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Why are sea lice vaccines not effective?

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Parasite vaccines

- In general vaccines against parasites are uncommon
- There are three/four that are developed or undergoing clinical trials and can be considered near market
- All are for ectoparasites
  - Ticks
  - *Haemonchus* worms in sheep
  - Sheep scab
  - Chile sea lice
- The “big” parasite problems such as malaria, sleeping sickness, and kala azar still remain a challenge for modern medicine

Relevance of parasite biology to a vaccines success

- Cattle tick
  - Engorges on blood, intracellular digestion, no peritrophic membrane. Vaccine target BM86 protein
- Sheep blowfly
  - Wide-scale blocking leads to partial starvation. Rate of blood feeding critical. Vaccine target peritrophic matrix.
- Buffalo fly
  - Rapid degradation of antibody. Vaccine target peritrophic matrix.

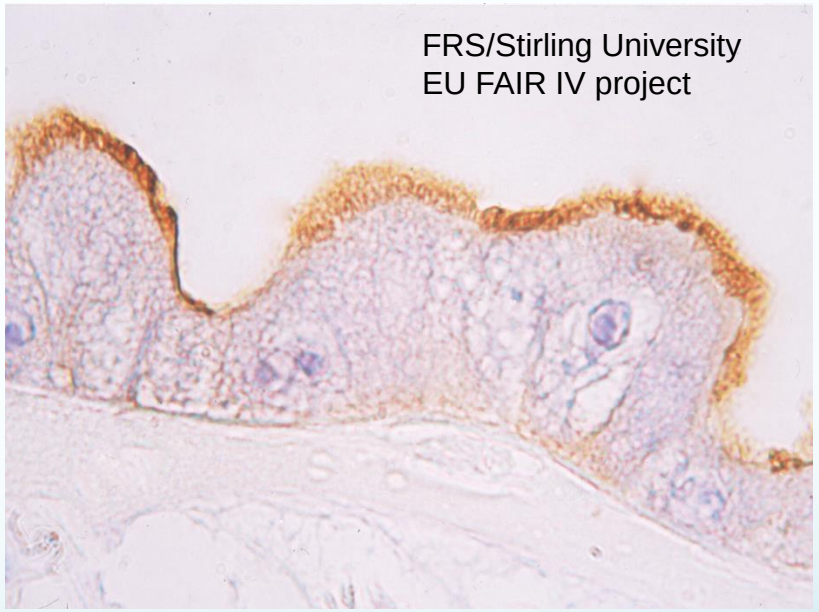
SUCCESSFUL

FAILED

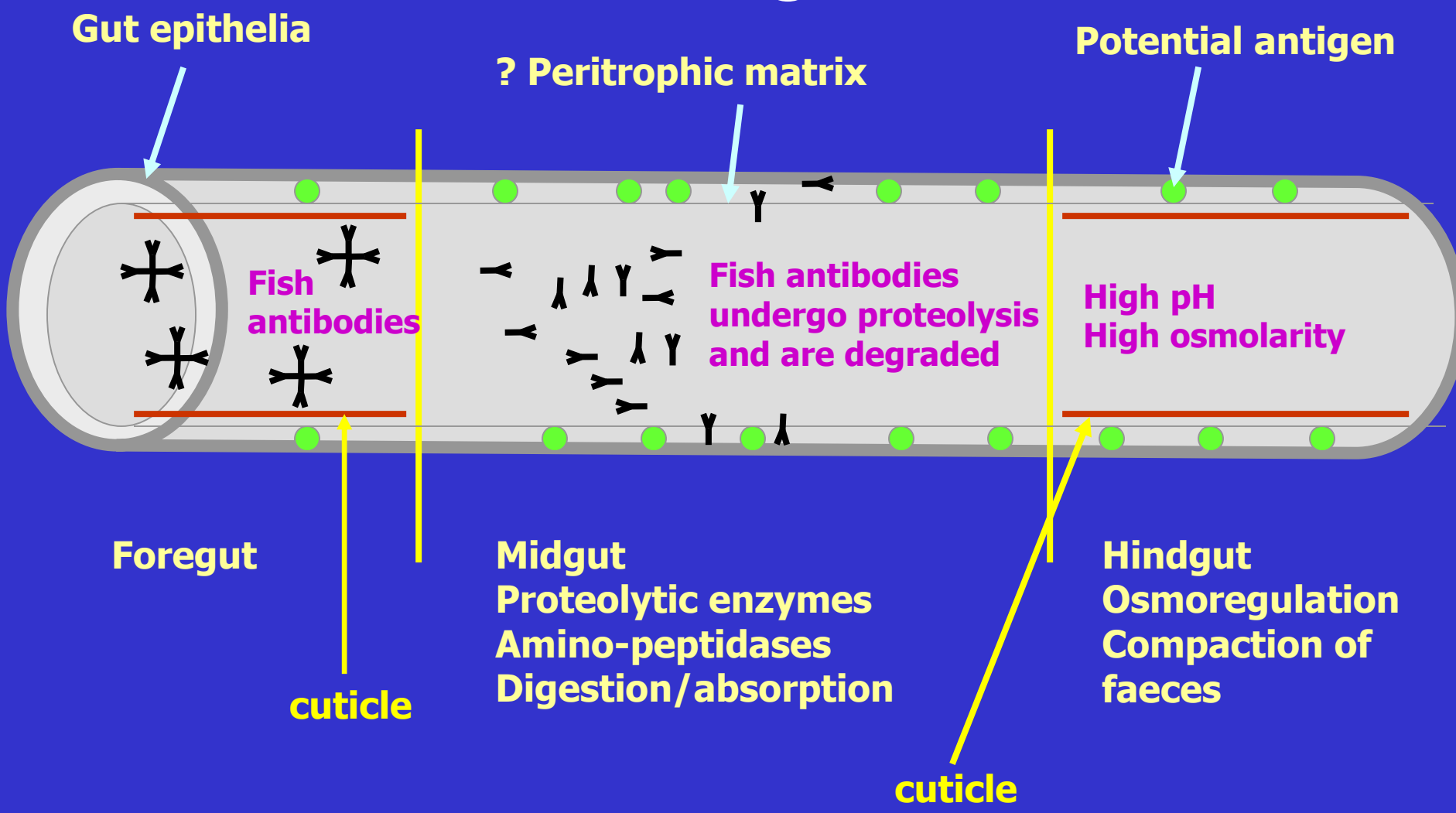
FAILED

Sea lice vaccines

- Often concentrate on the adult stages of louse
- Targets the digestive tract
- Large research effort, many groups involved over the last 20 years
- The result no effective lice vaccines
- WHY?



What happens in the sea louse gut?



You can vaccinate water buffalo against lions

But it does not stop lions from hunting them

And by the time the antibody is in the lion it is not a good day for the water buffalo

You can vaccinate salmon against adult sea lice

But it doesn’t stop sea lice settling on salmon

And by the time the antibody is in the lice it not a good day for the salmon

Where next for parasite vaccines for fish?

- Developing vaccines against fish ectoparasites is difficult and very demanding of resources
- Ease of vaccine development depends on the biology of the parasite/host
- Serious questions over the suitability of the louse gut as a target for a vaccine
- Salmon lice do not fit the model for successful vaccines against an ectoparasite
- Investigating host/parasite interactions is a promising approach

The Future…

- Or maybe we should just get a few of these!

The ultimate in sea lice control?