Indian Cobra Genome Decoded

Why in News?

An international team of researchers have sequenced the genome of the Indian cobra, in the process identifying the genes that define its venom.

What is the significance?

- This genome sequence can provide a blueprint for developing more effective anti-venom.
- The cobra genome sequence is of really high quality.
- Sequence information of the genes that code for venom proteins is very important for the production of recombinant anti-venoms.

Are existing anti-venoms not effective enough?

- Their **efficacy varies**, besides producing side effects.
- In India, the challenge has been producing anti-venom for the species known collectively as the “big four”,
    1. The Indian cobra (Naja naja),
    2. Common krait (Bungarus caeruleus),
    3. Russell’s viper (Daboia russelii), and
    4. Saw-scaled viper (Echis carinatus).
- **Common anti-venom** is marketed for the treatment of bites from the “big four”, but its effectiveness came under question in a recent study.
- The common anti-venom worked against the saw-scaled viper and the common cobra.
- But this anti-venom fell short against some neglected species and also against one of the “big four” - the common krait.
- **Facts** - Accidental contacts with snakes lead to over 100,000 deaths across the world every year.
- India alone accounts for about 50,000 deaths annually, and these are primarily attributed to the “big four”.

Why has production of effective anti-venom been challenging?

- Venom is a **complex mixture** of an estimated 140-odd protein or peptides.
- Only some of these constituents are toxins that cause the physiological symptoms seen after snakebite.

- But anti-venom available today does not target these toxins specifically.
- Anti-venom is currently produced by a century-old process.
- In this process, a small amount of venom is injected into a horse or sheep, which produces antibodies that are then collected and developed into anti-venom.

What are the issues with this 'horse technique'?

- This is expensive, cumbersome technique and comes with complications.
- Some of the antibodies raised from the horse may be completely irrelevant.
- The horse also has a lot of antibodies floating in its blood that have nothing to do with the venom toxins.
- One more problem with horse antibodies is that our immune system recognises it as foreign and when anti-venom is given our body mounts an antibody response. This leads to what is called **serum sickness**.

How does decoding the genome help?

- In the Indian cobra genome, the researchers have identified 19 key toxin genes, the only ones that should matter in snakebite treatment.
- They stress the need to leverage this knowledge for creation of safe and effective anti-venom using synthetic human antibodies.
- The next step would be obtaining the genomes and the venom gland genes from the other three of the "big four" and the deadly African species.
- However, there is a very long way to go from genomes to effective anti-snake venoms.

Source: Indian Express