Sea Lice Research Centre

Sea lice vaccine

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sfi Senter for forskningsdrevet innovasjon

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IMMUNOLOGIC CONTROL OF A PARASITIC ARTHROPOD

Identification of a Protective Antigen from *Boophilus microplus*[1]

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- ✓ Started with 988 g (50 000) hand picked ticks
- ✓ Extensive purification of membrane bound proteins
- ✓ Identifying and using a ~86 kD protein
- ✓ Immunisation

TABLE I

Vaccination of cattle with purified Boophilus microplus Ag[a]

Animal	Group	No. of Ticks/Day	Tick Weight (mg)	% Damage	Weight Eggs / Weight ticks
Trial 1					
26	Control	199	224	6	0.49
29	Control	237	231	3	0.52
31	Control	227	220	1	0.47
30	Vaccinate	25	152	86	0.16
32	Vaccinate	135	175	79	0.25
34	Vaccinate	38	152	70	0.22
Trial 2					
114	Control	197	230	1	0.56
115	Control	254	247	2	0.56
120	Control	224	220	2	0.57
123	Control	264	267	2	0.58
119	Vaccinate	55	143	90	0.18
122	Vaccinate	118	155	92	0.16
124	Vaccinate	89	157	91	0.19
125	Vaccinate	100	156	92	0.16

[a] In trial 1, the results for no. of ticks per day, weight, and estimates of damage are the means of 17 daily estimates. Egg laying figures are the means of nine estimates. For trial 2, the results for tick no., weight, and damage are the means of 15 days' estimates and those for egg laying of 8 days' estimates. The SE of the data are not shown individually. However, the largest SE for the parameters recorded were: for the mean daily tick count for any control animal, 23 ticks; for the mean daily tick count on any vaccinate, 14 ticks; for daily tick weight, 10 mg; for the egg laying ratio, 0.04 and for the estimates of damaged ticks on vaccinated cattle, 5%.

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- ✓ Commercial BM86 based vaccine available
- ✓ The ONLY metazoan ectoparasite vaccine

WHY?

- ✓ Not recognised by host immune system
- ✓ Large arsenal of properties to avoid host immunity
- ✓ External structures selected to avoid immune attach

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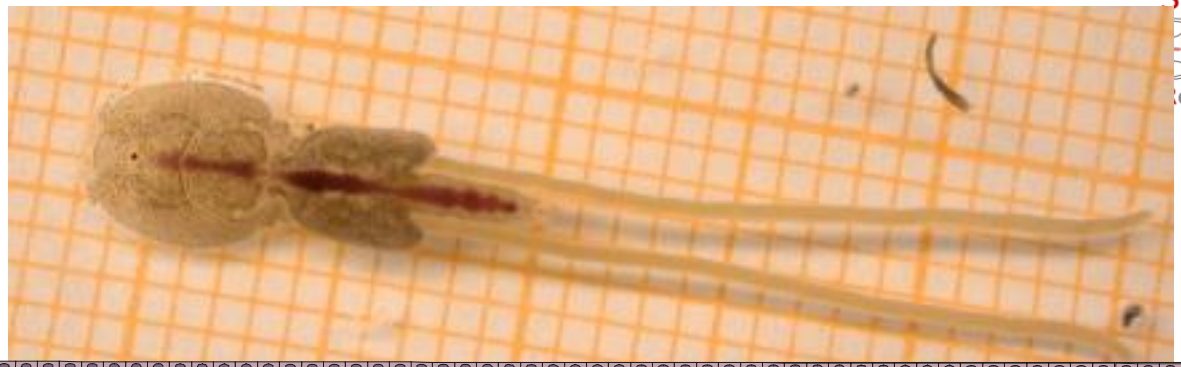

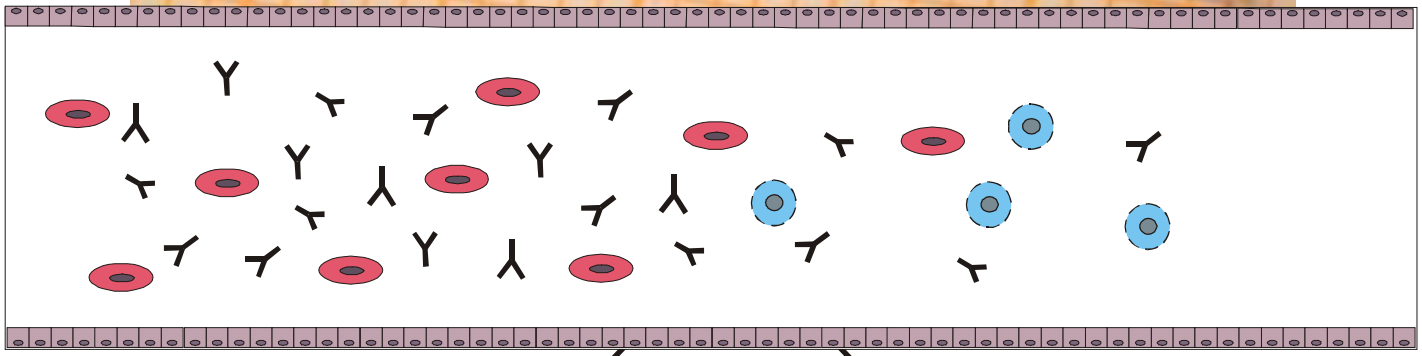

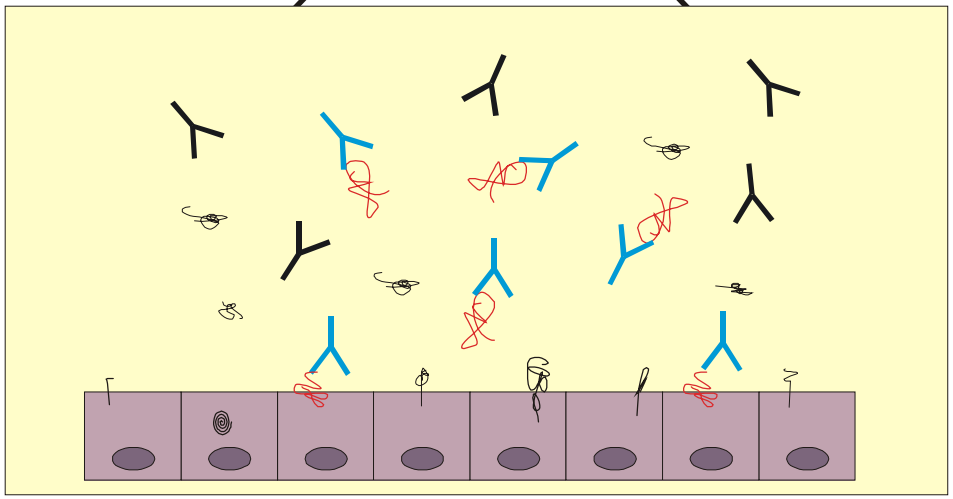

Salmon Ab in the lice?

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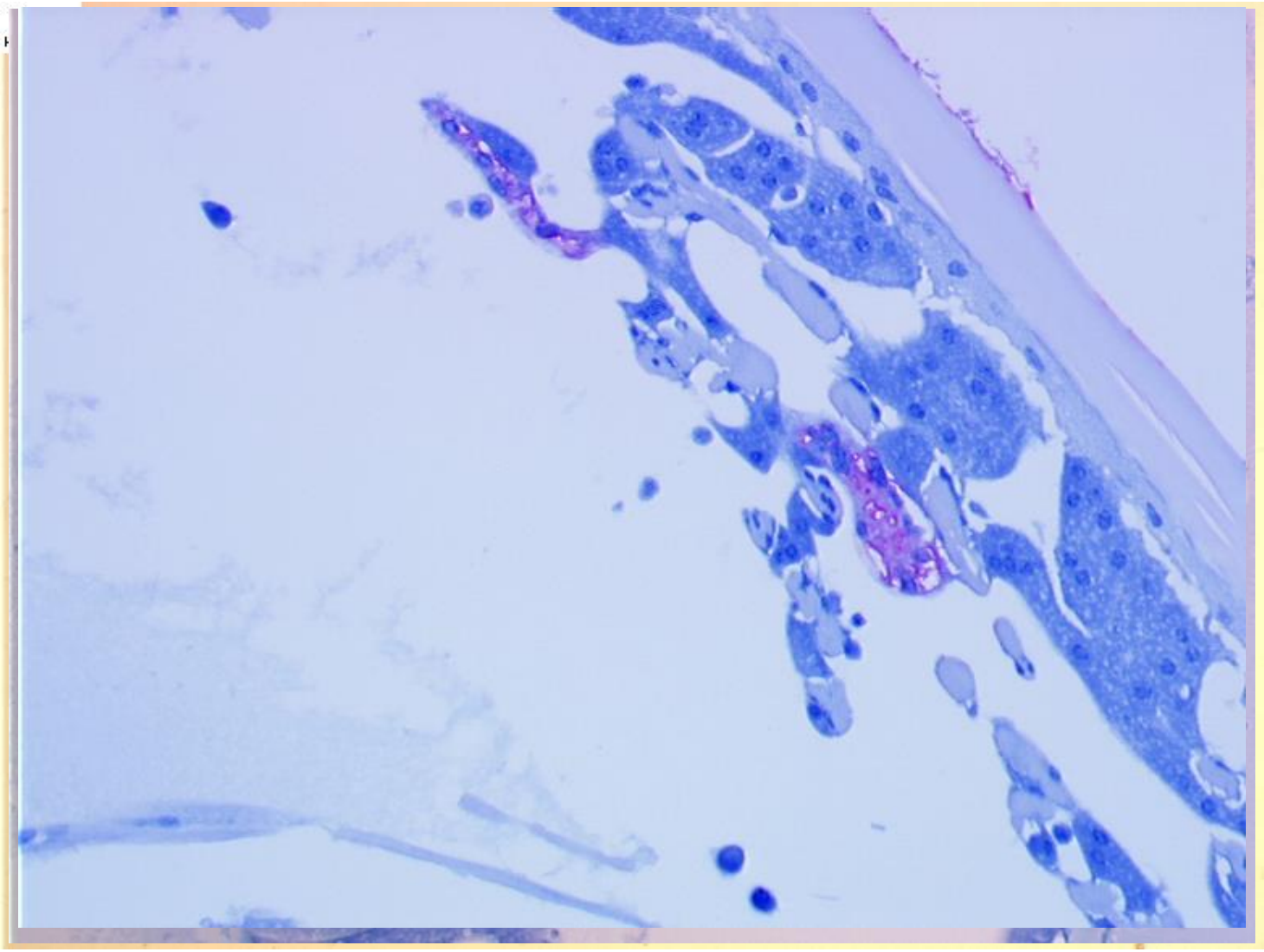


Caligus rogercresseyi : Successful vaccination using recombinant my32 antigen

DPI	Sample	Groups	Abundance	N fish	Inhibition %	
10	5	Placebo	13 +/-3	25	-	P<0.001
		Vaccine	23 +/-5	25	-	
24	20	Placebo	37 +/-10	20	-	P<0.0001
		Vaccine	16 +/-7	20	57%	

Carpio et al 2011, Vaccine, 29: 2810-2820

Ls4D8 – a my32 homologue in *L. salmonis*

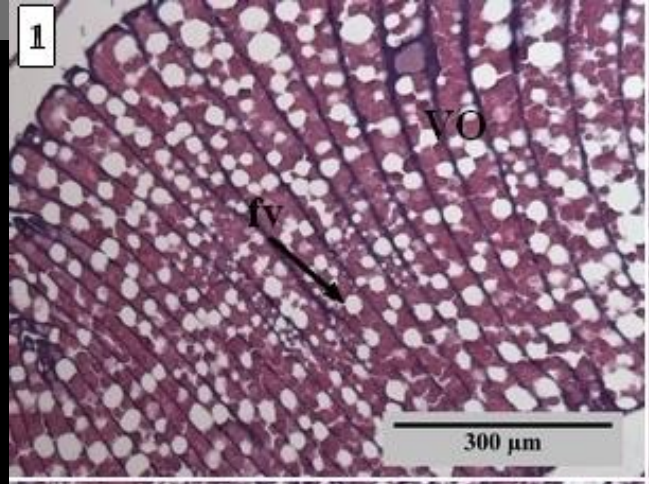
- Identified Ls4D8, homologue to subolesin in ticks and my32 in *C. rogercresseyi*
- Characterisation of Ls4D8 in salmon louse
- RNAi in adult female lice
- Production of a recombinant Ls4D8 test vaccine
- Evaluation of vaccine effects

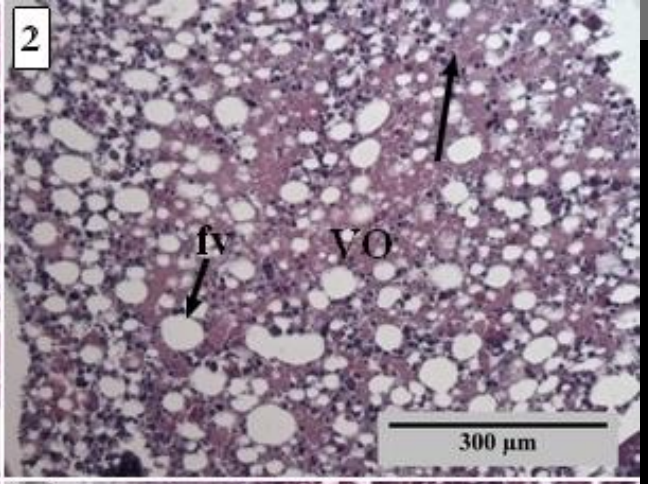
WP6: Lice Lab

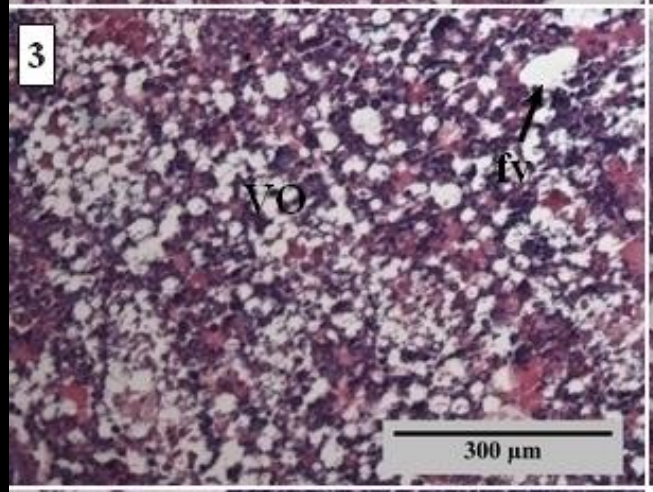
Scope: *To produce the sea lice material and wet lab experiments required for ongoing research in the Sea Lice Research Centre. A key task is to develop tools, methods and new knowledge on fundamental sea lice biology to improve experimental design.*

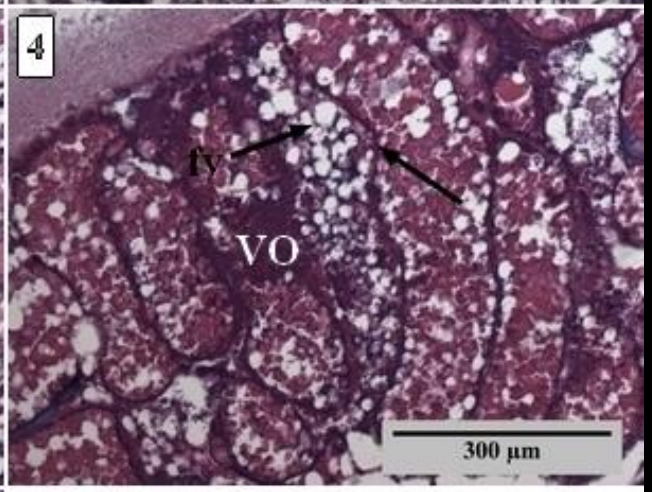
- Laboratory strains of salmon louse are kept in continuous culture for research. These include several resistant strains, sensitive strains and inbred strains.
- A significant screening capacity has been developed using single fish tanks (n=156) to test effects of drugs, vaccines and RNAi.
- Continuous flow incubators (n=1300) has been developed for large scale in-vitro drug efficacy assays, selective breeding and evaluation of vaccine effects..
- High throughput routines to evaluate 100 or more gene candidates by RNAi every year.

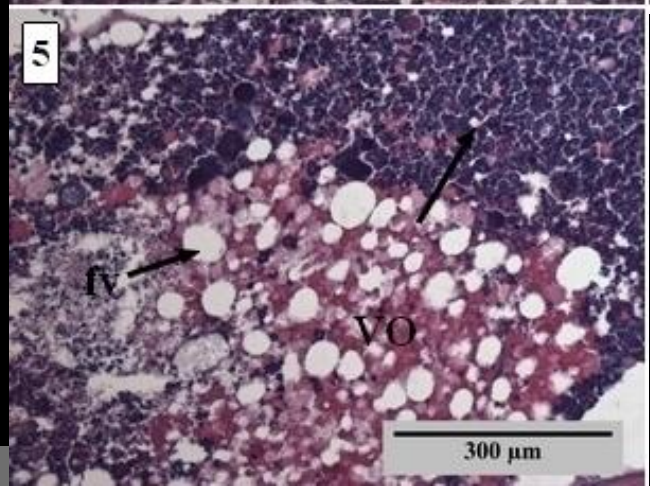
- No released eggs
- No blood in intestine











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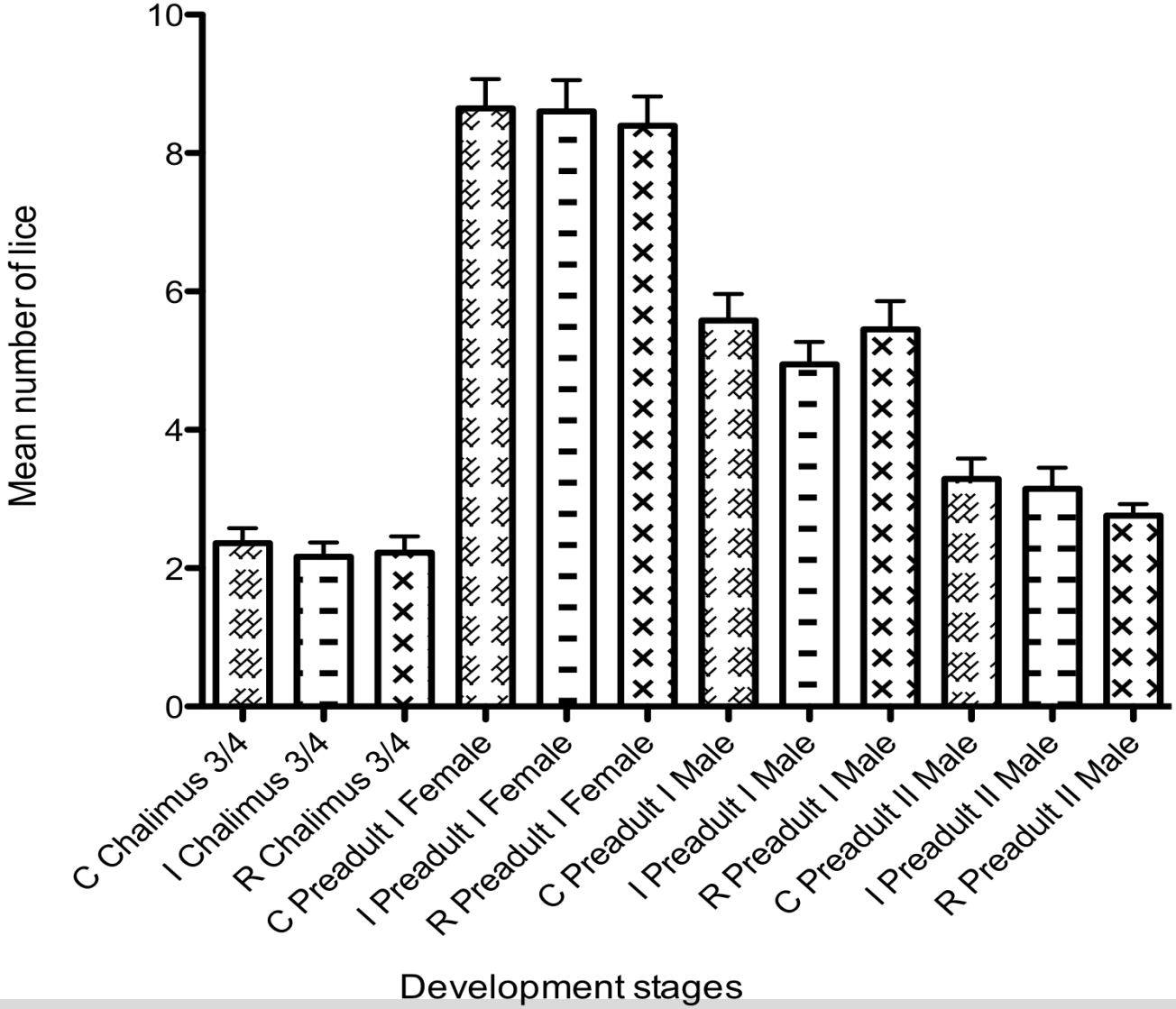
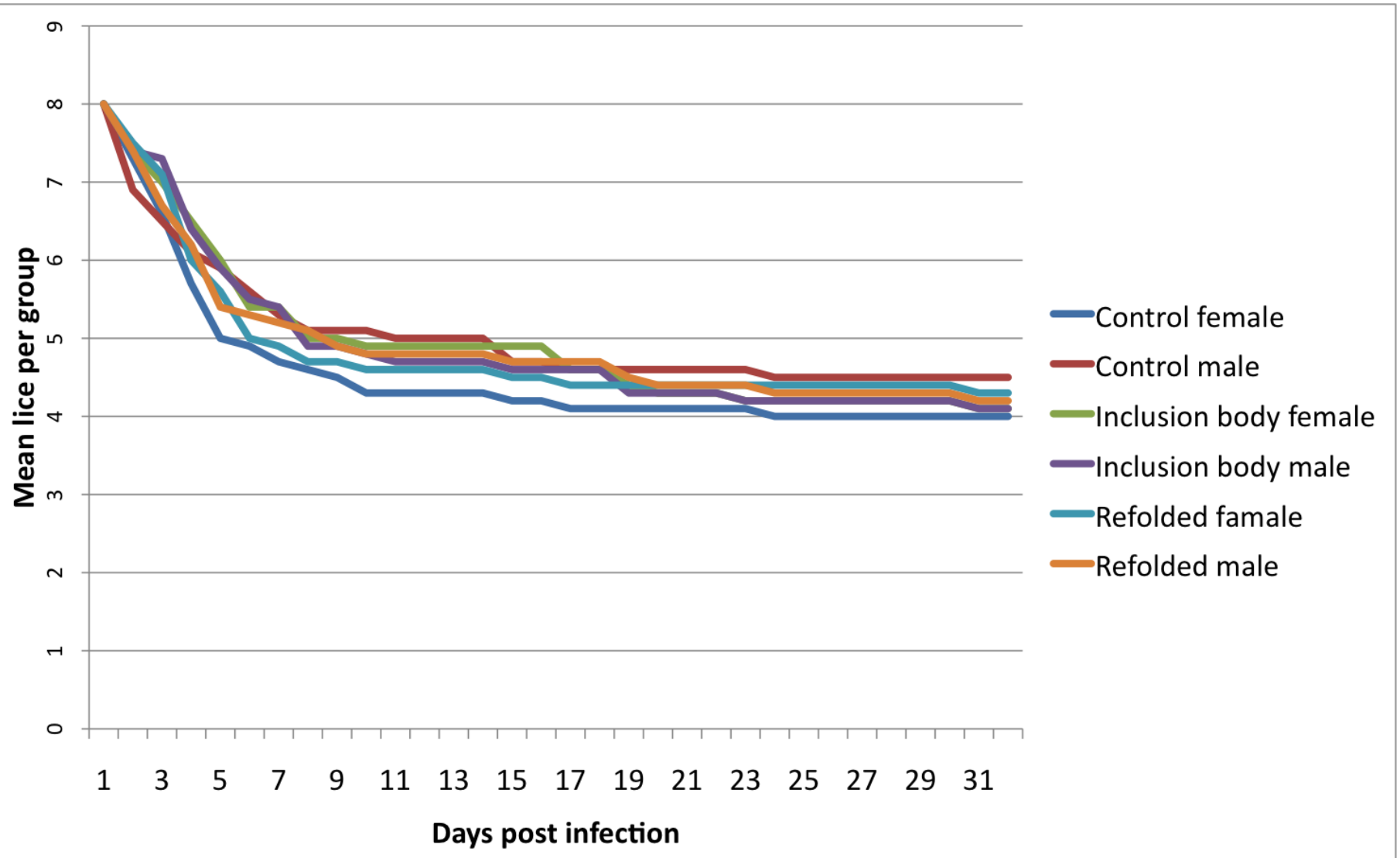
Severe deformities during oocyte maturation

Recombinant Test vaccine

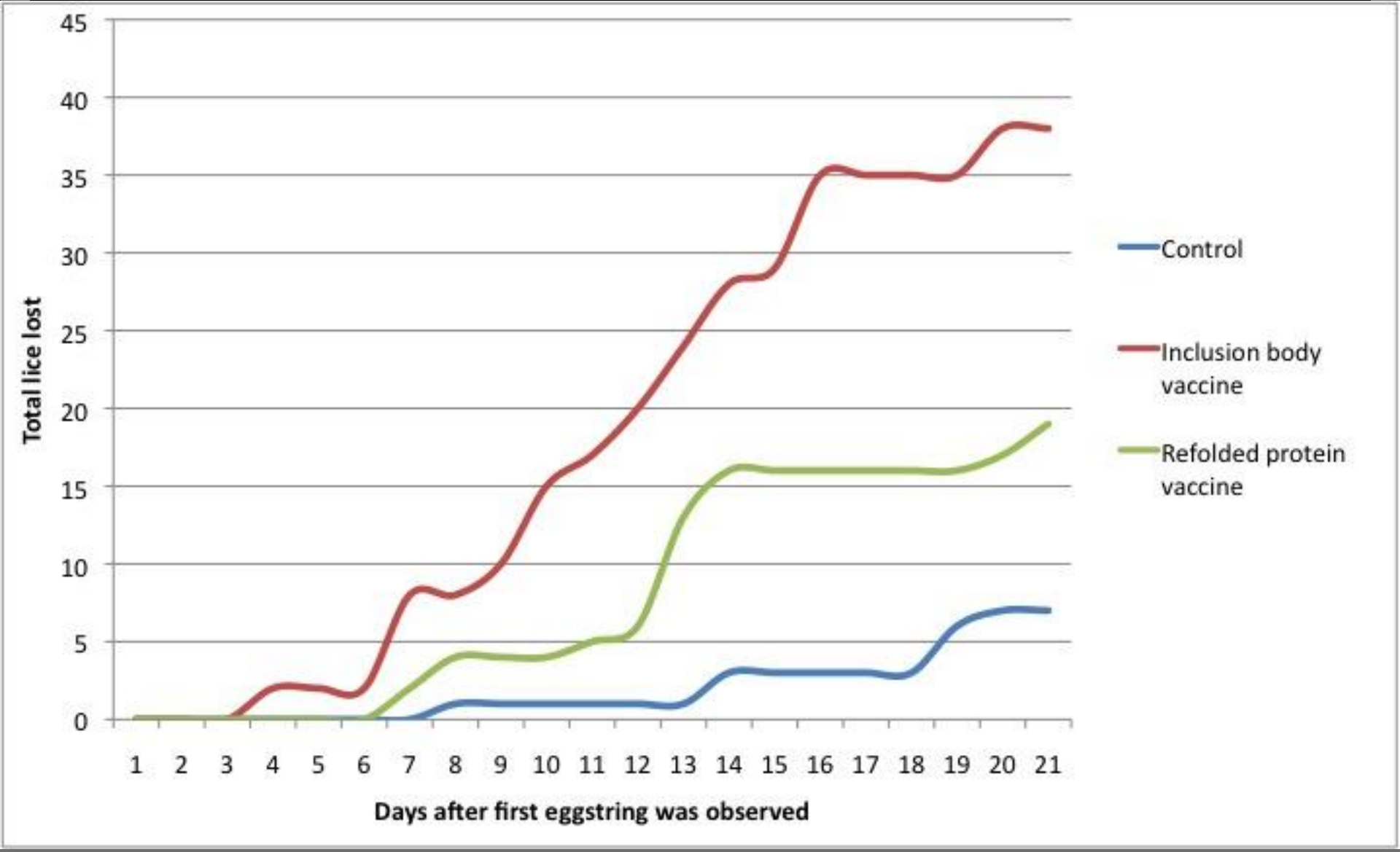
Effects on infection and growth of juvenile *L. salmonis*



Lice loss after infection on control and vaccinated fish



Egg string loss on control and vaccinated fish



Summary of reproductive output

Group	N egg-strings at termination	N egg-strings per lice	N eggs (corrected for un-measured egg-strings)	N copepodides	Hatching success in %	Copepodides/ louse
Controll	65	1.81	20633	15478	75,01 %	430
Inclusion body	52	1.68	15559	12033	77,34 %	388
Refolded	61	1.85	19700	16780	85,18 %	508

- **No obvious vaccine effects**
- **High loss of egg-strings**
- ***C. rogercresseyi* vs. *L. salmonis***

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First ever sea lice vaccine launched in Chile

Chilean salmon

November 24, 2015, 10:43 am

Alicia Villegas

The first ever vaccination against sea lice was launched in Chile last week, as other salmon producing countries could have it within two years, an executive with Tecnovax told *Undercurrent News*.

According to Alejandro Pino, technical

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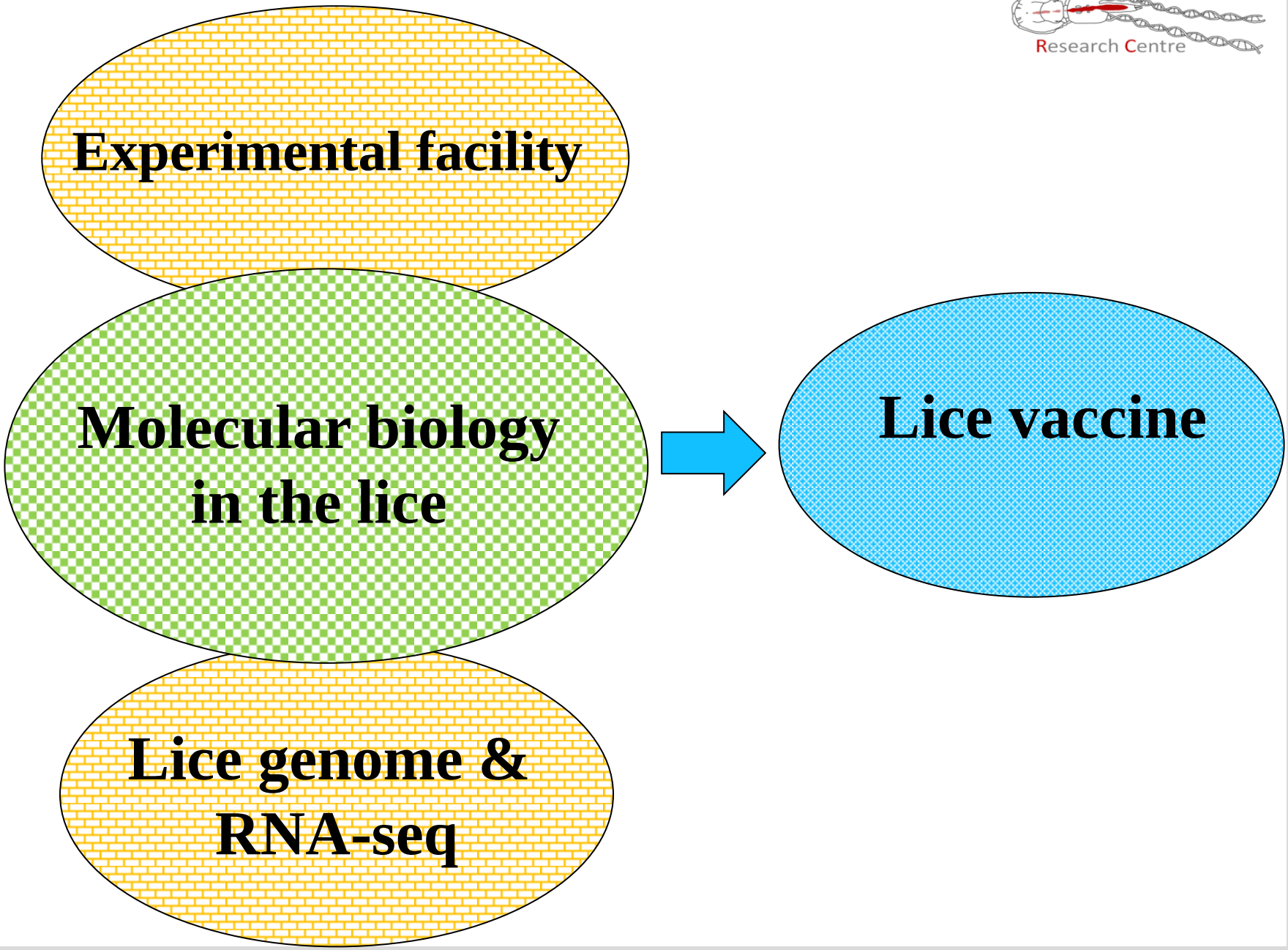

Candidate gene screening

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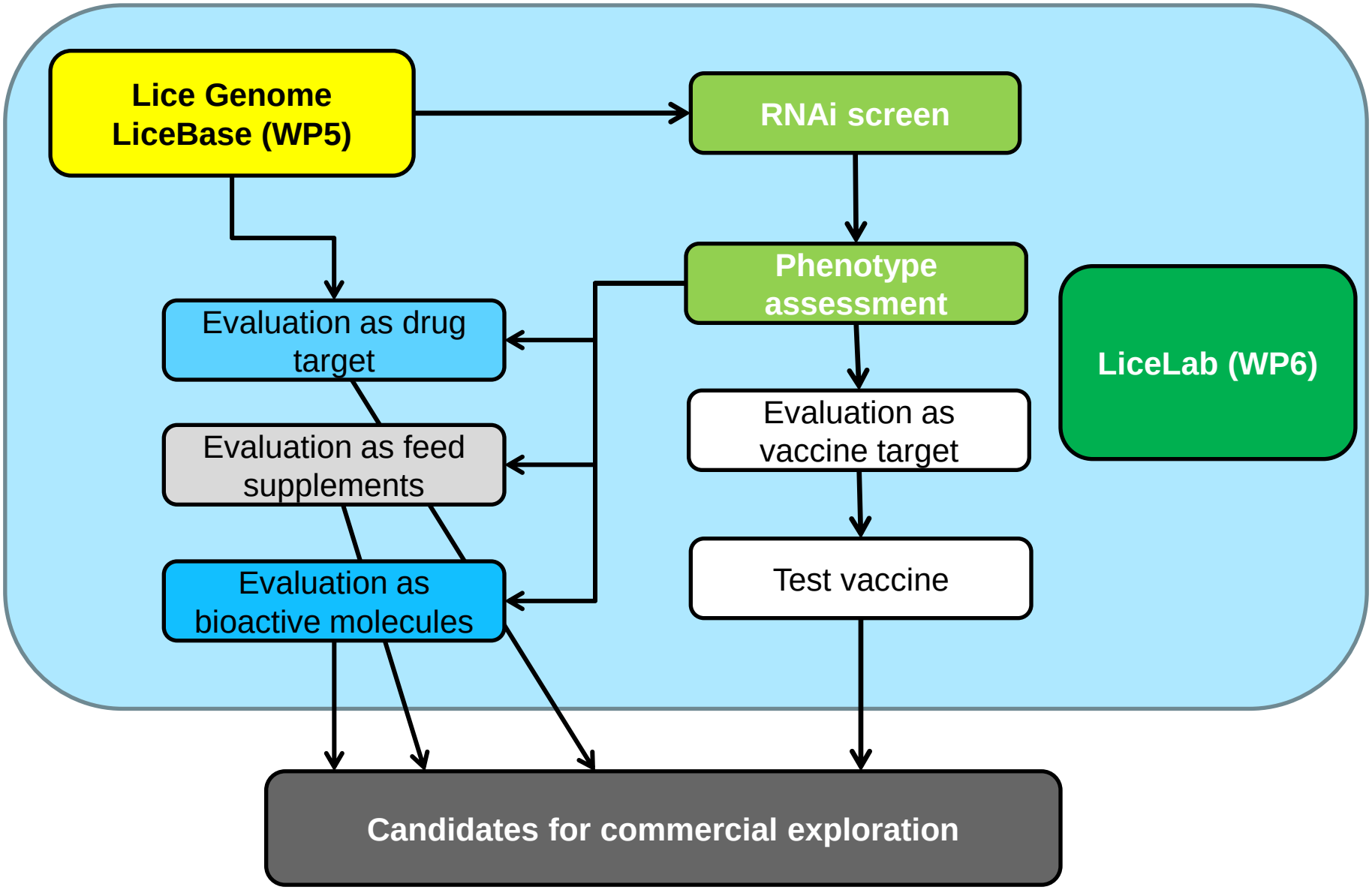

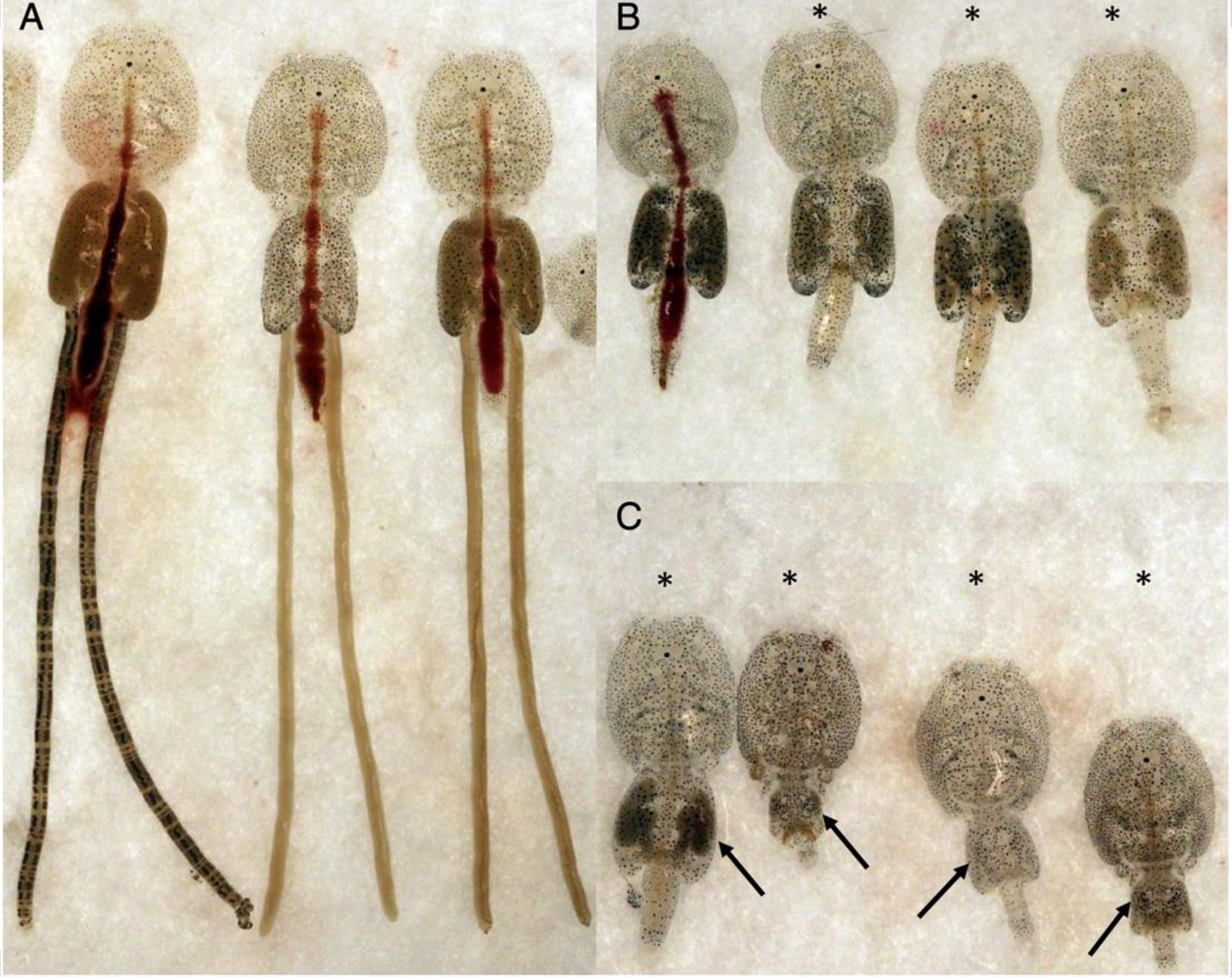
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