



AQUACULTURING THE NEXT GENERATION OF MARINE AQUARISTS



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INTRODUCTION

The Marine Science Magnet High School (MSMHS) and the Mystic Aquarium operate a Joint Aquaculture Research and Development Program that offers professional aquarium science and aquaculture training to high school, post-baccalaureate, and graduate students. This collaboration offered 51 MSMHS students the opportunity to work with professional scientists and aquarists to develop an efficient and cost-effective protocol for raising marine ornamental fish. Clownfish (*Amphiprion* spp.) were selected as the initial candidate to develop baseline fish breeding experience. After six successful trials, the partnership turned its attention to the royal gramma (*Gramma loreto*) to investigate its potential for commercial aquaculture production. By developing young professionals with technical training in marine ornamental aquaculture, the partnership envisions an influx of talented and skilled workers that will contribute to the growth and sustainability of the marine aquarium industry.

METHODOLOGY

Aquaculture Education

- Two courses were designed with input from industry professionals, secondary education teachers, and institutions of higher learning and covered all aspects of the aquaculture and marine aquarium industries in the following units:
 - Aquatic Husbandry:** Biosecurity Protocols, Closed System Design, Fish Breeding, Disease Management, and Aquaponics
 - Aquarium Science:** Introduction to Aquaria, Aquarium Husbandry, Aquarium Organisms, Exhibit Design, Fish Nutrition, and Sustainability and Aquaculture

Joint Aquaculture Research

- Recruit recent B.S. graduates in biology, zoology, or marine science from around the nation
- Guide Joint Intern in the operation of the Joint Aquaculture laboratory at MSMHS and in the mentorship of high school student interns
- Conduct research and development in a collaborative setting of aquaculture methods for clownfish (*Amphiprion* spp.) and the royal gramma (*Gramma loreto*)



Fig. 1. Aquaculture education in action:

- a) Mr. Litvinoff instructs students to build a larval rearing system
- b) Joint Intern tends to larval fish
- c) A student tends to a refugium
- d) Dr. Anderson teaches a student to inject elastomer into a royal gramma

ACCOMPLISHMENTS

Aquatic Husbandry Course

- 21 students completed the course with an average final grade of 84.25%
 - 57% were male students and averaged 84.25%
 - 43% were female students and averaged 91.33%
 - 28% were minority students and averaged 88.33%

Aquarium Science Course

- 30 students completed the course with an average final grade of 86.26%
 - 46% were male students and averaged 84.78%
 - 54% were female students and averaged 87.56%
 - 40% were minority students and averaged 82.75%

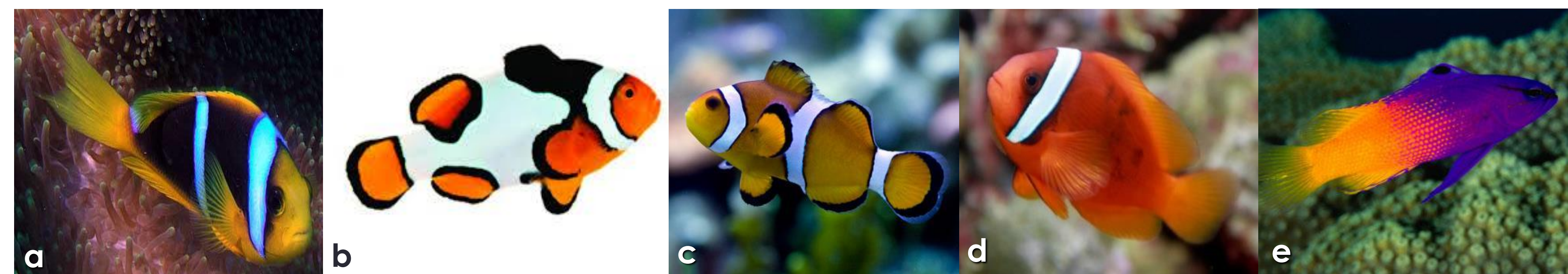


Fig. 2. Fish cultured by the Joint Aquaculture Research Partnership:

- a) Clark's clownfish (*A. clarkii*), b) Orange/Picasso clownfish (*A. percula*), c) Common clownfish (*A. ocellaris*), d) Tomato clownfish (*A. frenatus*), and e) Royal Gramma (*Gramma loreto*)

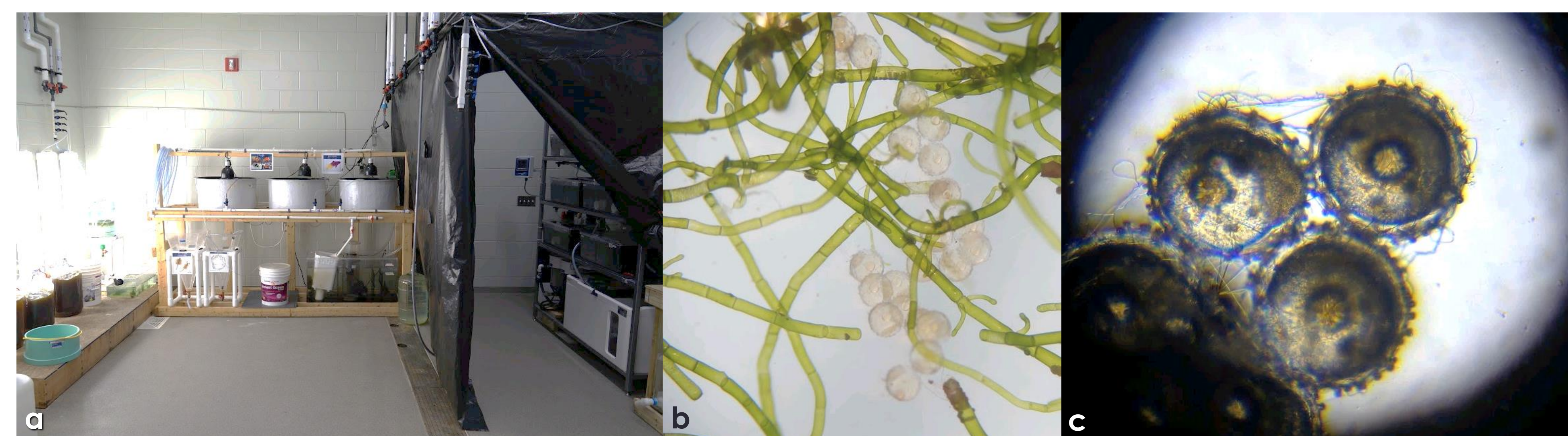


Fig. 3. Joint Aquaculture Research Partnership accomplishments:

- a) Joint Aquaculture Research Laboratory, b) Royal gramma eggs in a nest of algae, and c) Royal gramma eggs in developmental stages

Joint Aquaculture Research & Development

- Established a working Joint Aquaculture Research Laboratory at the Marine Science Magnet High School
- Mentored three Joint Interns in the past two years
- Presented to students, scientists, and industry professionals
- Awarded funding from the Sea World & Busch Gardens Conservation Fund and Connecticut Sea Grant

Clownfish Aquaculture

- Successfully raised six batches of clownfish (*Amphiprion* spp.) eggs
- Improved survival rate of larval fish from 15 to 70%

Royal Gramma Aquaculture

- Successfully acquired, quarantined and sexed 25 royal grammas
- Initiated research on the optimal sex ratio for breeding
- Conditioned fish to produce eggs in nests of algae

NEXT STEPS

Goal 1: To educate and inspire an up-and-coming workforce to enter the marine ornamental aquaculture business sector, supporting the growth and development of an industry while offering a sustainable solution to overfishing for the marine aquarium trade.

Goal 2: To publish an efficient, cost-effective aquaculture protocol for the royal gramma that can be implemented by commercial aquaculturists, benefitting its conservation and the economic livelihood of entrepreneurs.

ACKNOWLEDGMENTS

Thank you! To MSMHS (E. Huysman, S. Medvedev, N. Spera) and the Mystic Aquarium (the Fishes and Invertebrates, Mission Programs, and Veterinary Departments; and Joint Interns H. Pratt, V. Vacco, H. Yeh) for continued support throughout this program; and Roger Williams University (B. Bourque, D. Cerino, A. Gourlay, A. Rhyne, J. Szczebak) and the New England Aquarium (M. Tlusty) for providing training and equipment.

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