



# Marine Stingers

Robert Courtney



# Tropical Australian Stinger Research Unit

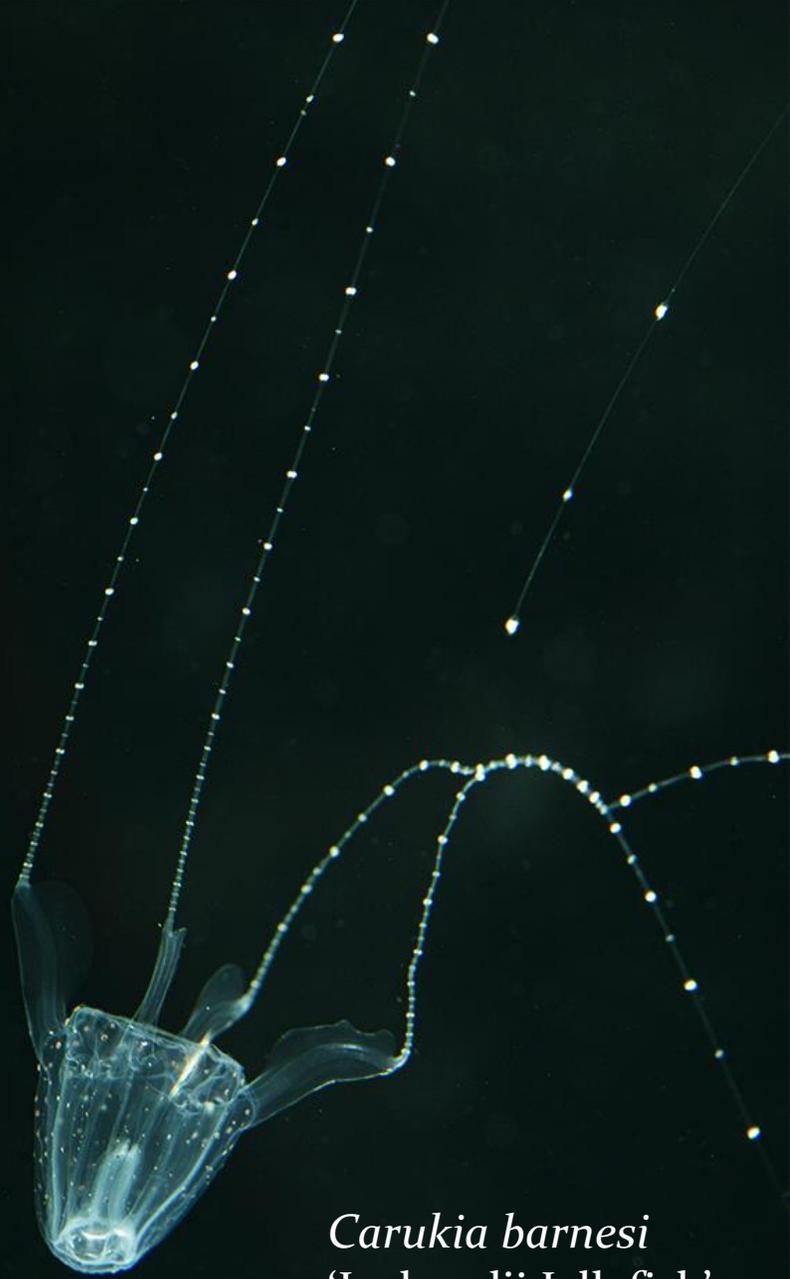
- Venom collection for antivenom production.
- Venom collection to understand how the toxins work.
- Development of improved first aid.
- Stinger management with Surf Life Saving Queensland.
- Stinger Ecology data collection.
- This research saves lives.
- The Lions Foundation has supported and contributed to this research extensively.



# Negative Impacts

- Potentially fatal stings
- Numerous species present (including Irukandji)
- Treating stings
- Patient transport costs
- Stinger exclusion nets
- Reduced tourism



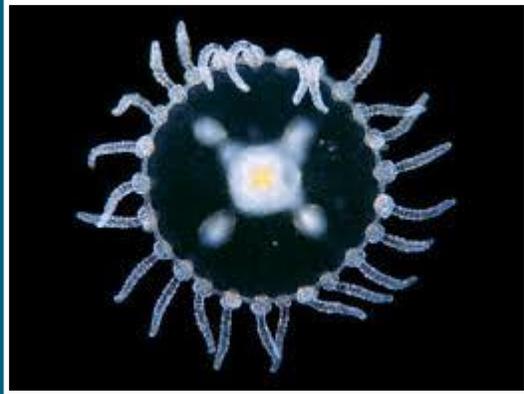


*Carukia barnesi*  
'Irukandji Jellyfish'



*Chironex fleckeri*  
'Box Jellyfish'

# Cnidaria



Hydrozoa



Scyphozoa



Anthozoa



Cubozoa

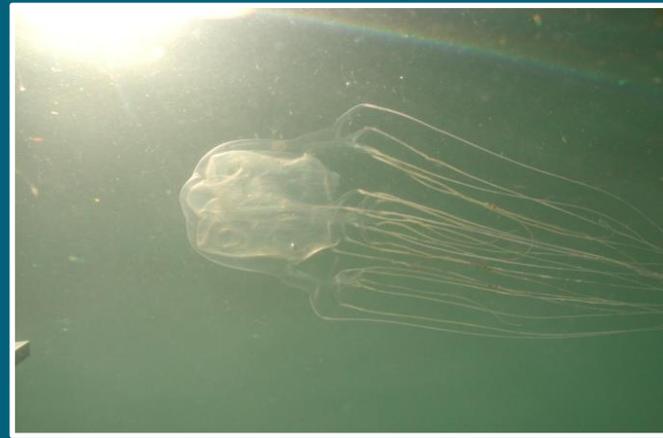
# Australian Species of Cubozoa

Cubozoa is divided into two Families:  
Chiropodids and Carybdeids



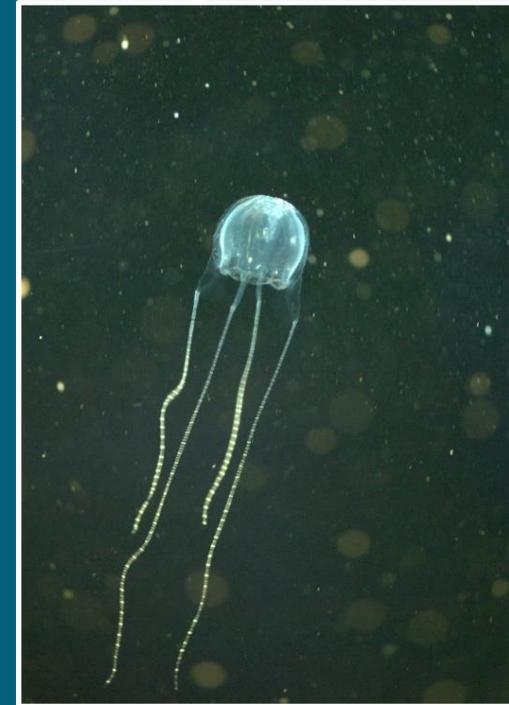
*Chironex fleckeri*

Chiropodids



*Chiropsella bronzie*

Carybdeid



*Carukia barnesi*

# *Chironex fleckeri*

- Highly Motile
- Visual Predators
- Complex Eyes
- Coastal, shallow water
- Big- Adults up to 300 mm bell with over 60 tentacles, each tentacle over 3 meters long.
- Highly Venomous- Contact with 2 meters of tentacle will stop an adult human heart in under 2 minutes.



# Negative Impacts

- Potentially fatal stings
- Stinger suits work
- Stinger exclusion nets work
- First Aid- Prompt Prolonged CPR
- Antivenom









# Box Jellyfish Collection

- Venom collection for antivenom production.
- Provides raw materials for research projects and novel compound exploration.
- Occurrence and behaviour data collection.
- Method testing for jellyfish detection.
- Also provides a unique opportunity to collect large numbers of jellyfish that may spawn.

# *Carukia barnesi*

- Planktonic
- Visual Predators
- Complex Eyes
- Oceanic, and at times can be present along beaches in high numbers.
- Small- Adults up to 30 mm bell with 4 tentacles, each tentacle 1.2 meters long.
- Highly Venomous- Contact with 1 mm of tentacle will often cause Irukandji Syndrome.



# Negative Impacts

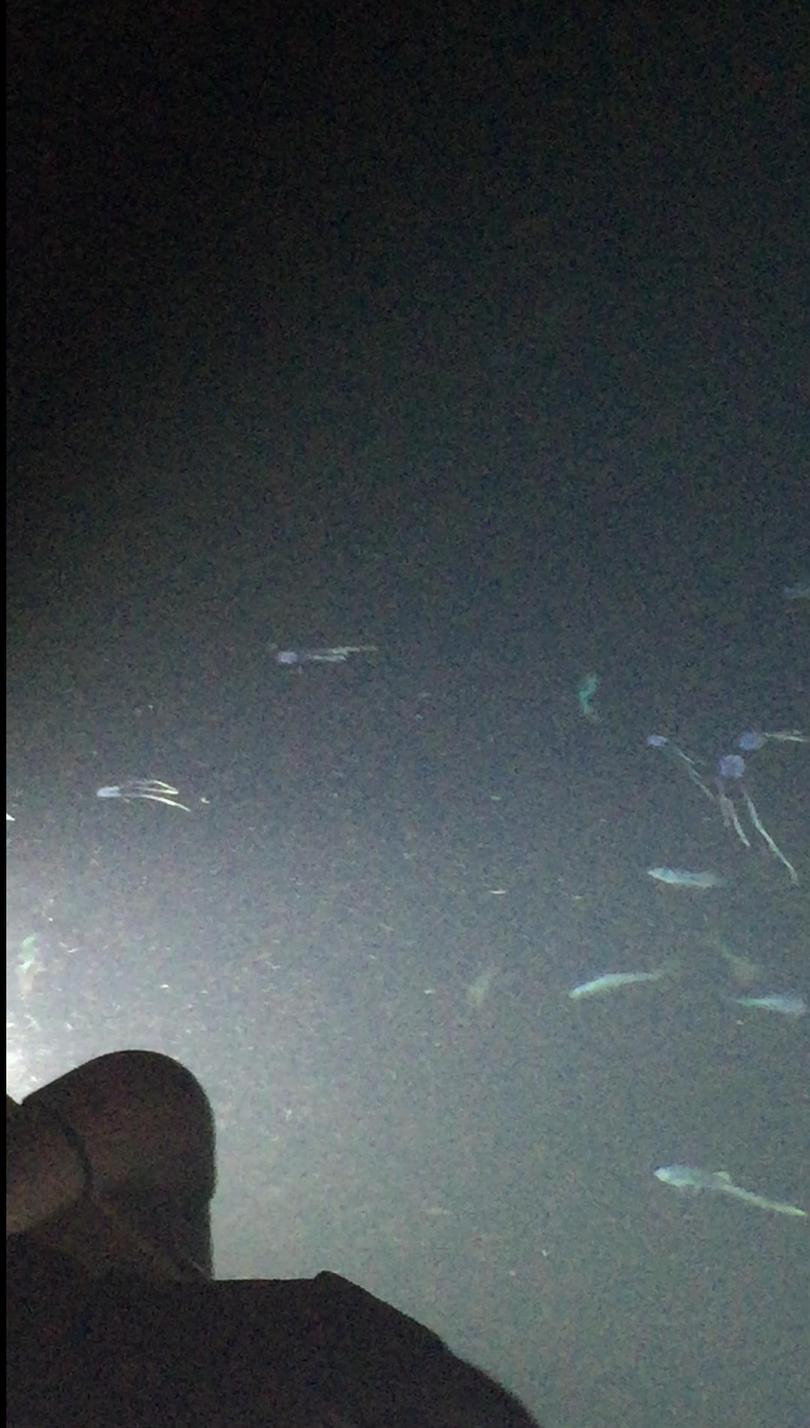
- Potentially fatal stings, but rare
- Initial sting is not overly painful, followed by a 20-40 minute delay.
- Causes Irukandji Syndrome, which will usually require hospitalisation, and is extremely painful.
- Stinger suits work
- Stinger exclusion nets don't work
- First Aid- Hot water (not scalding!), treat symptoms until help arrives.
- There is no antivenom



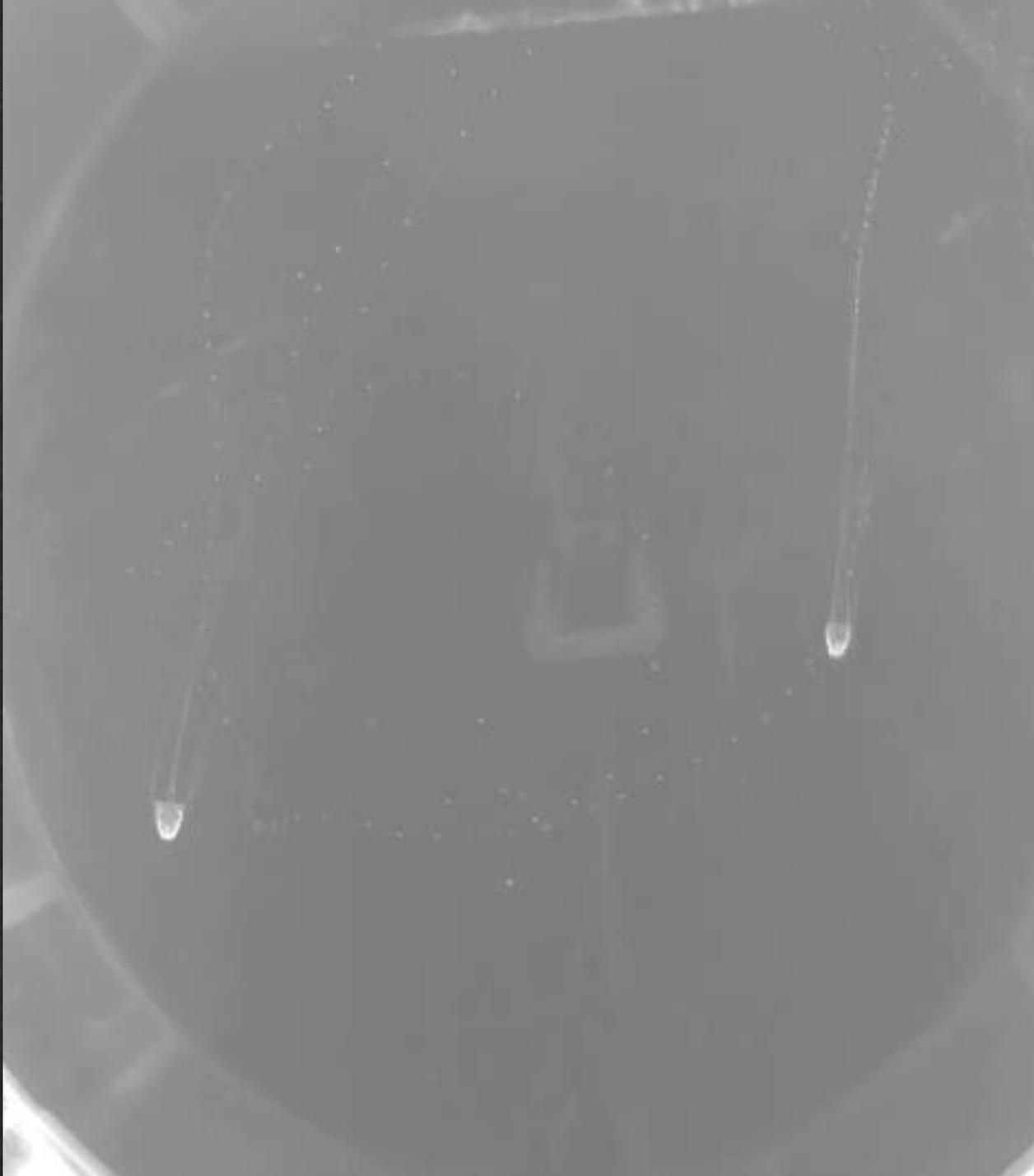






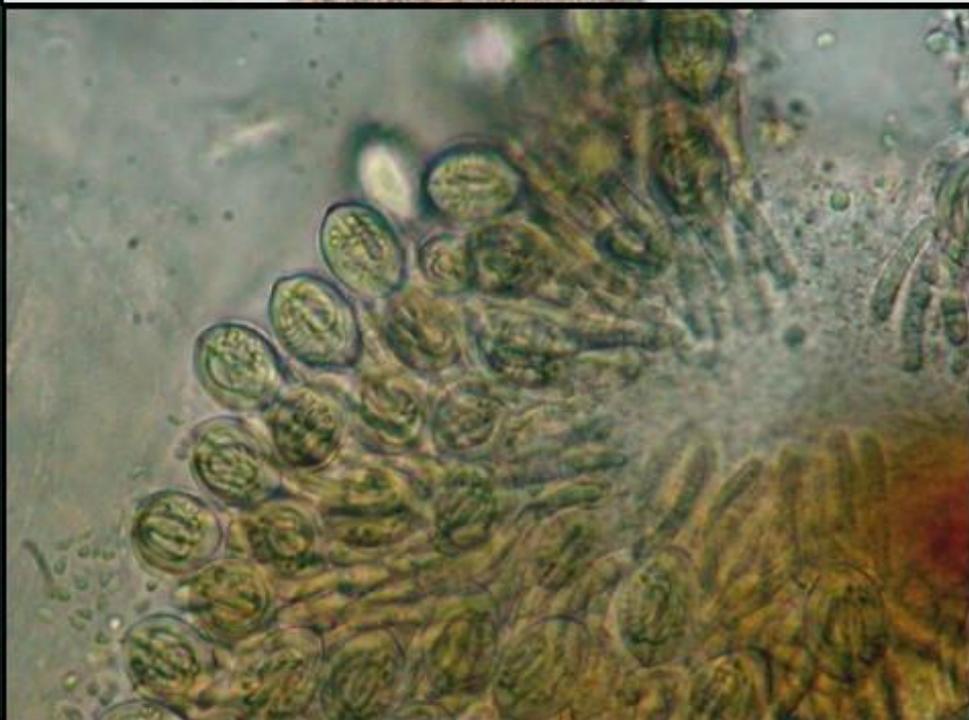


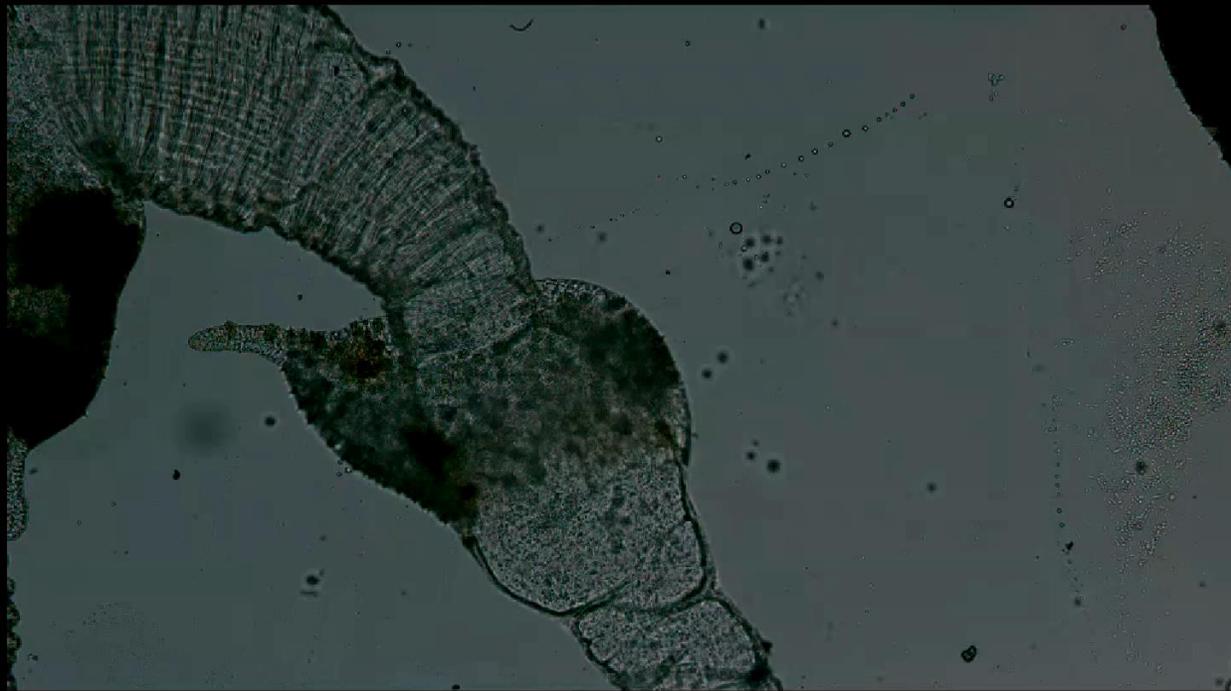










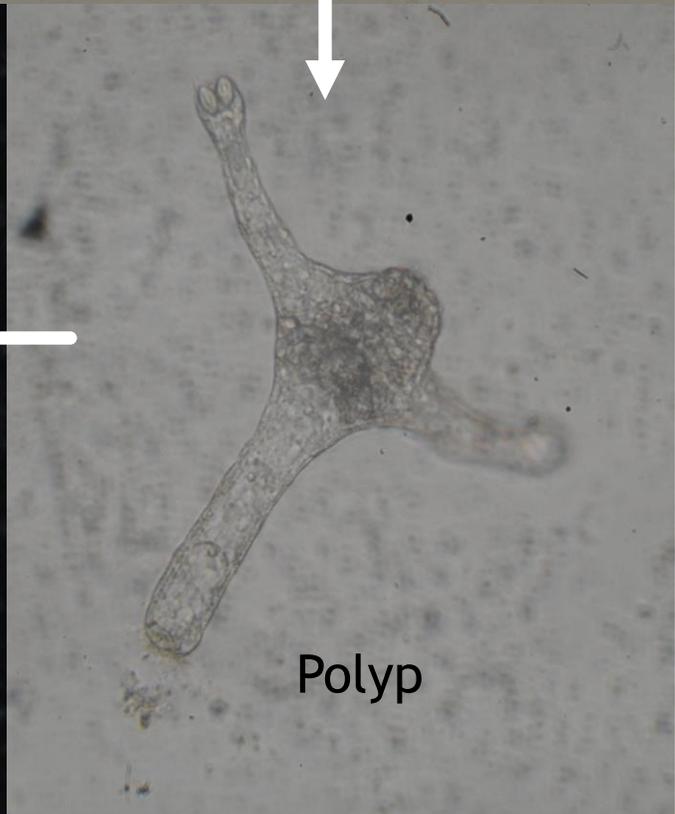
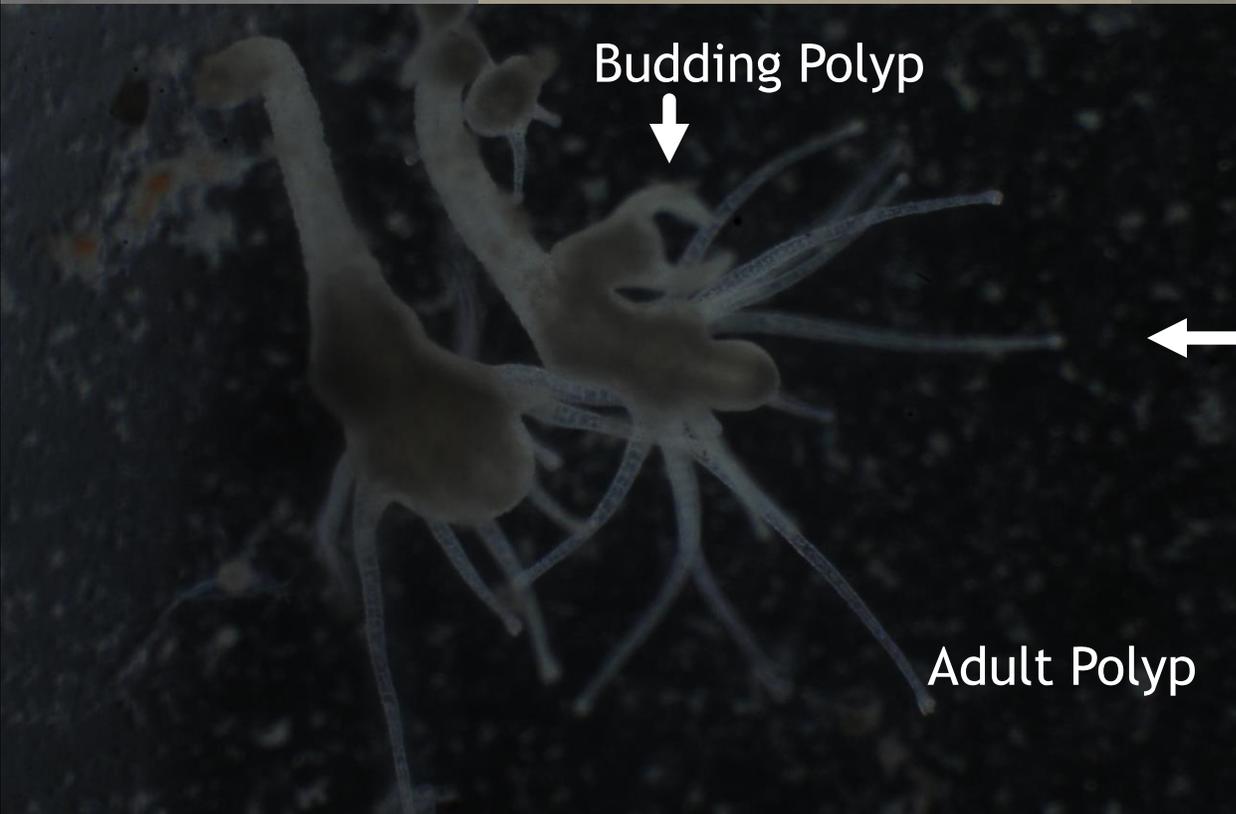
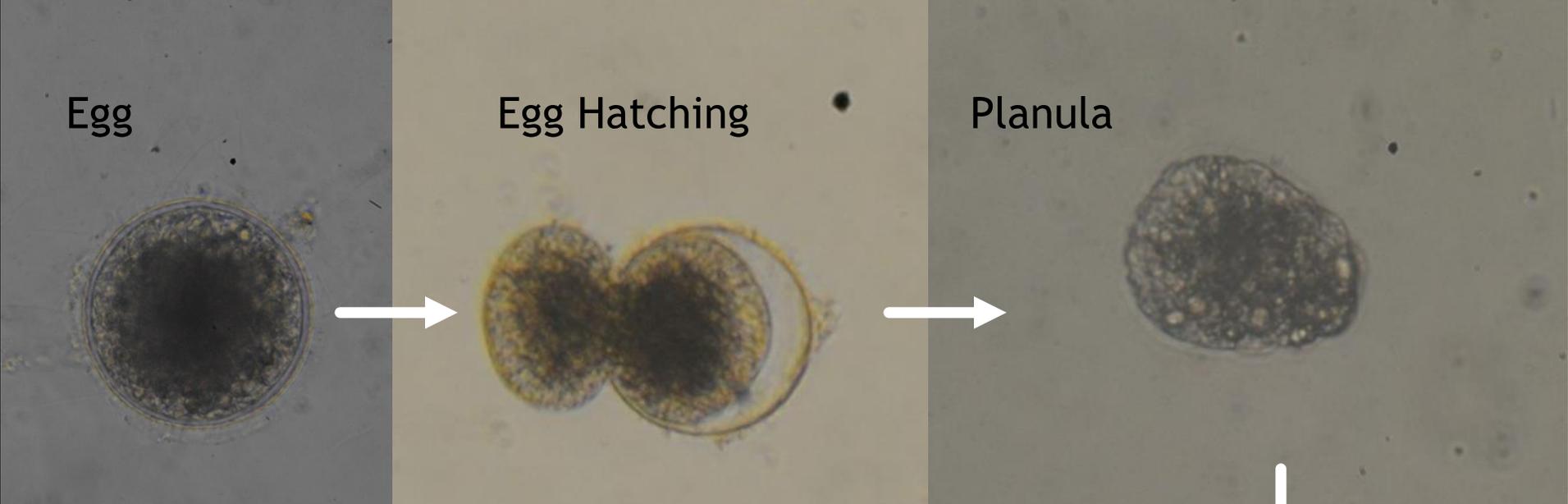


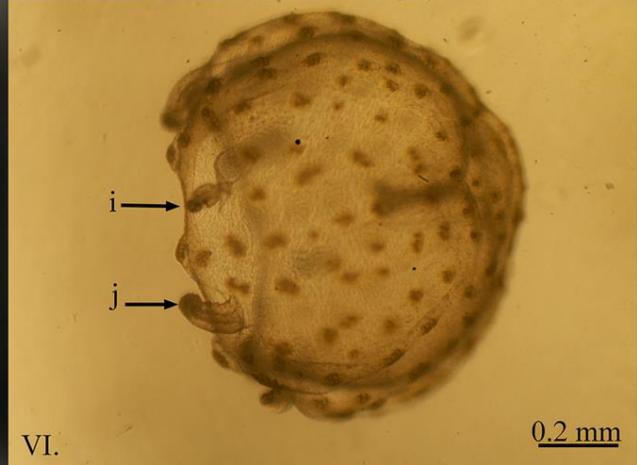
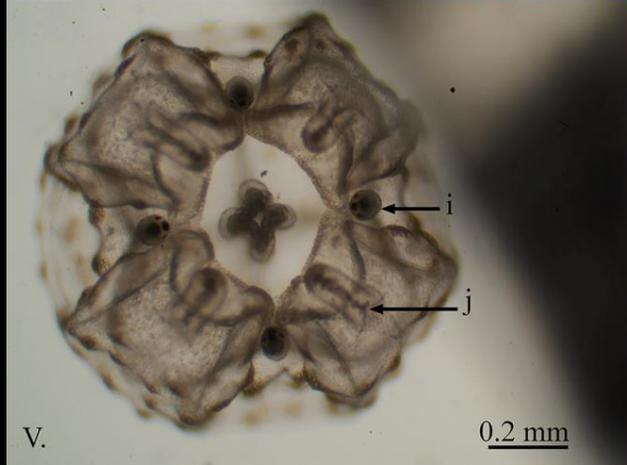
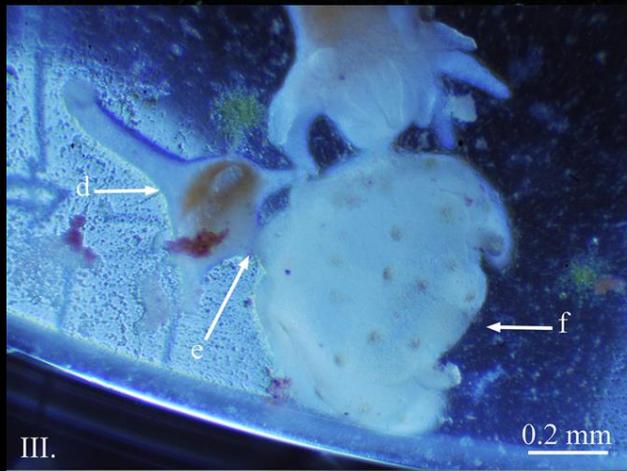
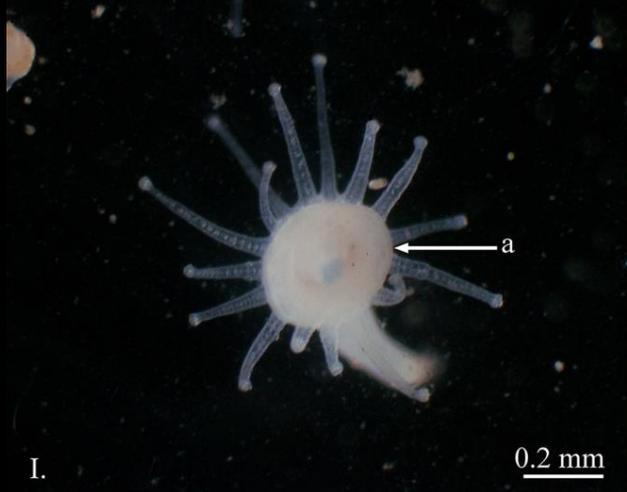
But where do the jellyfish come from?



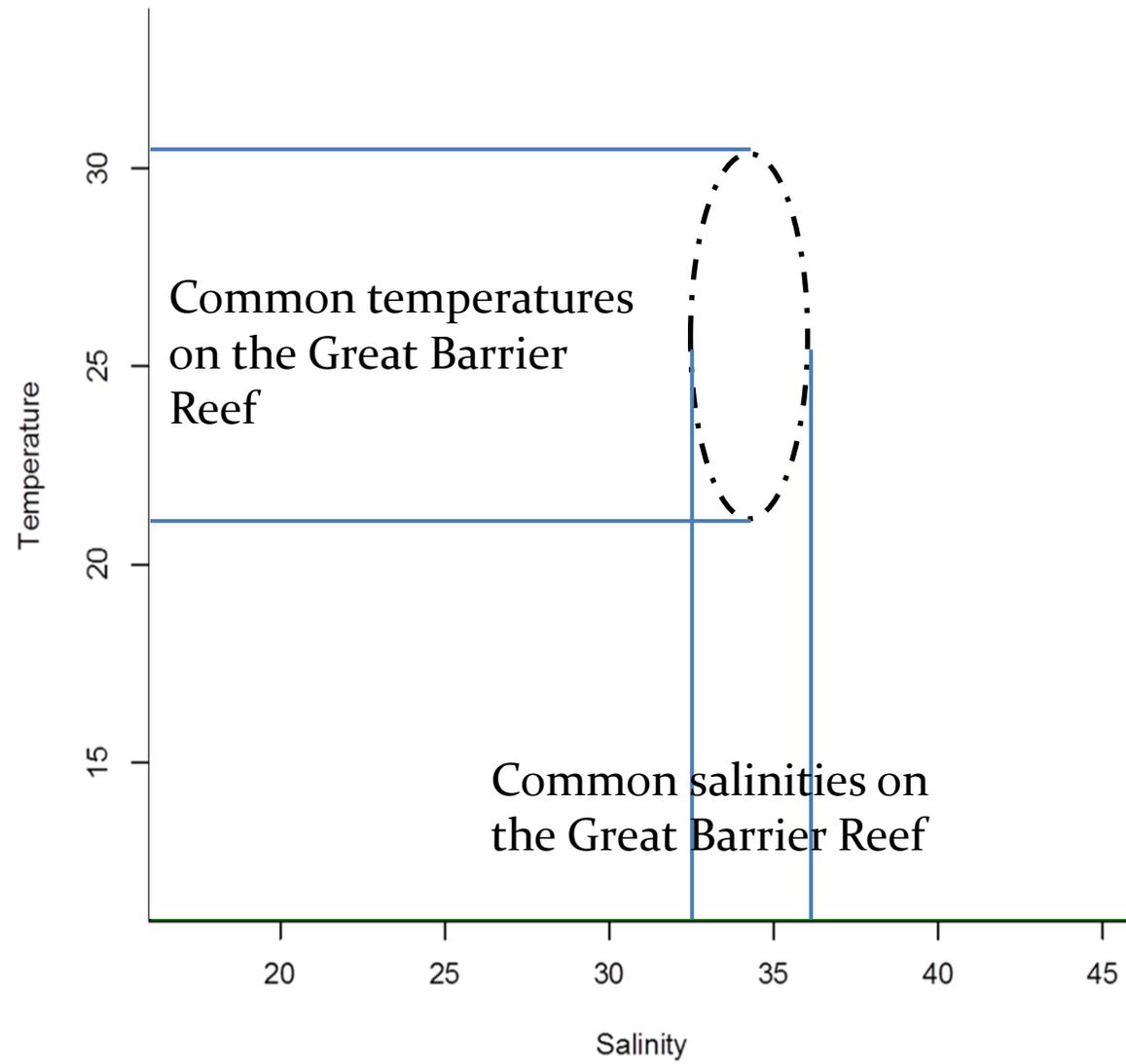
# Irukandji Polyps

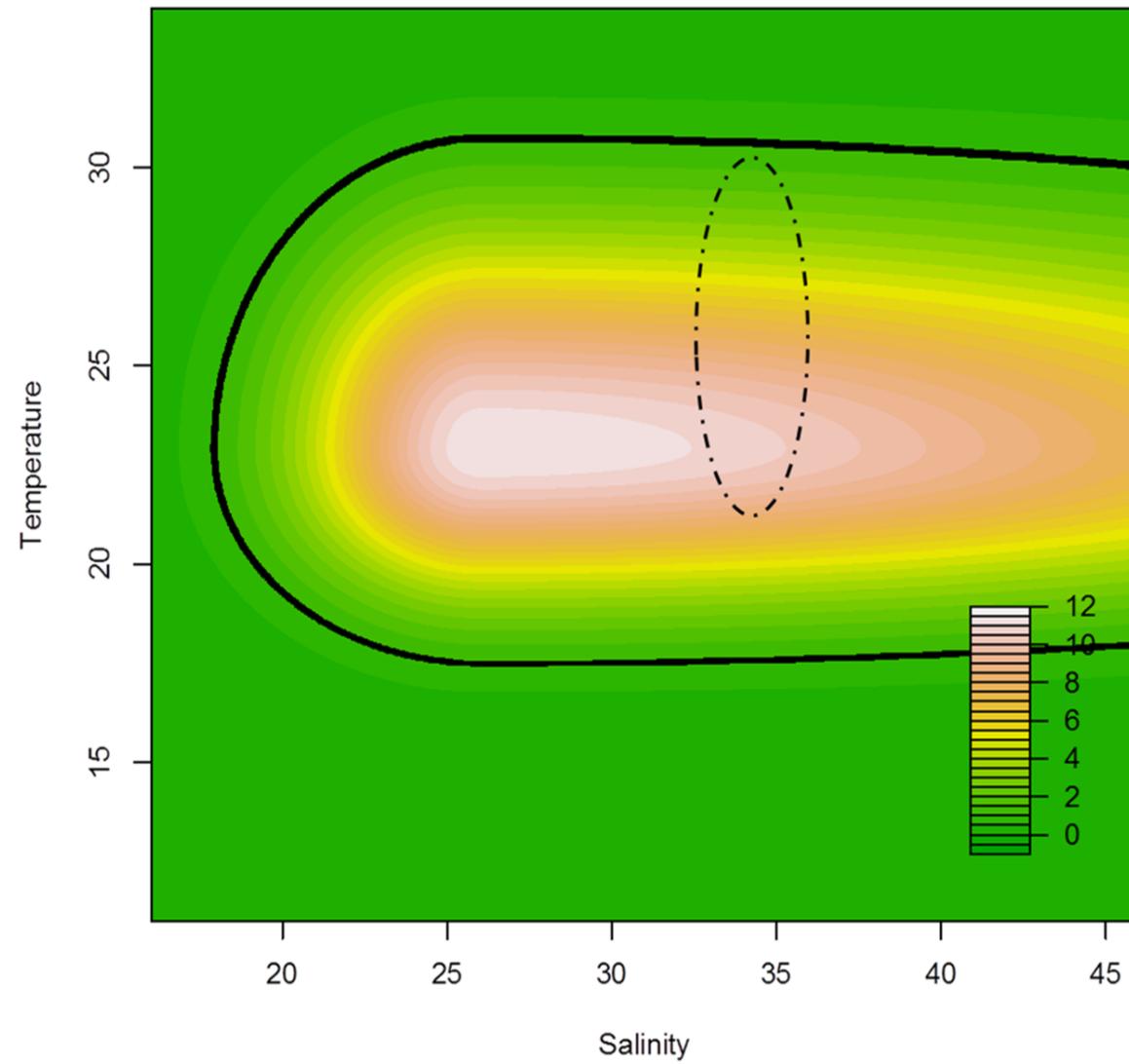
- The polyp life stage has never been found for most cubozoans.
- This life stage had never been seen before 2016 for this species.
- We produced the only verified culture of this species.
- This polyp culture was produced by getting adult medusae to spawn and mixing the gametes.
- This provides a very unique research opportunity.



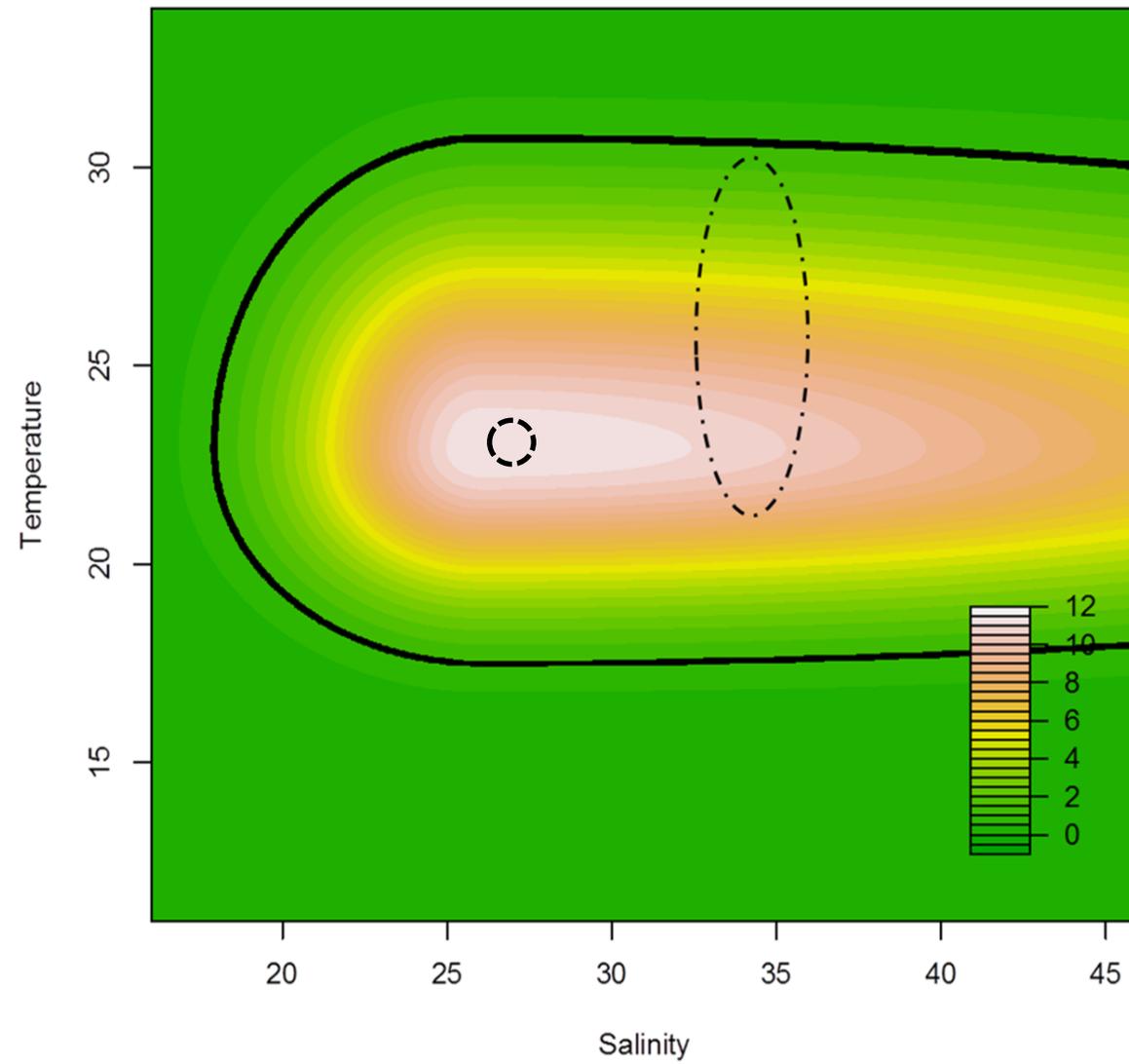








Symbol	Description	Value	2.5% CI	97.5% CI
$a$	Maximum proportional change	11.48	9.00	14.95
$T_{\text{opt}}$	Optimum Temperature	22.91°C	21.92°C	23.86°C
$S_{\text{opt}}$	Optimum Salinity	26.04‰	24.54‰	27.85‰



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# Box Jellyfish Polyps

- The polyp life stage has never been found for most cubozoans, but has been found once for this species.
- These polyps were produced by getting adult medusae to spawn and mixing the gametes.
- Getting these polyps into culture is extremely important for understanding this species.
- The team has been trying to do this for over 20 years.

EARLY LIFE HISTORY OF THE SEA WASP, CHIRONEX FLECKERI (CLASS CUBOZOA)

MASASHI YAMAGUCHI\* AND ROBERT HARTWICK

DEPARTMENT OF MARINE BIOLOGY, JAMES COOK UNIVERSITY OF NORTH QUEENSLAND,  
TOWNSVILLE, QUEENSLAND 4811, AUSTRALIA

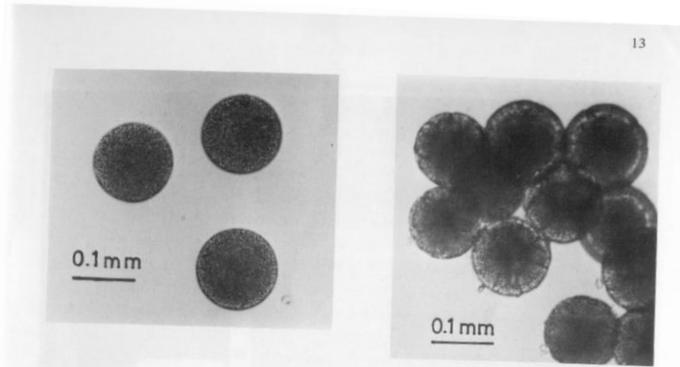


Fig. 1. Unfertilized ova.

Fig. 2. Developing embryos, 8 to 16 cells, 3 hrs. after fertilization. Note embryos adhered to each other.

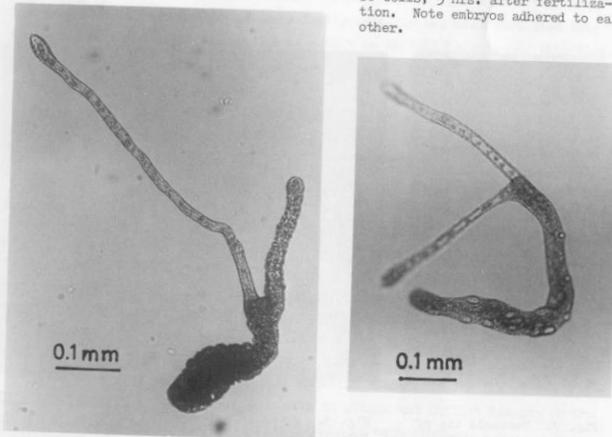


Fig. 3. Primary polyp, 6 days old.

Fig. 4. Primary polyp, 18 days old. Note nematocysts formed along lower body.

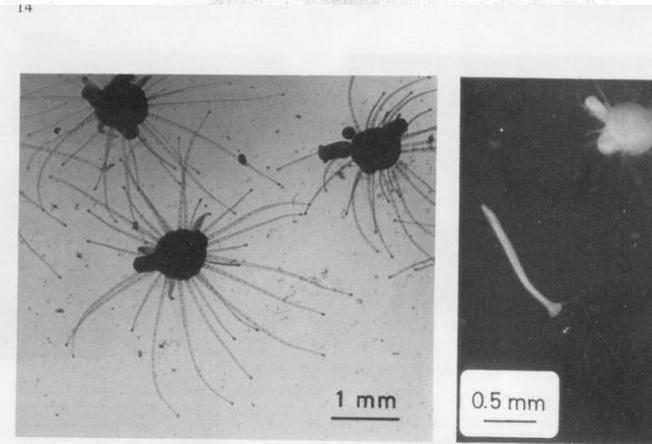


Fig. 5. Sedentary polyps with asexual buds.

Fig. 6. Creeping bud.

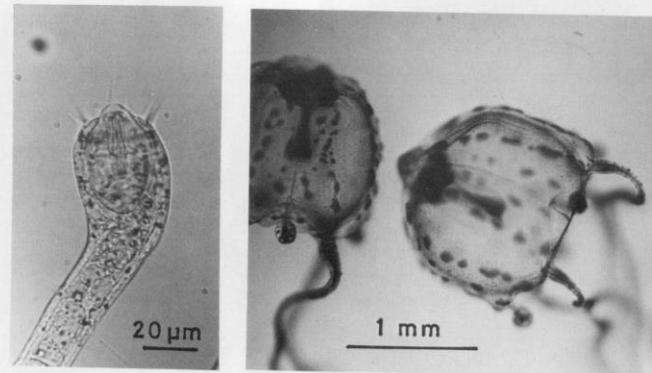
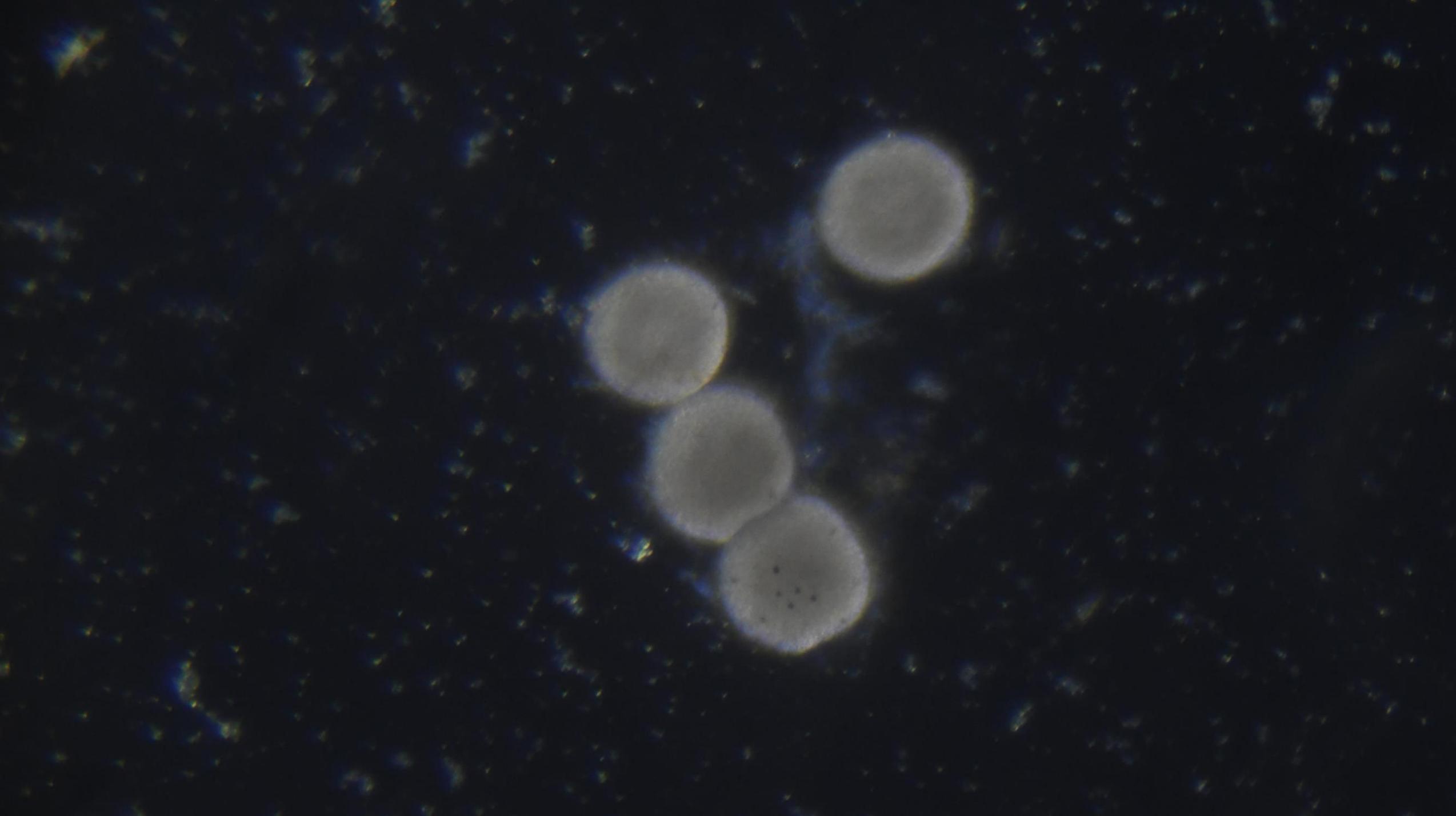
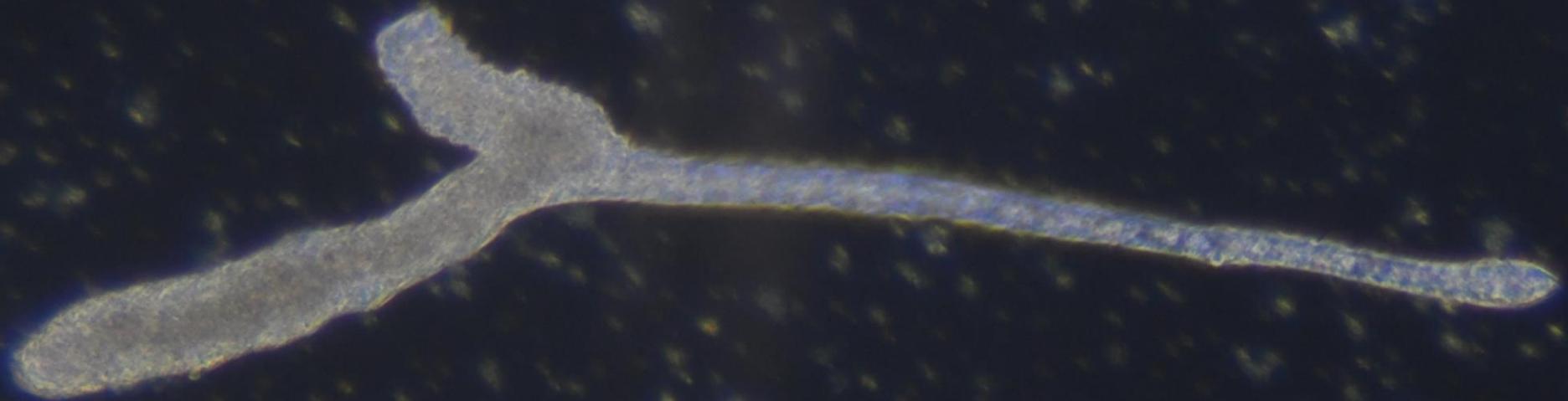


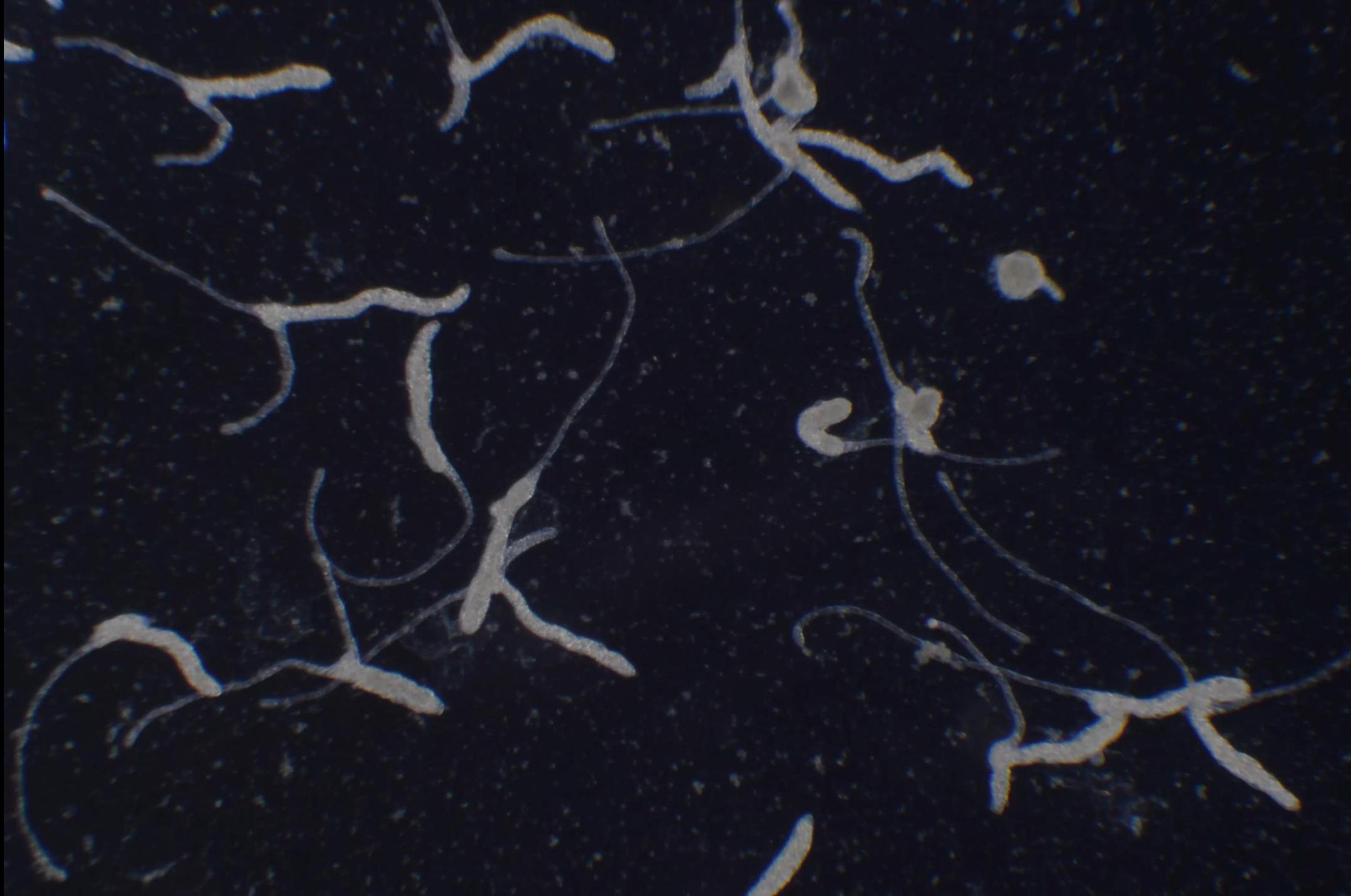
Fig. 7. Tentacle tip of sedentary polyp with a large nematocyst.

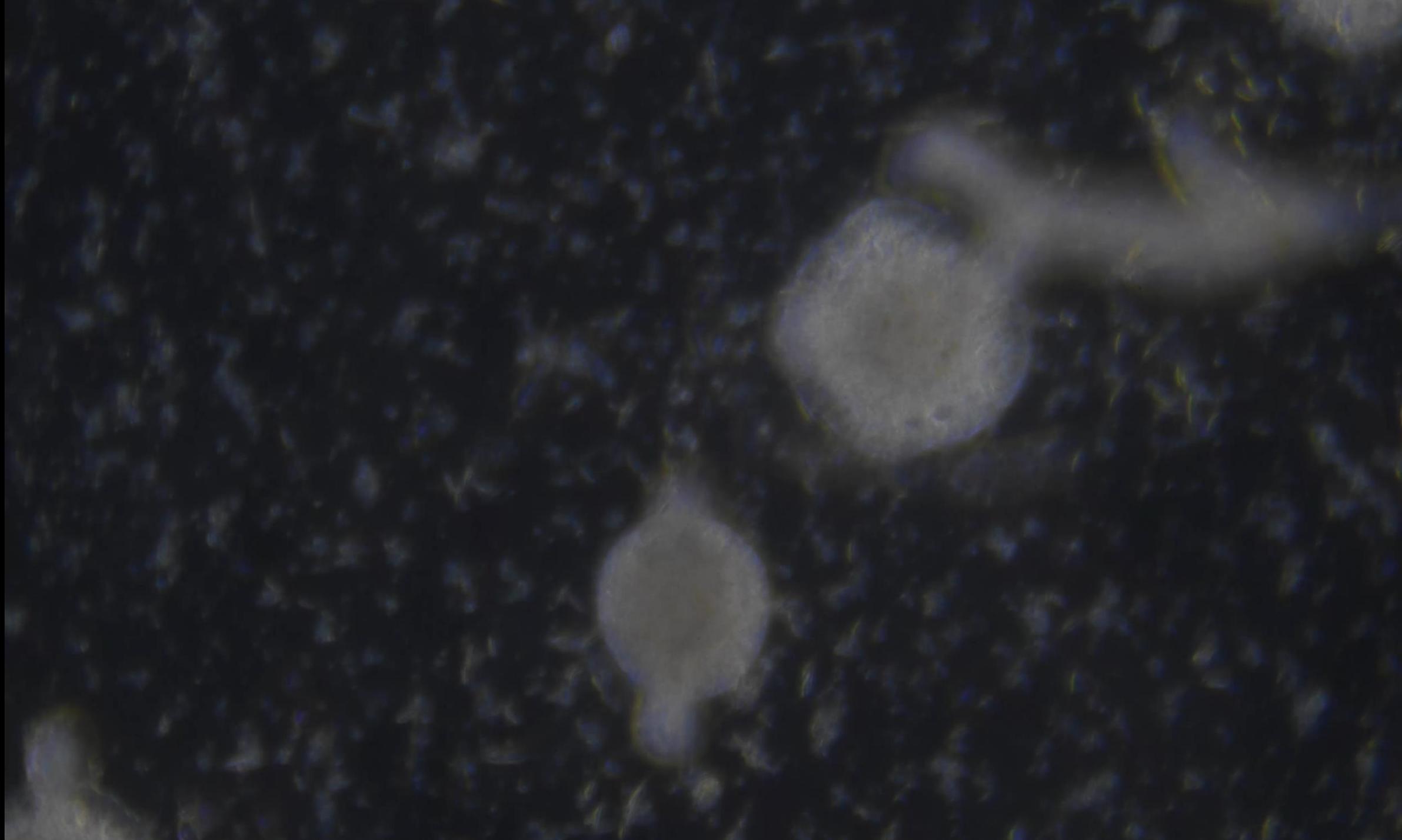
Fig. 8. Juvenile medusae just after liberation. Rhopalia and manubrium well developed but pedalia not very distinctive.

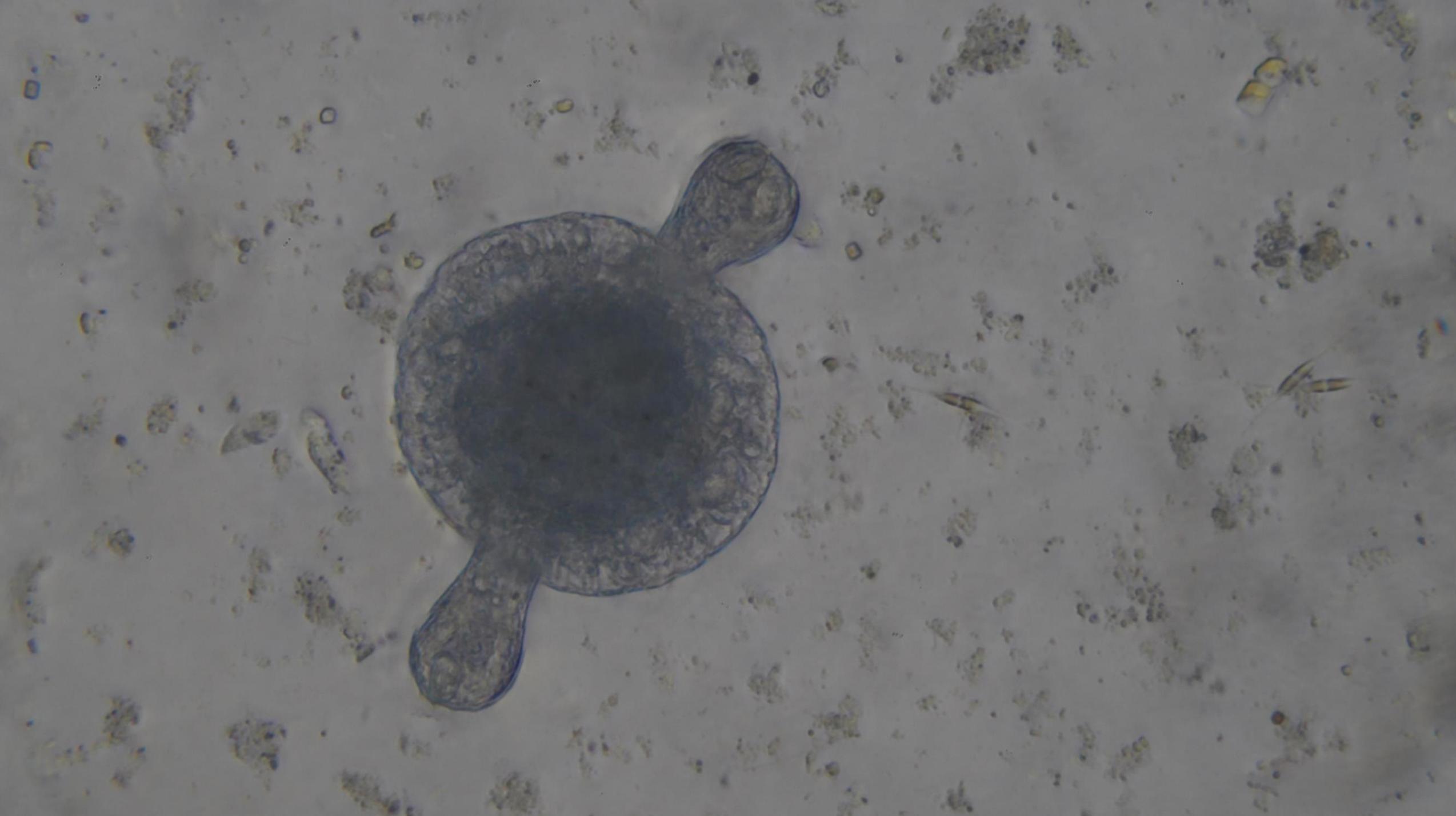




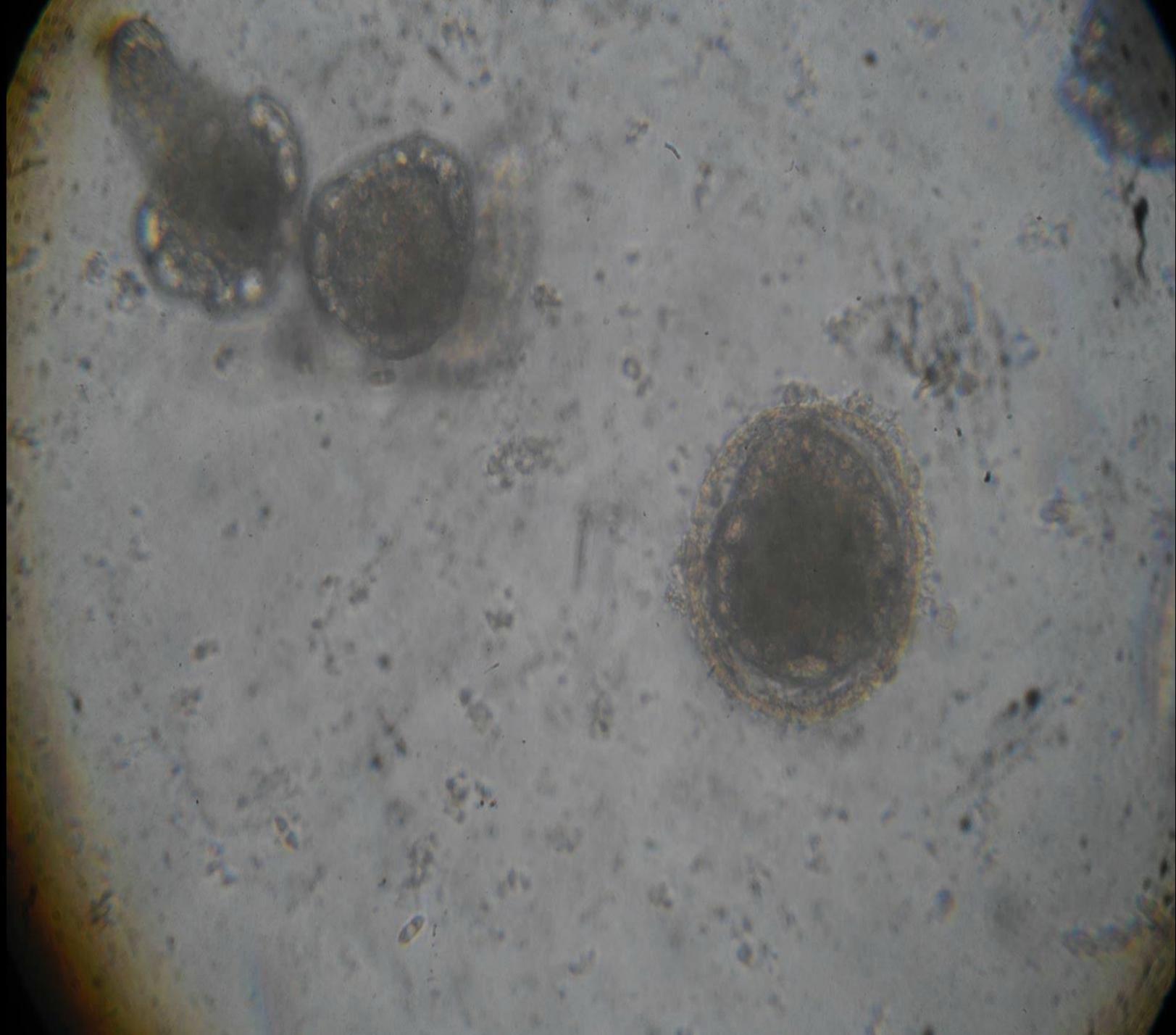


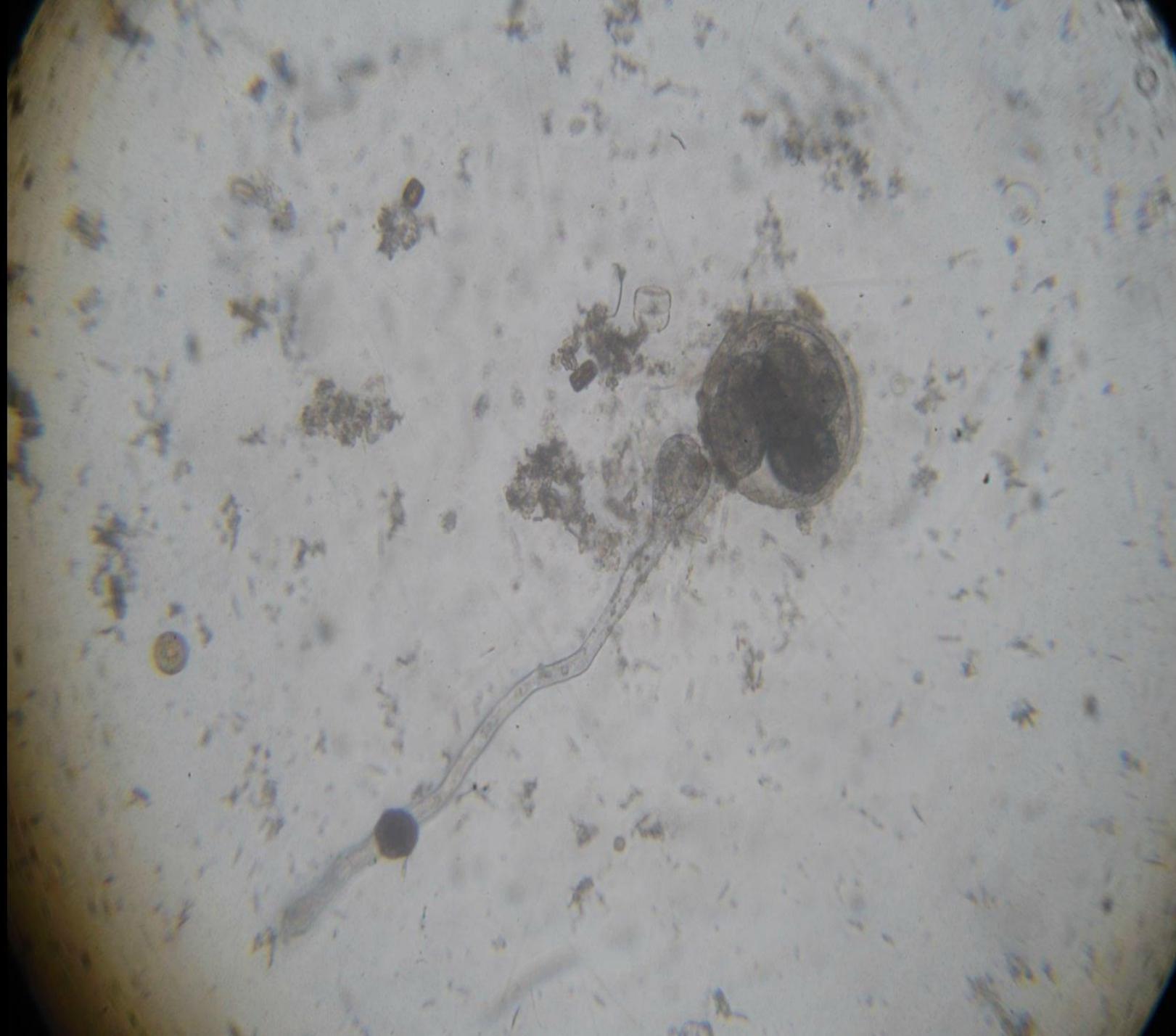






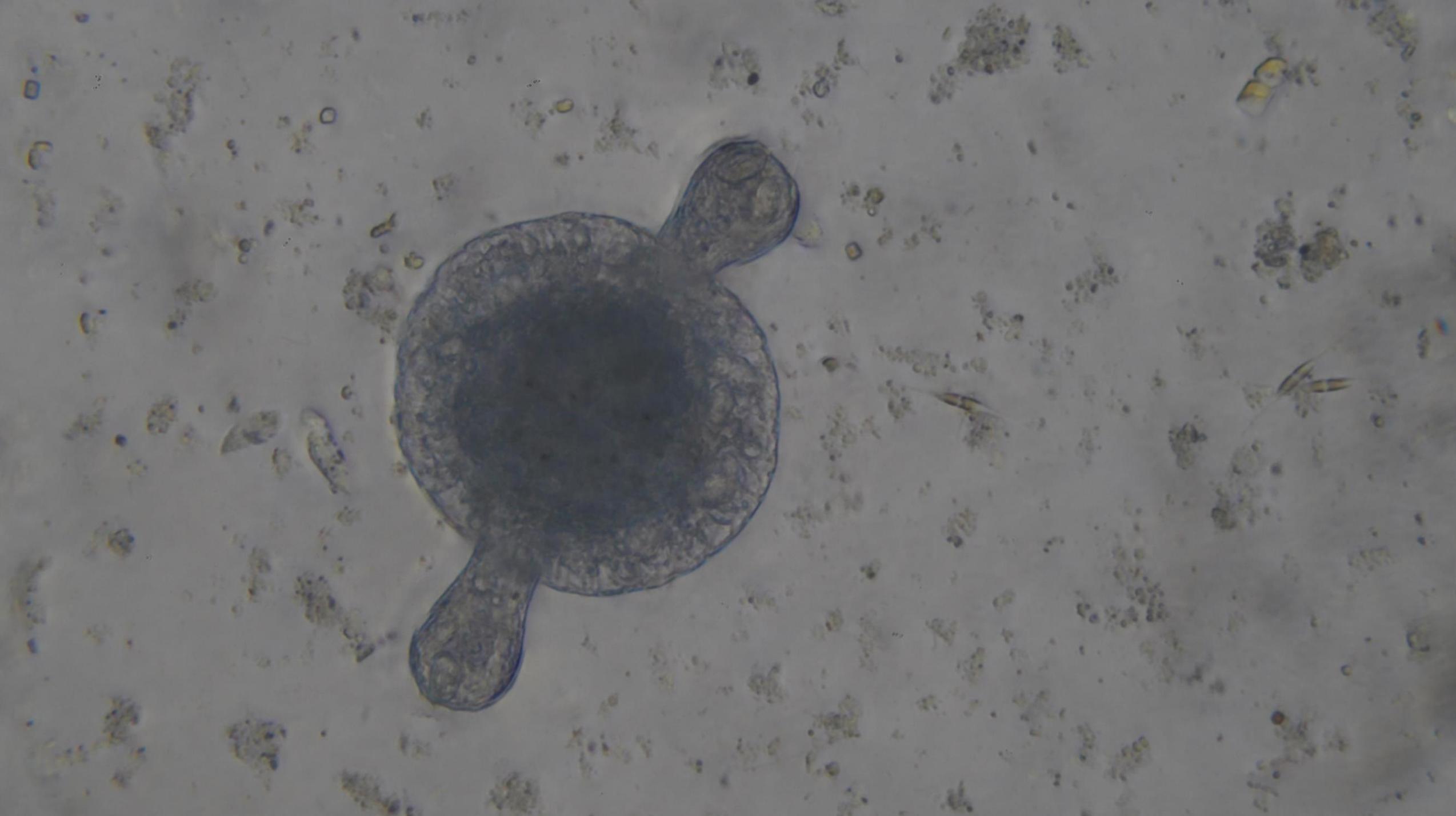


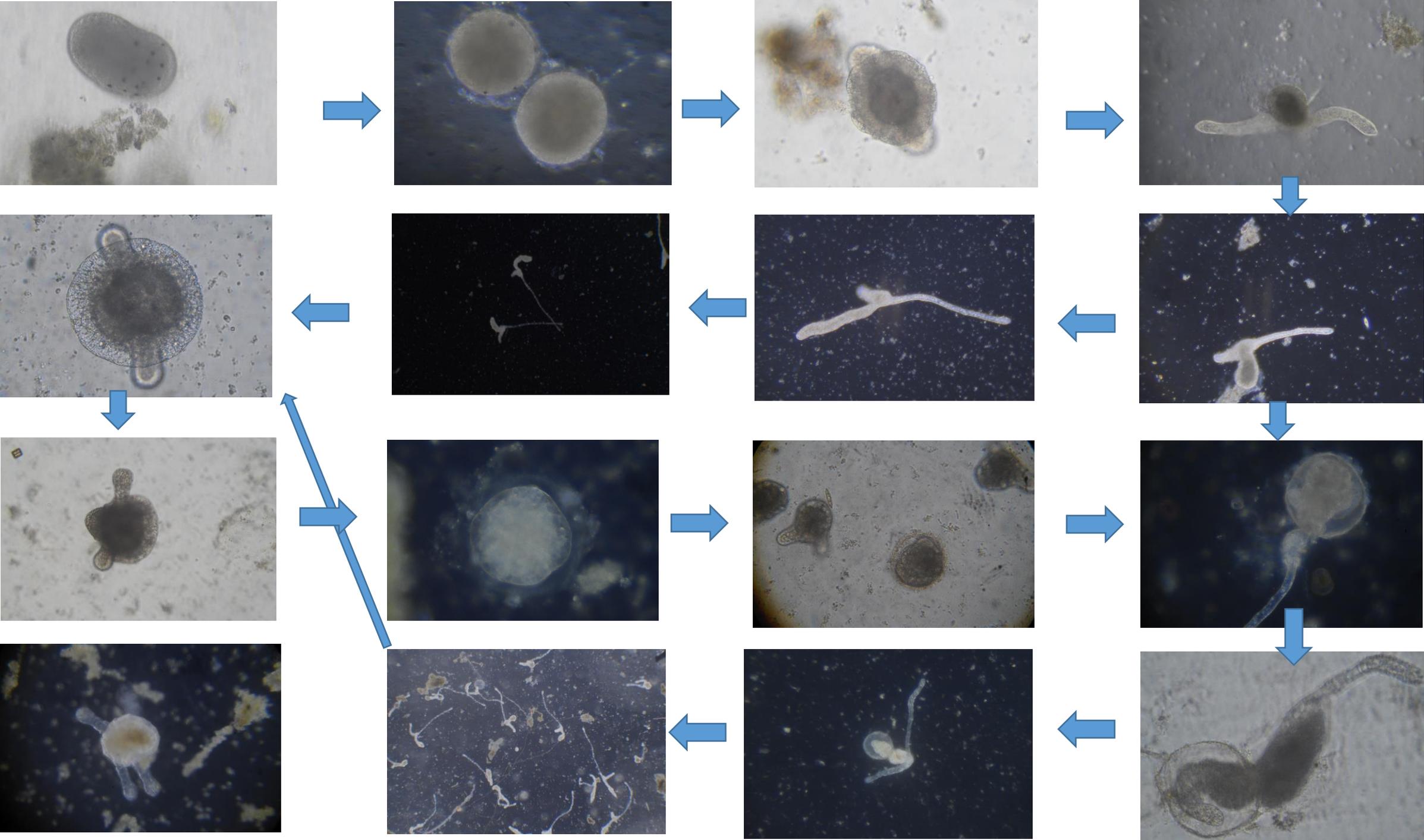












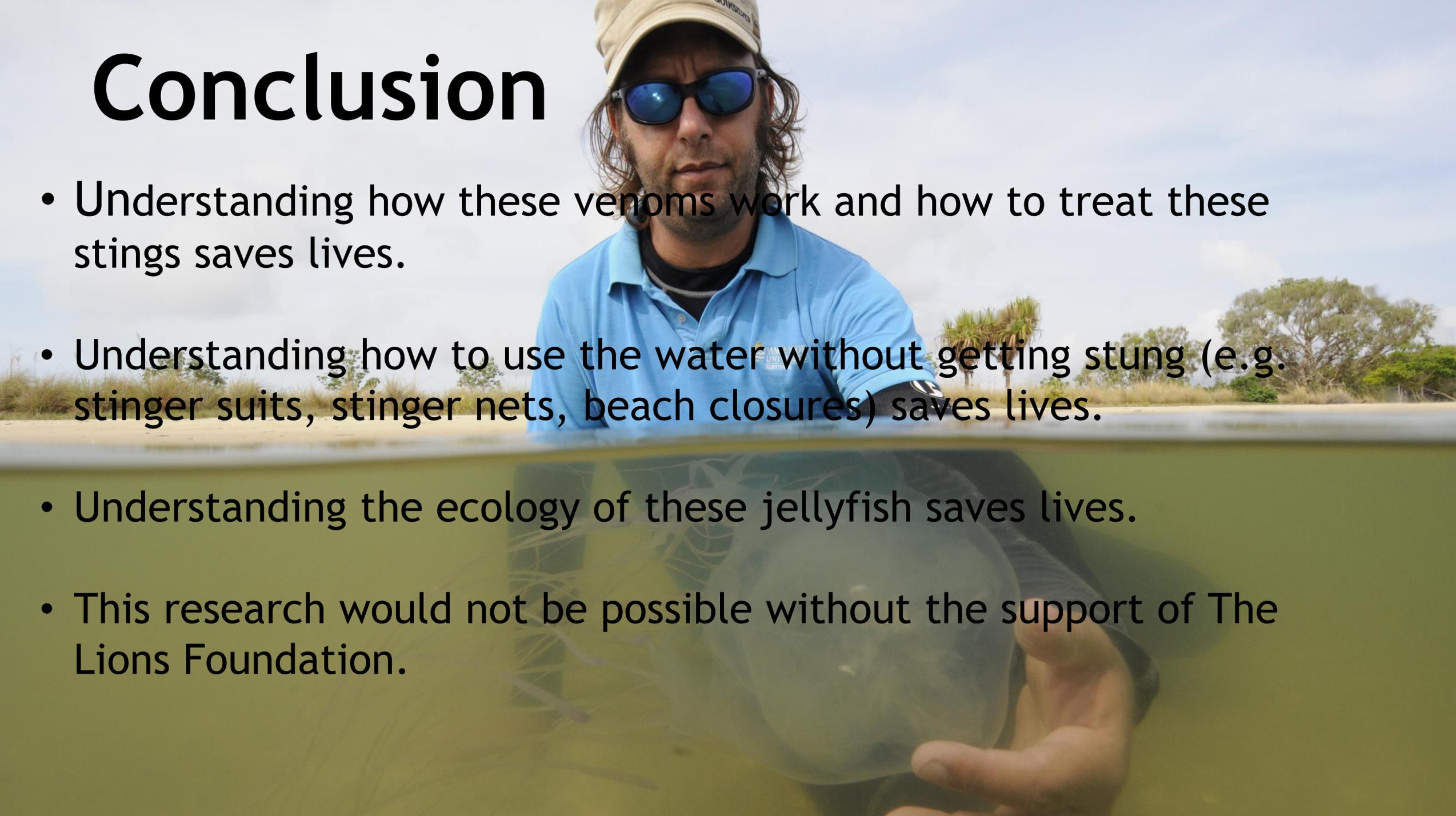
# The Next Step

- The polyps don't eat and continue this cycle for over 12 months, getting smaller and less active.
- Currently we are missing a cue to get them to the next stage.
- We have tried endless combinations of water quality and environmental parameters and foods.
- We need to get back to Weipa to make a fresh batch. This trip is scheduled for early November.



# Conclusion

- Understanding how these venoms work and how to treat these stings saves lives.
- Understanding how to use the water without getting stung (e.g. stinger suits, stinger nets, beach closures) saves lives.
- Understanding the ecology of these jellyfish saves lives.
- This research would not be possible without the support of The Lions Foundation.



# Thank You

With tremendous appreciation and acknowledgment to  
The Lions Foundation, who have generously  
contributed to this research over the years.

**Life Cycle, Prey Capture Ecology and Physiological Tolerances of Medusae and  
Polyps of the 'Irukandji' Jellyfish: *Carukia barnesi***

Robert.Courtney@jcu.edu.au

## **Thesis Dedication:**

I would like to dedicate this thesis to The Lions Foundation of Australia, for their continual financial support dedicated to stinger research, and to Dr. Jack Barnes, for his pioneering work in the field of Irukandji research.

