“U.S. PERSPECTIVE ON POSLARVAL QUALITY AND AVAILABILITY”

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POSTLARVAL QUALITY

EXTERNAL QUALITY CONTROL PRIOR SHIPMENT OF SPF POSTLARVAES

- Stress Test
- Gill development
- Average Weight and CV
- Activity

POSTLARVAL QUALITY

- **MICROSCOPIC EVALUATION**
- Deformity
- Necrosis
- Fungi
- Molting problems
- Bacterial internal and external
- Fouling internal and external
- Gut content

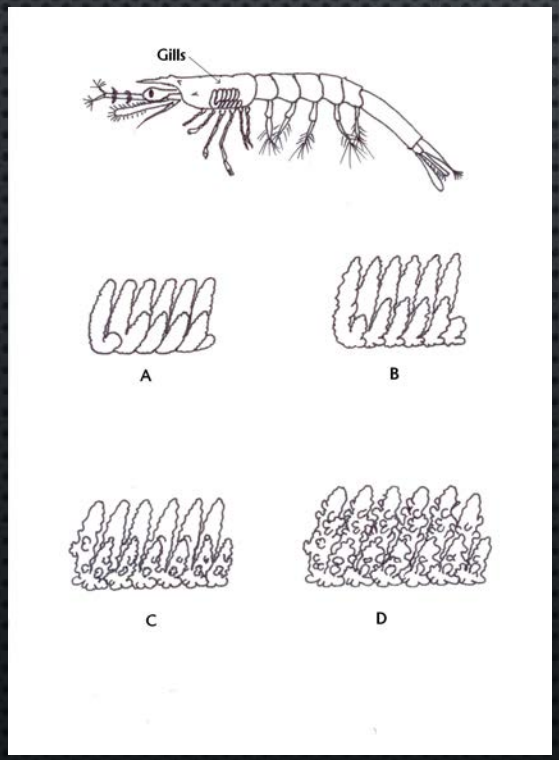
STRESS TEST

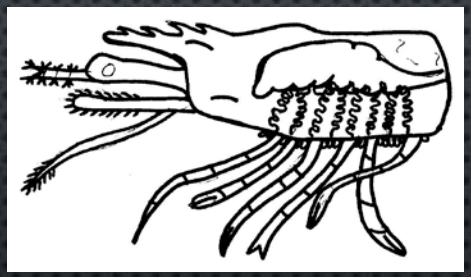
This test is one or the most important tests to check the quality of the larvae. No more than 15% mortality should be accepted for L. vanammei. during stress test. The procedure is described below:

- Take 100 pls from the tank and put in fresh water 0 ppt for 30 minutes, the fresh water is at room temperature.
- After that put the same pls in the salinity they have in the larval rearing tank for another 30 minutes.
- After the 30 minutes are over, count the dead and the alive pls to calculate the percentage of mortality.
- A larvae that has >90% survival rate proves that it has a good health status as well as a high capacity for osmoregulation. If the larvae has less than 90% a new test should be done to make sure there are no other factors affecting the test.

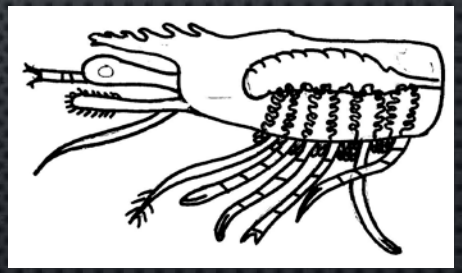
GILL DEVELOPMENT

The morphology of the gills will be evaluated from a random sample of 25 pls and what percent of the branquial cavity is full. We will also check the number of spines the rostrum has in pl10 there should be 4 superior spines and 0 inferior spines once they are pl 12 you will observe 4 -5 superior spines and 0-1 inferior spines. See drawing.





PL10, spines 4/0, 7.0mm



PL12, spines 4-5/0-10.0 mm

AVERAGE WEIGHT AND C.V.

It is optimal to ship a minimum average size of 8 mm for pls 10-12, with a coefficient of variation of no more than 15%.

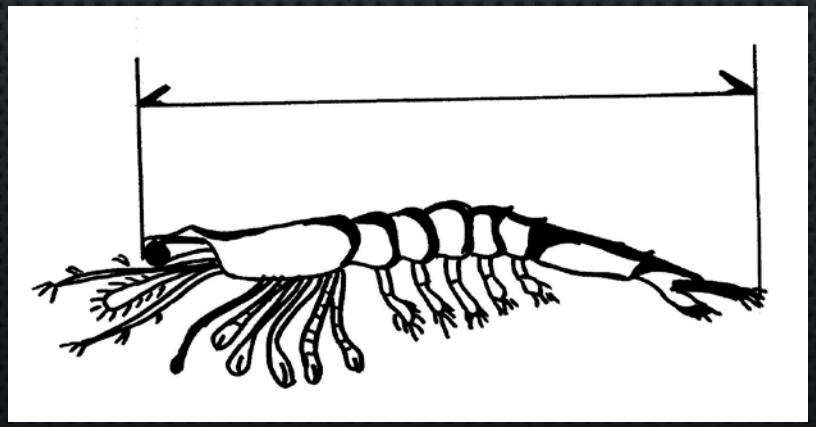
The pls should be measured in the following way:

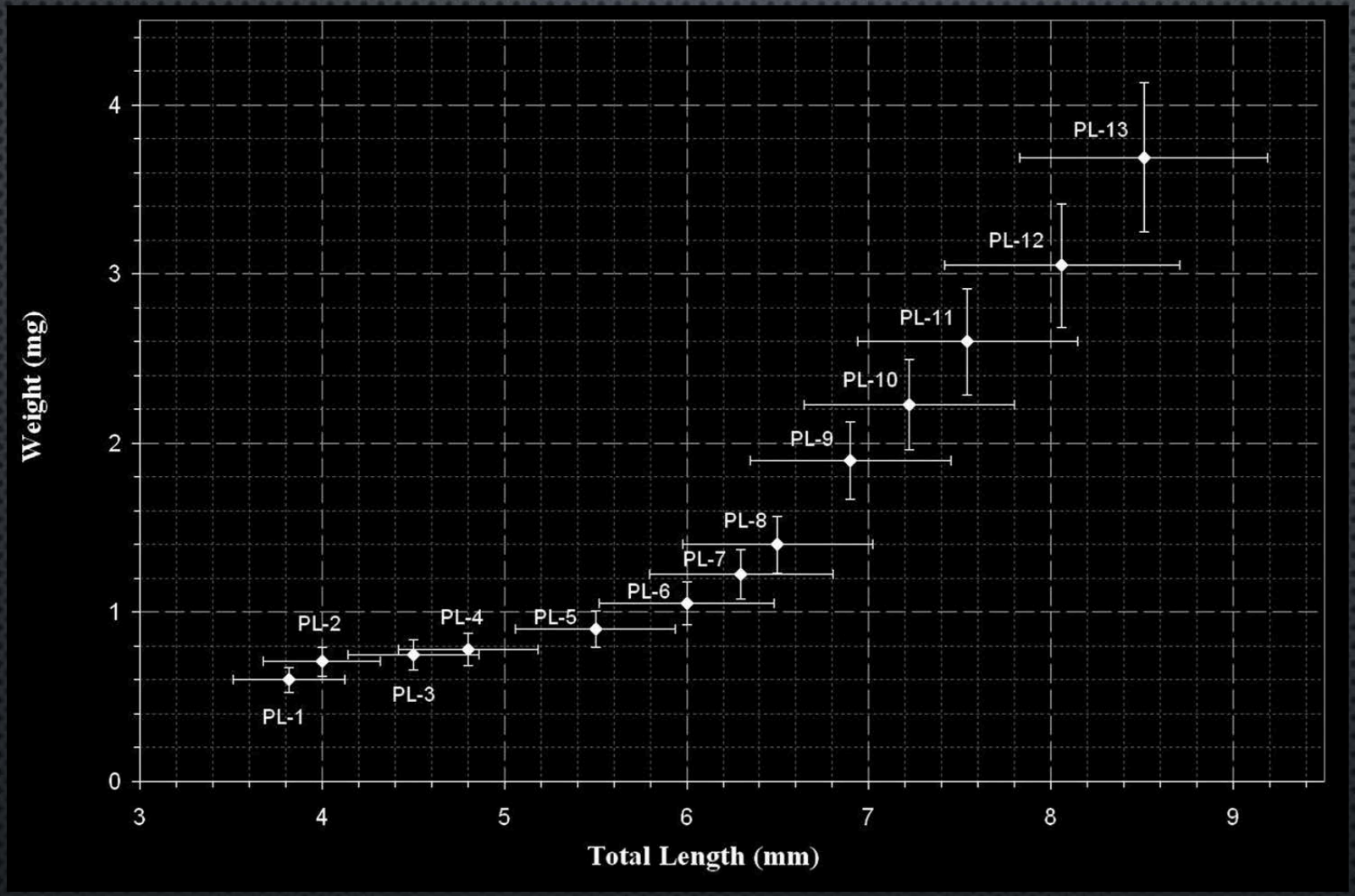
1.- A random sample of at least 25 pls will be taken from each tank that will be harvested try to measure all the animals trapped on the net.

2.- These animals can be stained with iodine if measuring is difficult.

3.- The animals are placed on a plasticized milimetric sheet of paper or on a slide and a ruler.

4.- The length will be measure from the tip of the rostrum to the end of the uropods (tail) as shown in the drawing





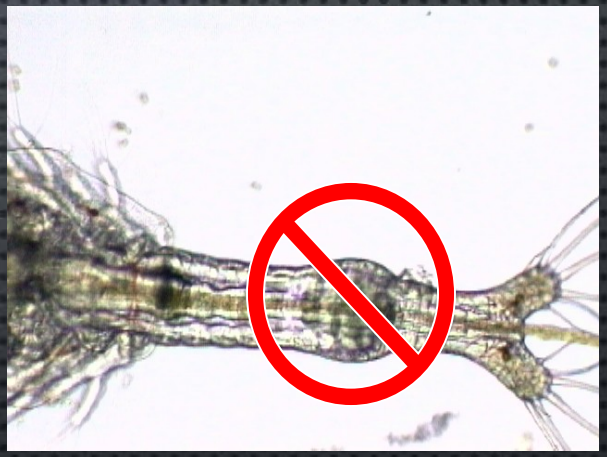
Length-weight relationship for postlarval *P. vannamei* (PL-1 to PL-13). Weight data represent means of 100 samples (100 PLs per sample) from different larval-rearing tanks and conditions, weighed throughout several production seasons. Total length data represent means of 100 individual PLs from the same tanks. error bars = Sd.

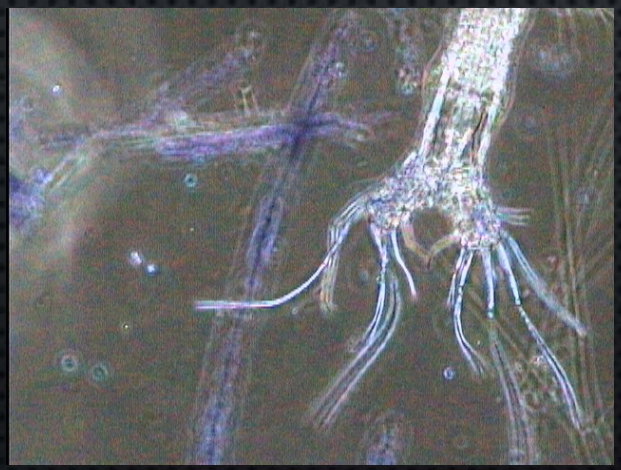
ACTIVITY

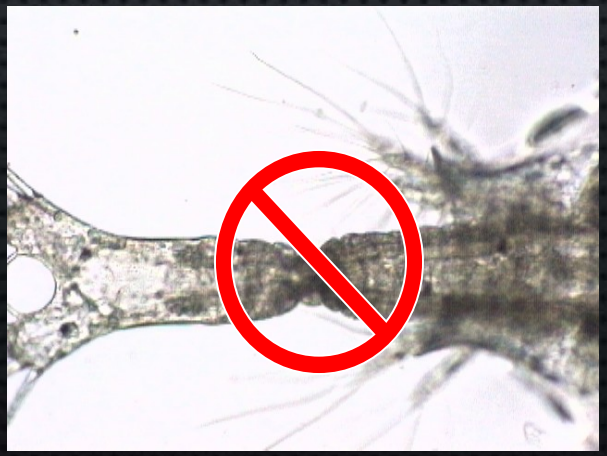
The larvae activity is measured observing the escape response, and swimming behavior. When you move the water in a circular motion normally the weak larvae or stressed larvae will go to the center, the strong ones swim against the current. It is important to remember that larval activity is affected by temperature, the higher the temperature, the more active the larvae.

DEFORMITIES

A microscope is necessary to detect any morphological deformities. The rostrum, antennas, etc. can be deformed and the percent of these deformities should be listed and the percentage calculated

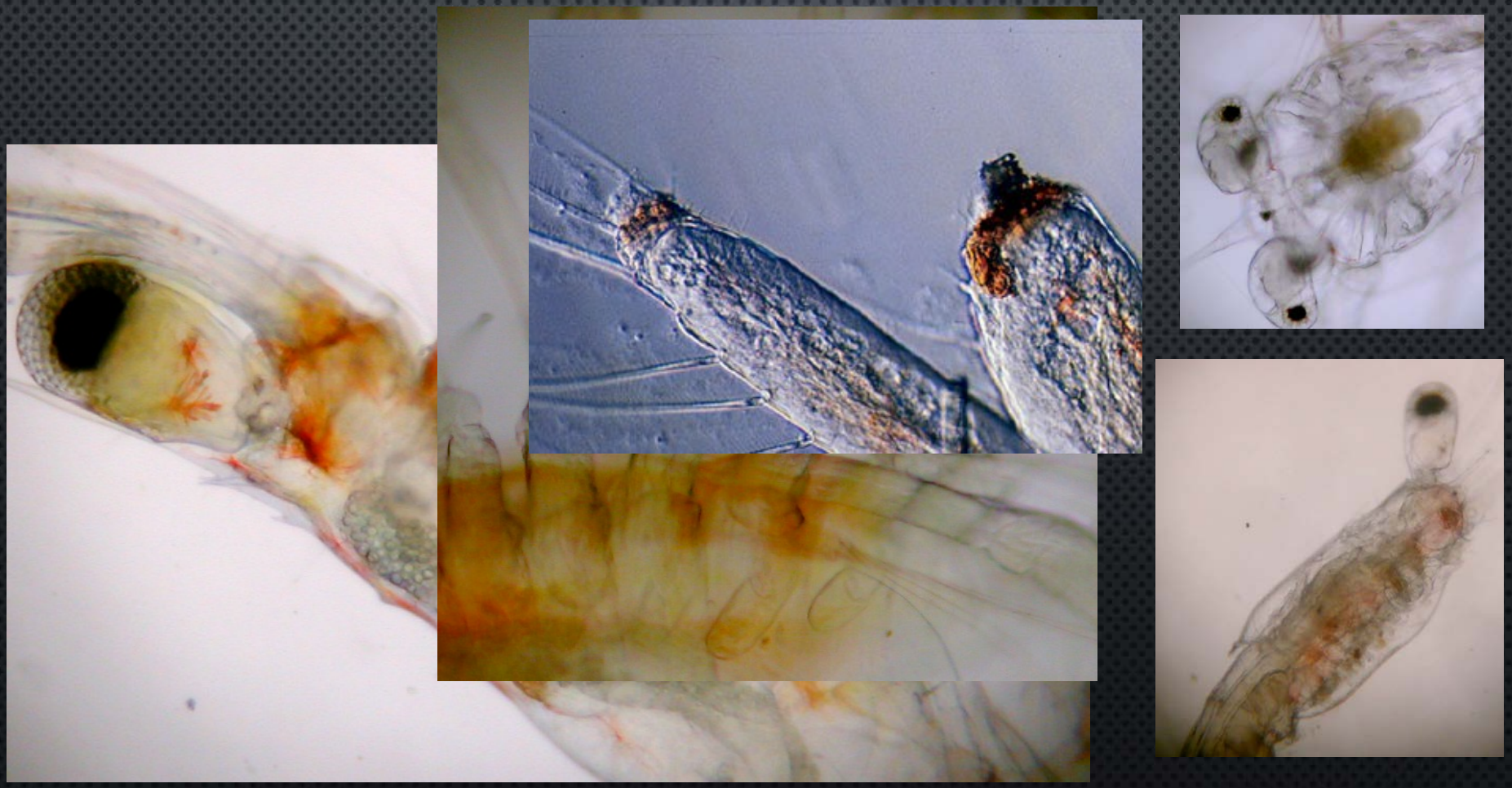




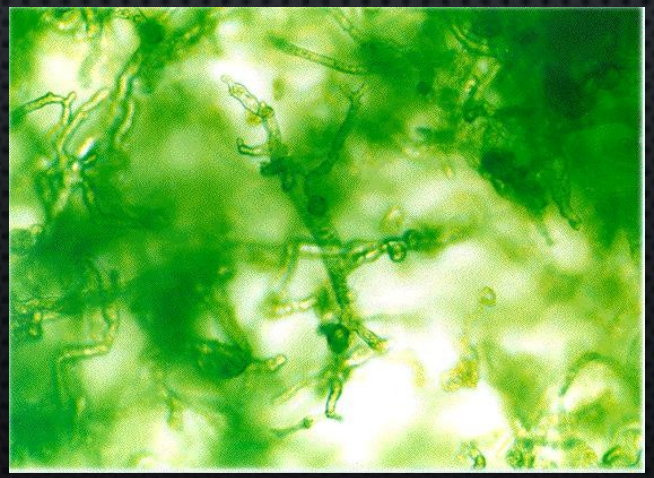


NECROSIS

This is a degenerative process which is frequently, seen in the in the gills and appendages. Observe the gills microscopically and evaluate what percentage of the gill has necrosis. The area of necrosis and percentage of affected larvae should be noted.

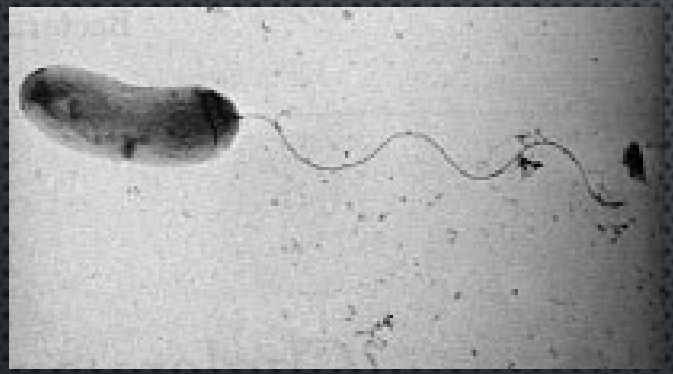


FUNGI

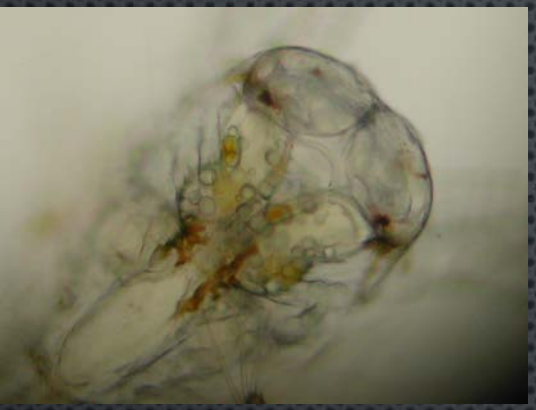


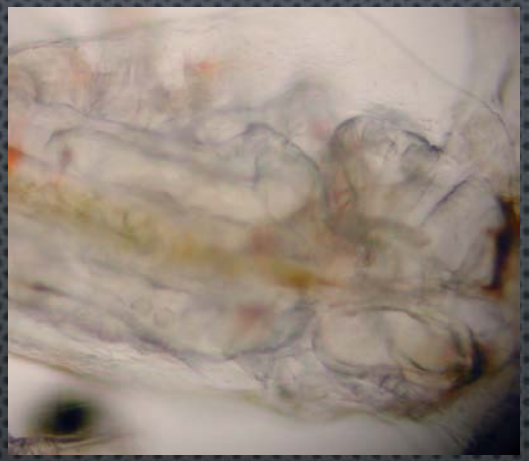
MOLTING PROBLEMS

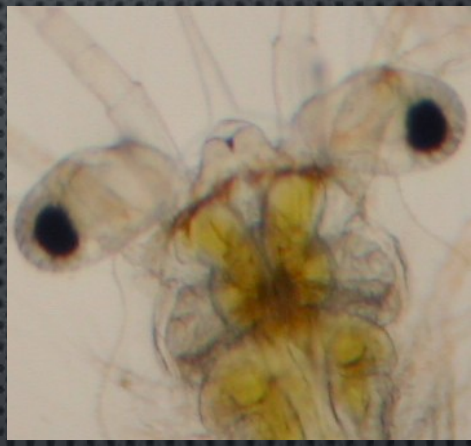
BACTERIAL LOADS INTERNAL

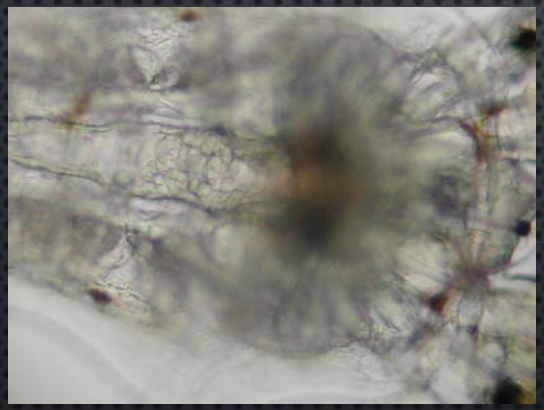


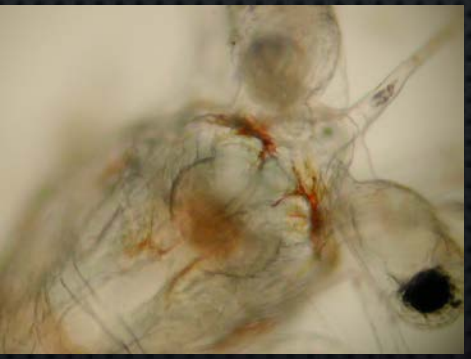
BACTERIAL

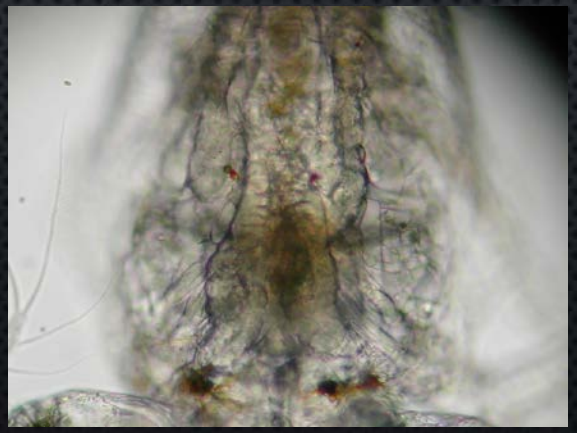




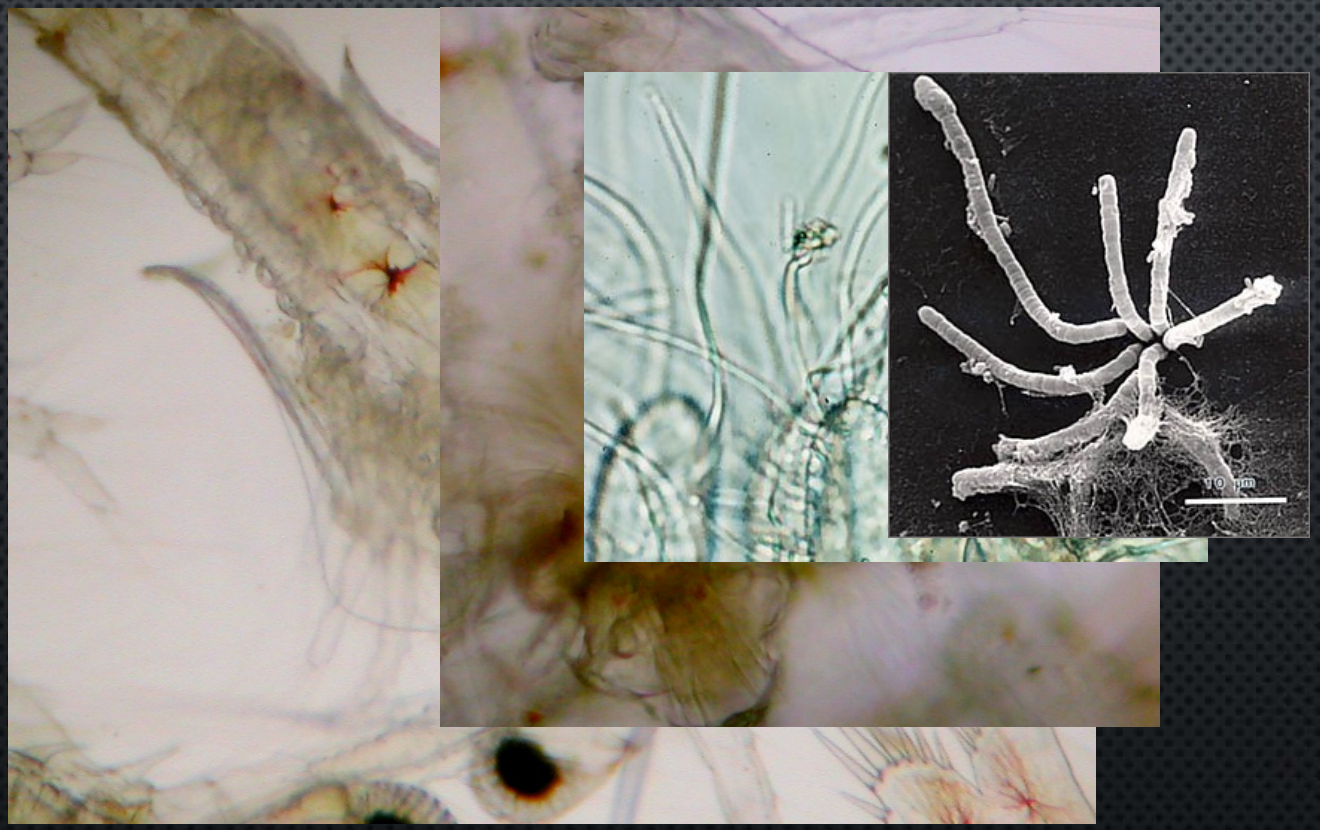








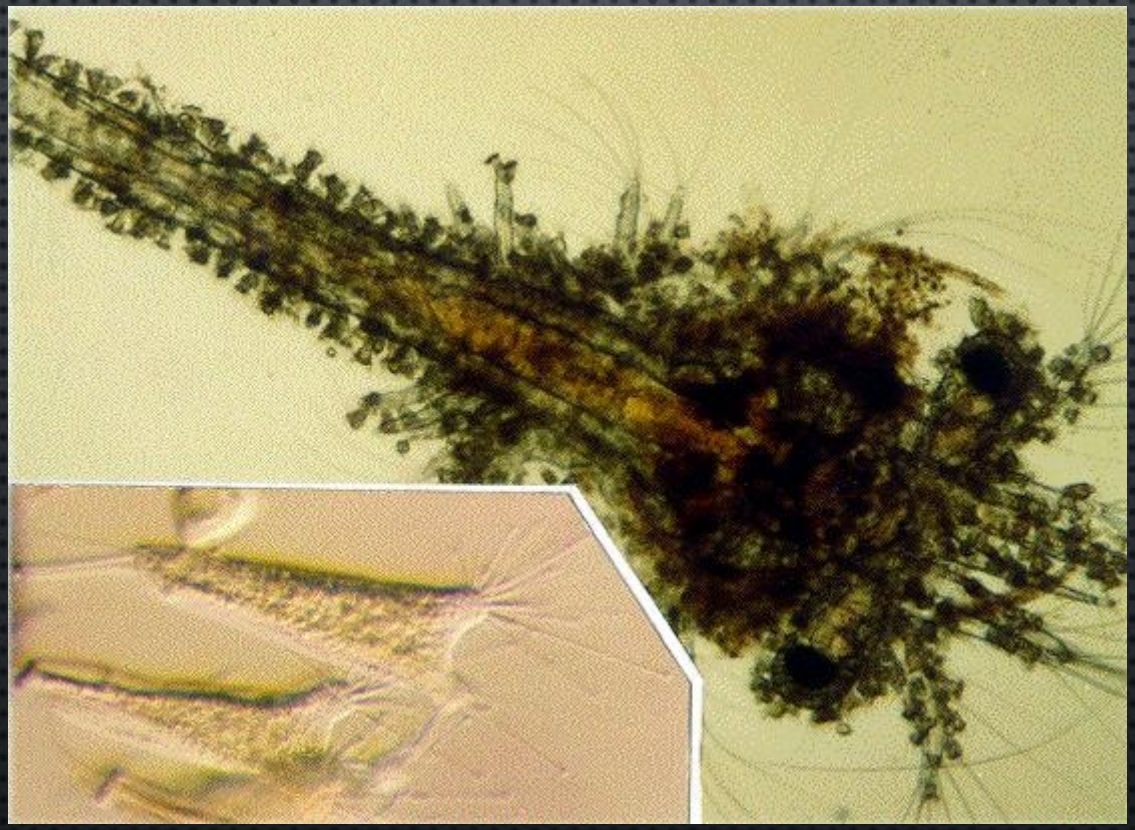
BACTERIAL EXTERNAL



FOULING

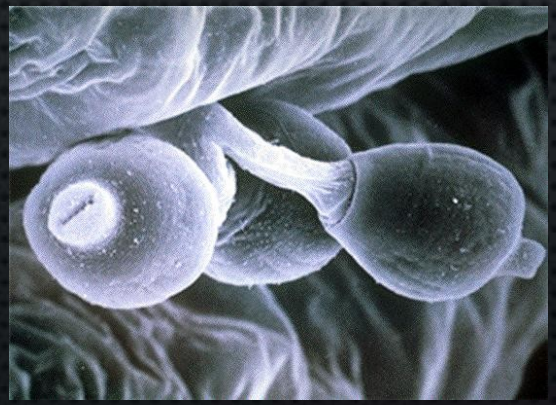
Algae, nematodes, bacteria, protozoans and/or other parasites will infect or attach to the larvae. They can be present in the gills, intestine and attached to the exoskeleton.

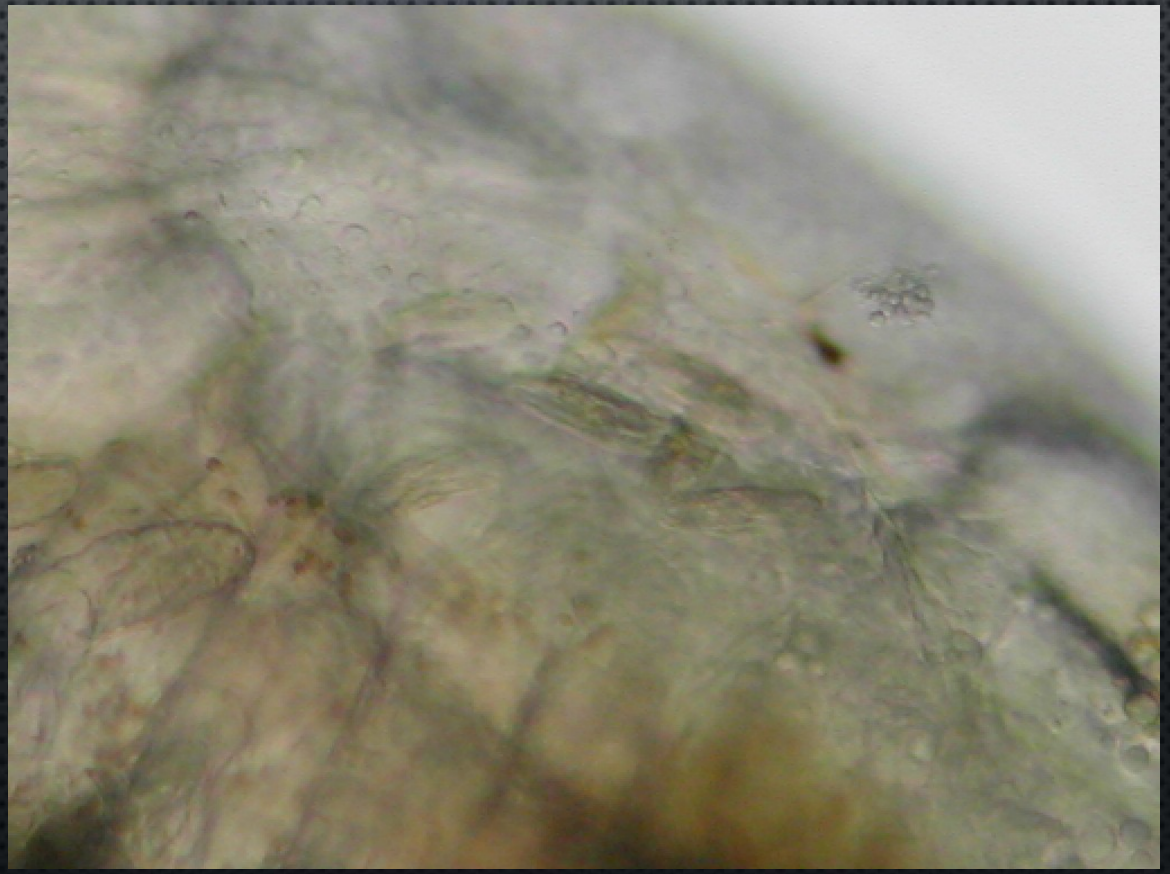
FOULING PARASITES



FOULING

PARASITES





FOULING SPP.

Fouling in Gills and exoskeleton

BACTERIA	ALGAE	GREEN ALGAE	NEMATODES	PROTOZOA	
*Leucothrix	*Spirulina	*Filamentous	Acarophis	PERITRICHS	*Zoothamnium
Flexibacter	Schizothrix	Flagellated	Leptolaimus		*Epistylis
vibrios					*Vorticella
					*Lagenophrys
				Gregarines	Amoebas
				Ciliates	Holotrichs
					Ephelota
					*Acineta

Fouling in the intestines

PROTOZOANS		NEMATODES	CESTODES	TREMATODES
GREGARINES	*Nematopsis	Acarophis	Renibulus peneus	Parorchs
	Cephalolobus	Leptolaimus	Parachristianella	Microphallus
	Paraophioidina		Cyclophyllidean larvae	

DIGESTIVE TRACT

POST-STOCKING STRESS

Stocking

5 hours

12 hours

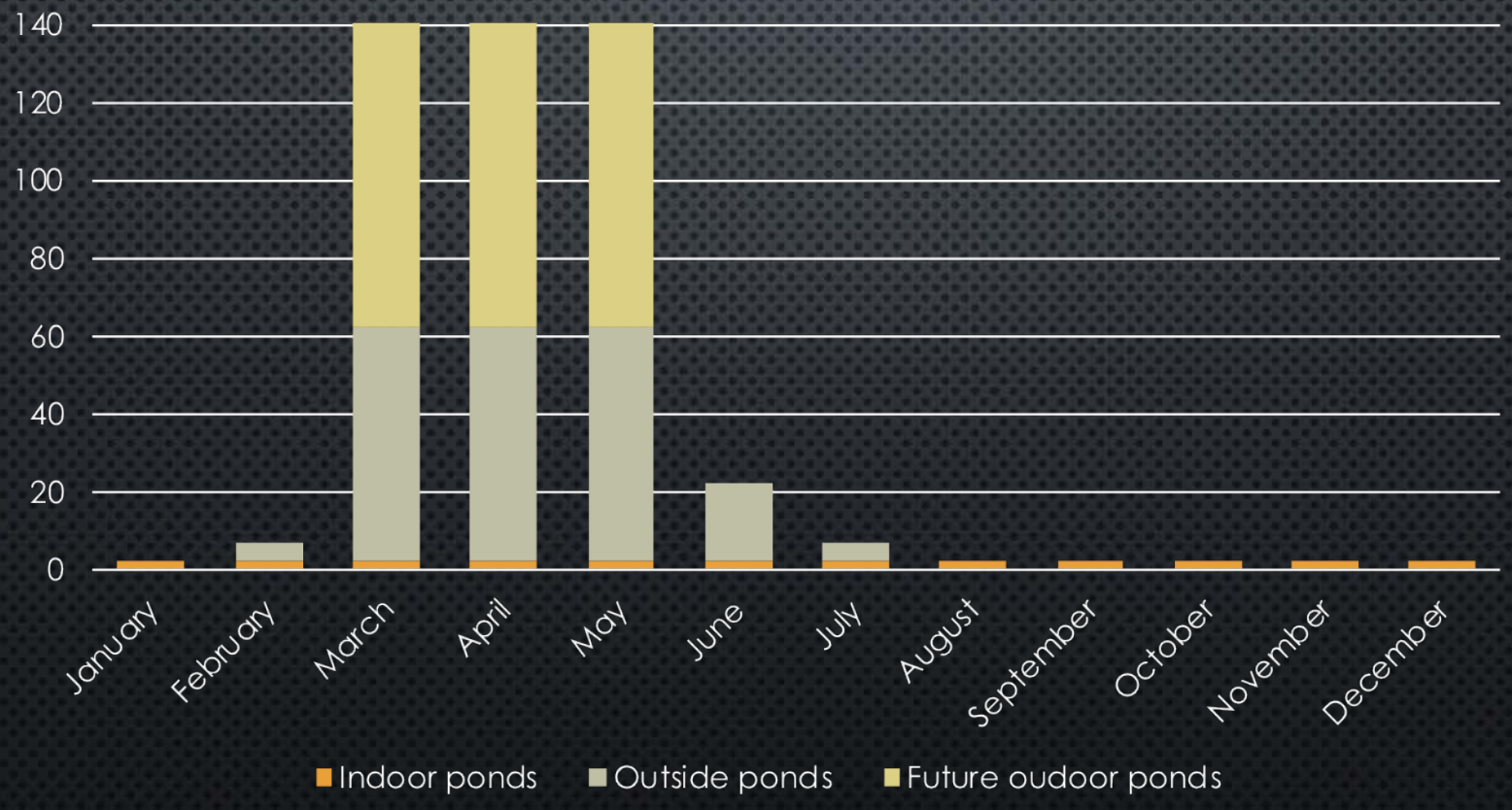
24 hours

72 hours

5 days

STRESS TEST			>90%	90 – 80%	<80%
	POINTS		10	8	0
LENGTH			≥8mm	7.5 – 7.9mm	<7.5mm
	POINTS		5	4	2
COEF.Var. (normal distribution)			≤15%	15 – 17%	>17%
	POINTS		10	6	2
GILL DEVELOPMENT			COMPLETE	SEMICOMPLETE	INCOMPLETE
	POINTS		5	3	2
ACTIVITY			VERY ACTIVE	NOT SO ACTIVE	SLOW
	POINTS		5	3	1
DEFORMITY			<5%	5 – 10%	>10%
	POINTS		4	3	1
ROSTRUM FORMULA			4-5/0-1	3/0	<3/0
	POINTS		4	3	1
NECROSIS			<10%	10 – 20%	>20%
	POINTS		3	2	1
MOLTING			<20%	20 – 30%	>30%
	POINTS		3	2	1
FOULING			<5%	5-10%	>10%
	POINTS		3	2	1
DIGESTIVE TRACT			FULL >75%	HALF FULL 75 – 30%	EMPTY <30%
	POINTS		3	2	1
SCORE			>50	>30	<30
			EXCELLENT	GOOD	NOT ACCEPTABLE

POSTLARVAL DEMAND IN THE U.S.



POSTLARVAL PRODUCTION FACILITIES

FACILITY	2017 and Before	2018
SIS	Aprox. 20, Million per month.	No more sales
Sea Products Development	Aprox 20 Million per month for sales	5 million per month for sales.
American Penaeid	Started to build a Hatchery	30 million per month
Bowers Shrimp		Started to build a hatchery 30 M aprox.
Trans-Amercian Aquaculture		Talks about building hatchery for 100 M
North American Broodstock.		???

CONCLUSIONS

- 2014 POSTLARVAE PRODUCTION WAS MONOPOLIZED.
- AFTER 2015 NEW HATCHERIES OPENED AND ALLOWED MORE COMPETITIVENESS
- HURRICANE SEASON IN 2017 AFFECTED THE TWO MAYOR HATCHERIES THAT PROVIDED POSTLARVAE TO THE U.S. AND THE E.U. THIS OPENED THE INTRODUCTION OF NEW PLAYERS.
- SEASONAL DEMAND HAS LIMITED THE EXPANSION OF HATCHERIES.
- ONLY OPERATIONS THAT ARE VERTICALLY INTEGRATED CAN JUSTIFY TO HAVE A HATCHERY IN THE INDUSTRY RIGHT NOW.
- NEW HATCHERIES WILL BE MORE CLIENT SPECIFIC.
- HI INTENSIVE INDOOR RECIRCULATING SYSTEMS WILL BECOME THE FUTURE WAY TO DO COMPETITIVE AQUACULTURE IN THE U.S. AND EUROPE.