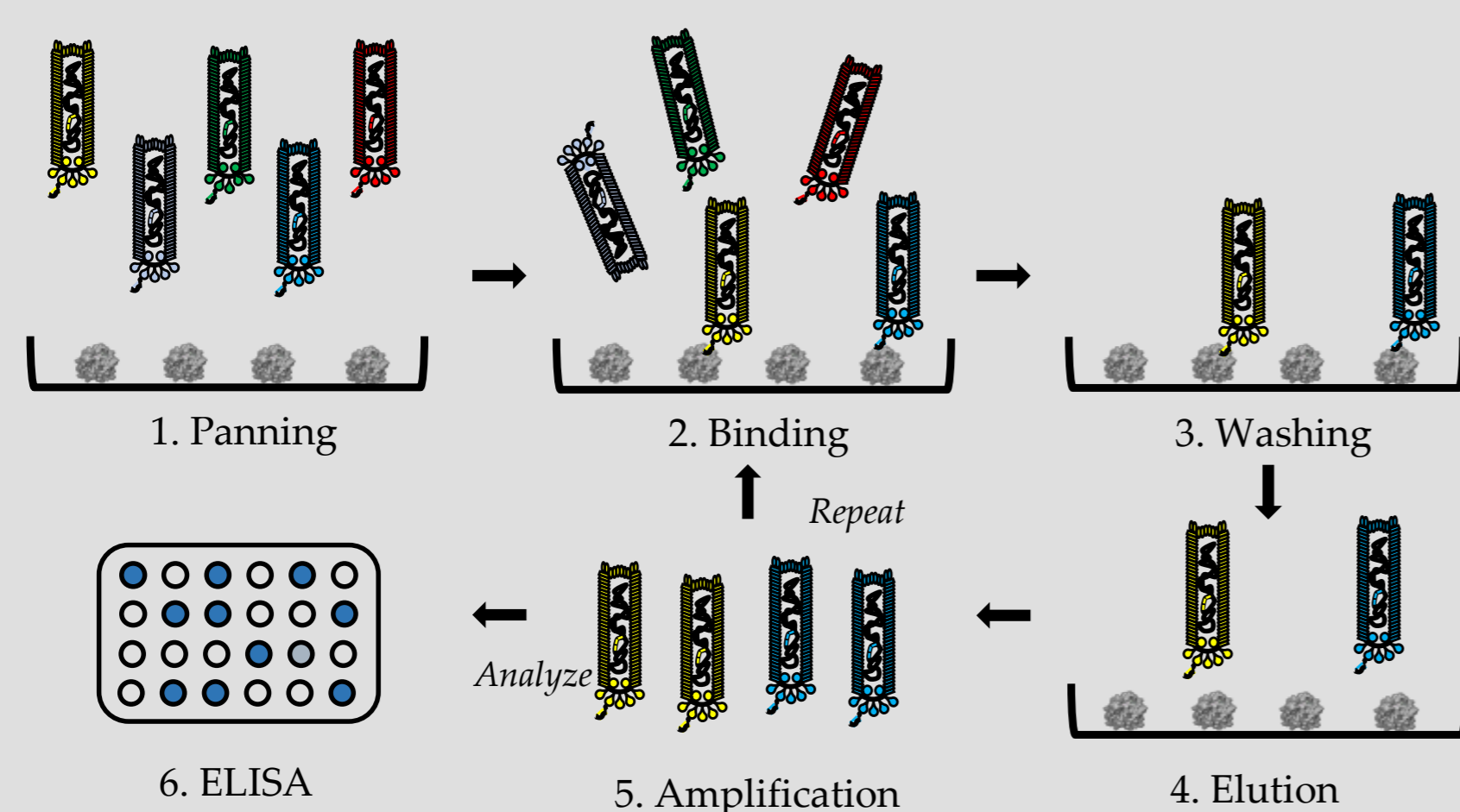


Fig. 3: PLA₂ [4]

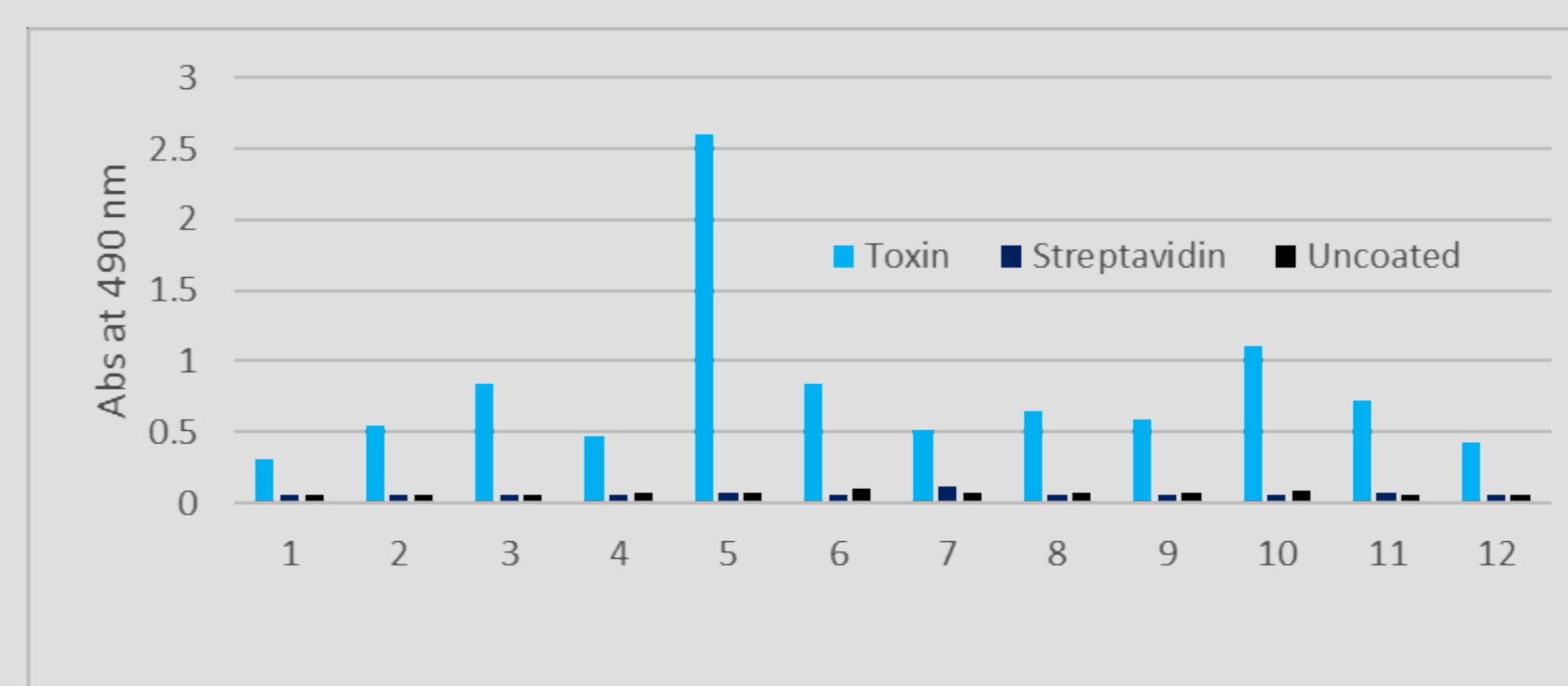
Conversion of scFvs to IgG Format



Discovery of scFvs with Phage Display



Strong Binders after 3 Rounds of Panning



References

- [1] Williams, DJ, et al. Ending the drought: new strategies for improving the flow of affordable, effective antivenoms in Asia and Africa. *Journal of proteomics* 74.9 (2011): 1735-1767.
- [2] Harrison, RA, et al. Research strategies to improve snakebite treatment: challenges and progress. *Journal of proteomics* 74.9 (2011): 1768-1780.
- [3] Petras, D, et al. Snake venomics of African spitting cobras: toxin composition and assessment of congeneric cross-reactivity of the pan-African EchiTAB-Plus-ICP antivenom by antivenomics and neutralization approaches. *Journal of proteome research* 10.3 (2011): 1266-1280.
- [4] Structures obtained from PDB.org

Future perspectives

It is our hope that this work will advance the development of recombinant antivenoms based on oligoclonal human antibodies that are compatible with the human immune system, and provide better treatment options for snakebite victims in rural parts of the tropical world.

Acknowledgements

We thank the Novo Nordisk Foundation (NNF16OC0019248) and Symphogen A/S for financial support.