UPCOMING MEETING: 8TH LARVAL BIOLOGY SYMPOSIUM
LISBON, PORTUGAL, JULY 6-11, 2008

The symposium is being organized by IPAMAR Portuguese Research Institute. The symposium program was planned to cover a wide range of research areas on larval biology, however six more specific symposia were chosen. They are:

- Larval behaviour, dispersal and mortality (J.I. Gonzalez-Gordillo and H. Queiroga)
- Molecular and geochemical markers for assessing larval dispersal (L. Levin and R.C. Vrijenhoek)
- Larval feeding strategeies (R. Calado and K. Anger)
- Eggs, embryogenesis and early larval life (B.W. Hansen)
- Ontogenetic strategies in extreme aquatic environments (A. Hilario)
- Larval settlement: cues, behaviour response, and possible mechanisms (P.-Y. Qian and J.T. Hoeg)

For more information, contact Antonina dos Santos at antonina@ipamar.pt or visit http://ipimar-iniap.ipimar.pt/larval/index.html

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A HERPES-LIKE VIRUS INFECTING CRASSOSTREA GIGAS AND RUDITAPES PHILIPPINARUM LARVAE IN FRANCE
T. Renault, C. Lipart, I. Arzul-2008
Journal of Fish Diseases 24 (6): 369–376
Abstract:
Concomitant sporadic high mortalities were reported in June 1997 among batches of larval Pacific oyster, Crassostrea gigas, and Manila clam, Ruditapes philippinarum, in a French commercial hatchery. Histological observation showed the presence of cellular abnormalities in affected animals. Electron transmission microscopy revealed the presence of herpes-like virus particles in infected larvae of both bivalve species. Viruses observed in C. gigas and R. philippinarum are closely related with respect to ultrastructure and morphogenesis. They were detected simultaneously in both bivalve species larvae indicating possible interspecific transmission. Moreover, PCR analysis using oyster herpes-like virus specific primers allowed amplification of fragments of expected sizes for both bivalve species and demonstrated the presence of viral DNA. The PCR products obtained for both bivalve species and digested by restriction enzymes displayed the same patterns. These data suggest that the same herpes-like virus may infect larval oysters and clams.

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HOW DO LARVAE ATTACH TO A SOLID IN A LAMINAR FLOW?
G. Zilman, J. Novak, Y. Benayahu-2008
Marine Biology 154(1): 1-26
Abstract:
A hydrodynamic model explaining the mechanism of contact of marine larvae in vertical flows is presented. Two hydrodynamic factors—flow vorticity and larval self-propulsion—are the key components in the mathematical model. It is shown that flow vorticity causes a larva to rotate and change the direction of self-thrust, thus leading to its migration across the mean flow. The latter motion is of an oscillatory nature. Contact will be enabled only for sufficiently large amplitudes of oscillations. Simple expressions for the probability of initial contact are obtained for two-dimensional Couette and Poiseuille flows. The three-dimensional motion of a larva in a tube is studied using the Monte-Carlo simulations. It is shown that contact probability depends mainly on the ratio of the characteristic flow velocity and the larva's swimming speed. The theoretical results compare favorably with available experimental data. Possible applications of the method and results presented here to the classical problem of larval attachment to bodies of general geometry are briefly discussed in the concluding section.
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EFFECTS OF THE DINOFLAGELLATES KARLODINIUM VENEFICUM AND PROROCENTRUM MINIMUM ON EARLY LIFE HISTORY STAGES OF THE EASTERN OYSTER (CRASSOSTREA VIRGINICA)
Diane K. Stoecker, Jason E. Adolf, Allen R. Place, Patricia M. Glibert, Donald W. Meritt-2008
Marine Biology 153(1): 81-90
Abstract:
The bloom-forming dinoflagellates Prorocentrum minimum and Karlodinium veneficum can have detrimental effects on some marine life, including shellfish, but little is known about their effects on early life history stages of bivalves. In the Chesapeake Bay region, blooms of these dinoflagellates overlap with the spawning season of the eastern oyster, Crassostrea virginica. In laboratory experiments, we compared the effects of P. minimum and K. veneficum on the survival and development of embryos and larvae of the eastern oyster. At 104 cells ml−1, P. minimum did not have a negative effect on embryos and larvae in 2-day exposures. The yield of D-hinge larvae was equal to or greater than in control treatments. At 2 × 104 cells ml−1 (approximately equal biomass to the P. minimum treatment) K. veneficum caused significant mortality to oyster embryos within 1 day and almost no embryos developed into D-hinge larvae. This effect was not alleviated by the provision of an alternate food source (Isochrysis sp.). Significant mortality was observed when larvae were exposed to K. veneficum at concentrations of 104 cells ml−1 (approximately 5 ng ml−1 of karlotoxin). The K. veneficum cultures used in these experiments were relatively low in toxin content, more toxic strains could be expected to cause mortality at lower cell concentrations. Survival and maturation of embryos and larvae may be reduced when spawns of the eastern oyster coincide with high bloom densities of K. veneficum.
(Horn Point Laboratory, University of Maryland Center for Environmental Science, P.O. Box 475, Cambridge, MD 21613, USA; email of Diane K. Stoecker: stoecker@hpl.umces.edu)

EFFECTS OF WATER TEMPERATURE ON SURVIVAL, DEVELOPMENT AND FEEDING OF LARVAE OF THE HORSEHAIR CRAB ERIMACRUS ISENBECKII (CRUSTACEA, DECAPODA, BRACHYURA) REARED IN THE LABORATORY

Tadao Jinbo, Katsuyuki Hamasaki, Masakazu Ashidate-2007

Nippon Suisan Gakkaishi 73 (6): 1081-1089

Abstract:

To determine the optimal rearing temperature for the larval horsehair crab Erimacrus isenbeckii, newly hatched larvae were reared in groups of 50 in 2-L beakers, the water temperature in which was regulated to 6, 9, 12, 15, 18, 21°C, respectively. Survival rates of larvae were high in the beakers at 6 to 15°C; however, mass mortality occurred in the beakers at 21°C from the third to fourth zoeal stage and at 18°C from the fifth zoeal stage through megalopa to first crab stage. The number of days required to reach each larval stage decreased with increasing temperature to 15°C. The coefficient of variation of the number of days required to reach the first crab stage was high in the beakers at ≥15°C. Carapace length tended to increase with decreasing temperature. The numbers of prey eaten by larvae were high at 9 to 15°C. We concluded that the optimal rearing temperature range for larvae of the horsehair crab was from 9 to 12°C.

(Minamiizu Station, National Center for Stock Enhancement, Fisheries Research Agency, Minamiizu, Shizuoka 415-0156, Japan)

EFFECTS OF SALINITY ON EGGS, LARVAE, AND JUVENILES OF BLACKNOSE SILVERSIDES FROM LAKE CHAPALA, MEXICO

Carlos A. Martínez-Palacios, Rosa L. Salgado-García, Ilie S. Racotta, Antonio Campos-Mendoza, Lindsay G. Ross-2008

North American Journal of Aquaculture 70(1): 12–19

Abstract.:

The salinity tolerance of eggs, larvae, and juveniles of blacknose silverside Chirostoma promelas was investigated with the objective of optimizing hatchery practice. A high proportion (>90%) of eggs became eyed in all salinities. Eggs exposed to an instantaneous change of salinity hatched best at 0–15 practical salinity units (psu; 1 psu 1‰); reduced hatching occurred at 20 psu and no hatching occurred at 25–35 psu. By contrast, eggs exposed after 5 d to a slow change of salinity to freshwater over 48 h also hatched well at 0–15 psu, but they hatched at higher salinities as well. Fungal infections of eggs were greatest at 0 and 5 psu. Larvae exposed to an instantaneous change of salinity (0–25 psu) had the best survival rates at salinities of 0 psu (83%) and 5 psu (87%), but lower survival was obtained at 10 psu (49%) and 15 psu (22%) after 144 h. At 20 and 25 psu, larval mortality was 90% and 100%, respectively, after 48 h. In contrast, larvae exposed to a slow change of salinity over 48 h showed a higher salinity tolerance (43% survival at 20 psu), although higher salinities killed the fish. Juveniles had a high tolerance (100% survival) to a slow salinity change over 48 h at 0–25 psu. After 90 d, survival was best at 5–20 psu, optimal growth occurring at 5, 10, and 15 psu. Mortality was 100% in fish reared in freshwater after 75 d of culture, possibly a result of the high stress at this salinity. The osmolarity of muscle tissue of juveniles was not significantly different ($P > 0.05$) between trials, indicating efficient internal ionic regulation at all salinities. The wide salinity tolerance of blacknose silverside is clearly beneficial for its management and culture.

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INEXPENSIVE APPARATUS TO RAPIDLY COLLECT WATER SAMPLES FROM A LINEAR-DESIGN, PLUG-FLOW HATCHERY RACEWAY

James D. Bowker, Daniel G. Carty, Molly P. Bowman-2008

North American Journal of Aquaculture 70(1): 8–11
Abstract.:
In July 2001, we conducted a study to determine whether a target concentration of chloramine-T (a waterborne chemical) could be achieved and maintained for 60 min in linear-design, plug-flow hatchery raceways (devoid of fish) via a "charged" flow-through treatment methodology. In each of four independent trials, a raceway was charged to achieve the target concentration by turning off the inflow water (creating a static bath) and manually mixing in a premeasured volume of chloramine-T stock solution. Water inflow was then turned on, and the target concentration was maintained by metering additional chloramine-T stock solution into the inflow water via a calibrated chicken-watering system. To help verify chloramine-T concentrations during treatment, we built an apparatus to rapidly collect many water samples from throughout a raceway. The apparatus comprised three fixed sampling stations, each of which was equipped with 9 water collection devices (i.e., nine 60-mL plastic syringes fitted with fixed-length "suction needles" made of rigid polyvinyl chloride pipe threaded with flexible vinyl tubing) and 9–11 plastic bottles for storing the collected samples. During each of the four 60-min trials, water samples were collected at elapsed times of 0, 30, and 60 min; thus, 12 sampling events were conducted during the study. During each sampling event, three people (working simultaneously but independently) collected a total of 29 water samples (27 for chloramine-T dose verification and 2 for quality control). The time for one person to collect 9–11 water samples (50–60 mL per sample) from one sampling station averaged 1.5 min (SD = 0.382; n = 36) and ranged from 0.9 to 2.5 min. The apparatus was inexpensive, easy to build and use, and portable; it ultimately helped us verify the spatial and temporal distribution of chloramine-T in linear-design, plug-flow hatchery raceways during 60-min charged flow-through treatments.
(U.S. Fish and Wildlife Service, Aquatic Animal Drug Approval Partnership Program, 4050 Bridger Canyon Road, Bozeman, Montana 59715, USA; email of James D. Bowker: jim_bowker@fws.gov)

CRYOPRESERVATION AND METHANOL EFFECTS ON BURBOT SPERM MOTILITY AND EGG FERTILIZATION

N. R. Jensen, M. D. Zuccarelli, S. J. Patton, S. R. Williams, S. C. Ireland, K. D. Cain-2008
North American Journal of Aquaculture 70(1): 38–42
Abstract.:
Cryopreservation of semen from North American burbot Lota lota maculosa was investigated and optimal methanol concentrations were determined for a conservation breeding program. Methods were modified from those reported for Eurasian burbot L. lota lota. The permeable cryoprotectant (methanol) concentration in the semen extender was varied to provide final methanol concentrations of 5, 10, and 20%. Semen motility was evaluated at 80 and 363 d postfreeze (dpf). Fertilization was determined at 340 and 367 dpf. Methanol concentration in the extender significantly ($P < 0.05$) affected sperm motility and egg fertilization percentages. Motility and fertilization were lowest when 5% methanol was used. Motility of semen at 80 dpf was not significantly different between 10% and 20% methanol, but semen at 363 dpf had significantly higher motility when stored in 20% methanol than in 10% methanol. Egg fertilization was highest when semen was stored in extenders containing 10% or 20% methanol. Results suggest that good motility and fertilization can be achieved by cryopreserving burbot semen with 10% or 20% methanol in the extender instead of 5% methanol. This study demonstrates the potential to utilize cryopreserved burbot semen in the development of germplasm repositories for imperiled fish stocks.
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EVALUATION OF EGG INCUBATION METHODS AND LARVAL FEEDING REGIMES FOR NORTH AMERICAN BURBOT

Nathan R. Jensen, Susan C. Ireland, John T. Siple, Scott R. Williams, Kenneth D. Cain-2008
North American Journal of Aquaculture 70(2):162–170
Abstract:
Incubation methods and larval feeding regimes were investigated for North American burbot Lota lota maculosa over 2 years. Three upwelling incubators were tested: 6.0-L McDonald-type jars, 2.0-L pelagic egg jars, and 1.2-L Imhoff cones. Larvae were allocated to five feeding regimes in year 1 (trial 1) and three feeding regimes in year 2 (trial 2). In trial 1, a live diet (marine rotifers Brachionus plicatilis and brine shrimp Artemia spp.) was administered from 11 d posthatch (dph) until introduction of a commercial diet at 21, 31, or 41 dph; the fourth treatment applied the commercial diet exclusively starting at 11 dph, and the fifth treatment used only the live diet. Trial 2 examined (1) exclusive use of live feed beginning at 16 dph; (2) use of live feed at 16–50 dph, which was combined with commercial feed at 31–50 dph, and use of only the commercial diet at 51–76 dph; and (3) use of the live diet at 16–50 dph, the addition of frozen brine shrimp at 31–50 dph, and use of the commercial diet at 51–76 dph. Approximate stocking densities for feeding trials were 25 larvae/L in trial 1 and 250 larvae/L in trial 2. Survival and total lengths (TLs) were measured at 52 dph in trial 1 and at 76 dph in trial 2. Incubation trials showed that Imhoff cones or pelagic egg jars significantly improved embryo survival relative to McDonald jars. Larvae fed a live diet for an extended time had significantly higher survival and TLs in both trials. Introduction of a commercial diet at 31 or 41 dph after live-diet feeding was successful. This study provides a basis for further development of burbot aquaculture.
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AQUACULTURE OF THE ATLANTIC RED PORGY
James A. Morris Jr., Troy C. Rezek, Neil A. McNeill, Wade O. Watanabed-2008
North American Journal of Aquaculture 70(2): 184–191 |
Abstract.:
Aquaculture of red porgy Pagrus pagrus (Sparidae) in North America was assessed by the investigation of broodstock conditioning and egg production, larval growth and survivorship, and juvenile grow out. Red porgy broodstock were collected off the coast of North Carolina and held in an outdoor recirculating seawater tank under ambient photoperiod and offshore bottom temperatures. Red porgy broodstock (n = 20) produced up to 300,000 viable eggs/d during their natural spawning period between January and March 2005. Larval survival to 10 d posthatch (dph) was 75.0 ± 2.2% (mean ± SE). Survival declined markedly after 13 dph and was 2.4% by 35 dph, when 1,200 postmetamorphic-stage juveniles remained. Larvae reached 11.2 ± 1.12 mm and 29.3 ± 0.55 mg at 35 dph, and juveniles reached 55 mm total length (TL) at 90 dph. Juvenile grow-out trials in recirculating tanks resulted in red porgy reaching 195 ± 0.32 mm TL and 158 ± 0.14 g at 313 dph and a weight-specific growth rate of 6.8%. The results suggest a lower larval growth rate for western Atlantic red porgy compared with Mediterranean red porgy culture; however, juvenile growth rates were significantly higher than previously reported. Given the high market demand for reef fish species, the red porgy appears to be a good candidate for marine fish culture in North America.
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