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EFFECTS OF TEMPERATURE AND SALINITY ON PREREPRODUCTIVE LIFE SPAN AND REPRODUCTIVE TRAITS OF TWO SPECIES OF ARTEMIA (BRANCHIOPODA, ANOSTRACA) FROM ARGENTINA: ARTEMIA FRANCISCANA AND A. PERSIMILIS
G. R. Medina , J. Goenaga, F. Hontoria, G. Cohen, F. Amat-2007
Hydrobiologia 579(1): 41-53
Abstract:
The identification of the environmental conditions inducing different ecophysiological responses in the different strains and populations of the brine shrimp Artemia should improve the understanding of their biogeographic distribution. Nauplii from two Argentinean brine shrimp populations, Artemia persimilis from Salinas Grandes de Hidalgo (province of La Pampa) and Artemia franciscana from Laguna Mar Chiquita (province of Cordoba), were grown up until adulthood at different salinities (30, 60, 90, 120 gL−1) and temperatures (12, 21, 28°C). The aim was to assess the effects of these different conditions on prereproductive life span and reproductive traits. Results evidenced that at 21 and 28°C, at any salinity, A. franciscana from Laguna Mar Chiquita attained higher survival and fecundity, after a shorter prereproductive period, than A. persimilis from Salinas Grandes de Hidalgo. These data support that A. franciscana, considered a superspecies, exhibits higher phenotypic plasticity than A. persimilis, and that A. persimilis is better adapted to lower temperatures than A. franciscana. These differences in temperature and salinity tolerance could explain the present distribution of these two species in the South Cone in South America.
(Instituto de Acuicultura de Torre de la Sal (CSIC), 12595 Ribera de Cabanes (Castellón), Spain : email of G. R. Medina :germelo@hotmail.com)

EFFECTS OF DIETS WITH DISTINCT PROTEIN-TO-CARBOHYDRATE RATIOS ON NUTRIENT DIGESTIBILITY, GROWTH PERFORMANCE, BODY COMPOSITION AND LIVER

INTERMEDIARY ENZYME ACTIVITIES IN GILTHEAD SEA BREAM (SPARUS AURATA, L.) FINGERLINGS

Felipe Fernándeza, Anna G. Miquel, Marlon Córdoba, Manuel Varas, Isidoro Metón, Anna Caseras, Isabel V. Baanante-2007

Journal of Experimental Marine Biology and Ecology 343(1): 1-10

Abstract:

The effect of replacing dietary protein with gelatinized cornstarch (GCS) on apparent digestibility coefficient (ADC), body composition, growth performance and liver enzyme activities involved in control of intermediary metabolism, was studied in Sparus aurata L. Fingerlings of S. aurata were fed 93 days three diets containing 63% protein and 5% gelatinized cornstarch (LC diet), 54% protein and 18% GCS (MC diet) or 47% protein and 26% GCS (HC diet). Diet HC gave ADC values for carbon, nitrogen and dry matter that were significantly below the corresponding values of the other diets. Fish on MC diet registered higher fresh weight than fish on LC and HC, and higher specific growth rate (SGR) than fish on HC. The lipid body content ranked in the order HC > MC > LC. High correlations between carbohydrate level and liver enzyme activity were found for pyruvate kinase, glucose 6-phosphate dehydrogenase, 6-phosphogluconate dehydrogenase and alanine aminotransferase. For cultures of S. aurata, we conclude that carbohydrates like GCS could replace dietary protein, enhance growth rate and reduce nitrogen losses to the ambient waters when used at levels below 20%.

(Departamento de Ecología, Universidad de Barcelona, Facultad de Biología, Avda. Diagonal 645, E-08028 Barcelona, Spain; email of Felipe Fernándeza: ffernandez@ub.edu)

USE OF ENCAPSULATED LIVE MICROALGAE TO INVESTIGATE PRE-INGESTIVE SELECTION IN THE OYSTER CRASSOSTREA GIGAS

Emmanuelle Pales Espinosa, Laurent Barillé -2007

Journal of Experimental Marine Biology and Ecology 343(1): 118-126

Abstract:

The involvement of algal chemical cues in the pre-ingestive selection of food particles in Crassostrea gigas was studied using a new approach. Live cells of two microalgal species, Nitzschia closterium and Tetraselmis suesica, were separately entrapped in small alginate microcapsules using an emulsification/internal gelation method. Microcapsule size was adjusted to be within the range of particles ingested by oysters. Using this technique, about 80% of microcapsules had a diameter ranging from 21 to 100 μm. The monitoring of entrapped algae showed that phytoplankton cells remained alive and maintained an active growth for at least 24 days. In particle selection bioassays, adult C. gigas were fed a mixture of microcapsules containing the above algae species as well as control empty alginate microcapsules. The comparison of the proportions of each microcapsule type in the diet and in pseudofeces revealed that those containing T. suesica were significantly ingested while those containing N. closterium were preferentially rejected. Since microcapsule material (alginate matrix) prevented physical contacts between algae cells and oyster feeding organs, this study clearly demonstrate that extracellular metabolites produced by microalgae play a crucial role in the pre-ingestive selection of particles in suspension-feeding bivalves.

(NewYork State Department of Environmental Conservation, 205 Belle Meade road, East Setauket, NY 11733, USA; email of Bassem Allam: Bassem.Allam@stonybrook.edu)

GENETIC DIFFERENCES BETWEEN HATCHERY STOCKS AND NATURAL POPULATIONS IN PACIFIC ABALONE (HALIOTIS DISCUS) ESTIMATED USING MICROSATELLITE DNA MARKERS

Motoyuki Hara, Masashi Sekino-2007

Marine Biotechnology 9(1): 74-81

Abstract :

Genetic variations within and between nine hatchery stocks and seven natural populations of abalone including Ezo-abalone (Haliotis discus hannai) and Kuro-abalone (H. d. discus) were assayed with

nine microsatellite markers. Marked reductions of genetic variability in the hatchery stocks were recognized in the allelic diversity and mean heterozygosity compared with the natural populations. Thirteen of 16 significant HWE deviations in hatchery stocks revealed heterozygotes excess, while all natural populations did not show such a tendency. Highly significant F ST values were observed for all cases between the hatchery stocks, and between the hatchery stocks and natural populations. Genetic distance (D A) between each hatchery stock and the geographically proximal population (mean ± SD, 0.108 ± 0.035) were similar to those estimated for between the natural Ezo-abalone and Kuro-abalone (0.101 ± 0.021). The self-assignment test, which allocated individuals to their own stock with a high success rate, provided evidence of solid genetic differences among the nine hatchery stocks. These results suggests that the allelic composition and diversity in the natural populations was not necessarily reflected in the hatchery stocks owing to population bottleneck and genetic drift through seedling process, and thus the seedling and stocking practice of these hatchery stocks should take much notice of the results to conserve the genetic diversity of natural populations.
(National Research Institute of Aquaculture, Minami-Ise, Watarai, Mie 516-0193, Japan; email of Motoyuki Hara: mhara@affrc.go.jp)

RESPONSE OF MUSCLE-BASED BIOCHEMICAL CONDITION INDICES TO SHORT-TERM VARIATIONS IN FOOD AVAILABILITY IN POST-FLEXION REARED SEA BASS DICENTRARCHUS LABRAX (L.) LARVAE
I. A. Catalán, E. Berdalet, M. P. Olivar, C. Roldán-2007
Journal of Fish Biology 70 (2): 391–405.
Abstract:
Six condition indices based on RNA, total soluble protein and two metabolic enzymes [lactate dehydrogenase (LDH) and citrate synthase (CS)] were analysed in muscle tissue of individual larvae, post-flexion reared sea bass Dicentrarchus labrax using DNA and total soluble protein as standards for size. In addition, the effect of 2 days of food deprivation on the cell proliferation rates was assessed. The RNA:DNA best reflected short-term changes in feeding conditions. If standardized by DNA content, LDH activity was a better indicator of condition than any other index but RNA:DNA. Further, the analysis of cell proliferation rates in muscle from 26 day-old larvae proved useful in distinguishing continuously fed larvae from individuals subjected to 2 days of fast.
(Instituto de Ciencias del Mar (CSIC), Passeig Marítim 37-49, Barcelona 08003, Spain; email of I. A. Catalán: icatalan@icm.csic.es)

CHARACTERIZATION OF SPERM MOTILITY IN SEA BASS: THE EFFECT OF HEAVY METALS AND PHYSICOCHEMICAL VARIABLES ON SPERM MOTILITY Journal of Fish F. J. F.J. Abascal, J. Cosson, C. Fauvel -2007
Journal of Fish Biology 70 (2): 509–522
Abstract:
Computer assisted sperm analysis (CASA) was used to characterize the motility of sea bass Dicentrarchus labrax spermatozoa and to study the effect of several physicochemical variables and heavy metals on sperm swimming performance. Duration of sperm motility in sea bass was very short (<50 s). During the first 20 s all the motility variables measured remained approximately constant, the velocity and linearity of the movement being maximum during this period, while both variables decreased sharply later. While slight variations in pH did not significantly modify sperm swimming performance, changes in osmolality affected all the measured motility variables. Two of the heavy metals tested, Cu2+ and Pb2+, did not affect sperm motility when the activating media contained up to 100 ppm of the metal salts. In contrast, Hg2+ modified the morphology of post-swimming spermatozoa at 0·4–1 ppm (sperm dilution rate 1:39) and completely arrested sperm motility at concentrations as low as 0·1 ppm (sperm dilution rate 1:2500). Assuming a covalent binding to sperm cells, this revealed a finite number of c. 10 million Hg2+ binding sites per spermatozoon. Complementary results using demembranated spermatozoa suggested that the main target of HgCl2

would be located in the plasma membrane and that HgCl2 would inhibit water channels, hence preventing sperm motility.
(Instituto Español de Oceanografía, Unidad de Cádiz, Puerto Pesquero, Muelle de Levante s/n, Apdo. 2609, 11006 Cádiz, Spain ; email of F. J. Abascal: francisco.abascal@uca.es)

EARLY DEVELOPMENT AND GROWTH OF THE LABORATORY REARED NORTH-EAST ATLANTIC MACKEREL SCOMBER SCOMBRUS L.
D. Mendiola, P. Alvarez, U. Cotano, A. Martínez de Murguía-2007
Journal of Fish Biology 70 (3): 911–933.
Abstract:
The early development, growth and morphological changes of mackerel Scomber scombrus were investigated at different incubation temperatures (8, 10, 13, 15 and 18° C). Details on the early life history are illustrated with special reference to morphological transformations. Culture techniques to rear larval mackerel stages are described using laboratory cultured foods. Artificially fertilized eggs were hatched after 80·6 h at 18·4° C and 256·8 h at 8·7° C. The standard length (LS) of the individuals at first feeding was 4·71 ± 0·18 mm. Four mortality critical periods and cannibalistic behaviour were identified. A maximum average larval size of 37·5 ± 4·41 mm LS was attained 30 days post-hatch (dph) at 18·4° C. Development and growth were affected significantly by temperature during both endogenous and exogenous feeding periods. Larvae grew more rapidly at high, than at low temperatures. Daily specific growth rate (in mass) ranged from 2·4% at 10·6° C to 16·9% at 18·4° C. Likewise, average growth rate (in length) ranged from 0·05 mm day1 at 8·4° C to 0·37 mm day1 at 18·4° C. The allometric relationship of LS, with several body measurements was not affected by temperature. Comparison with larvae collected in the Bay of Biscay did not show any significant difference in the dry mass and LS relationship; conversely, the growth rate in length differed significantly between both laboratory and field conditions. The trends observed in the laboratory are described in relation to some aspects of the year-class strength regulation.
(AZTI-Tecnalia, Marine Research Division, Herrera Kaia, Portualdea, s/n; 20110 Pasaia, Spain; email of D. Mendiola: dmendiola@pas.azti.es)

THE INFLUENCE OF INVERTEBRATE PREDATORS ON DAPHNIA SPATIAL DISTRIBUTION AND SURVIVAL IN LABORATORY EXPERIMENTS: SUPPORT FOR DAPHNIA HORIZONTAL MIGRATION IN SHALLOW LAKES
Adrianna Wojtal, Piotr Frankiewicz, Magorzata Andziak, Maciej Zalewski-2007
Abstract :
The behavioural response of Daphnia cucullata to the presence of the pelagic invertebrate predator Leptodora kindtii, and the predation rate of littoral dragonfly nymphs on this species were investigated under laboratory conditions.
Results of this study revealed a strong hiding response of Daphnia cucullata in the presence of the predatory cladoceran, L. kindtii, which was similar to the response of Daphnia in the presence of juvenile perch. This suggests that pelagic invertebrate predators may cause Daphnia to hide in the littoral zone which could result in increased exposure to predation by littoral invertebrates. A strong influence of dragonfly nymphs on D. cucullata, both in the presence and absence of macrophytes, was found. The average predation rate of Odonata larvae was about 5 prey ind-1 h-1 and did not differ significantly between treatments. Quantification of dragonfly pressure on Daphnia populations will require cross-verification with field experiments since in the natural conditions Daphnia seeks a shelter in the vegetation stands against predation by Leptodora, despite the occurrence of odonates.
(Department of Applied Ecology, University of Lodz, 90-237 Lodz, Banacha 12/16 Str., Poland; email of Adrianna Wojtal : adwoj@biol.uni.lodz.pl

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COEXISTENCE OF SEXUAL AND PARTHENOGENETIC ARTEMIA POPULATIONS IN LAKE URMIA AND NEIGHBOURING LAGOONS

Naser Agh, Theodore J. Abatzopoulos, Ilias Kappas, Gilbert Van Stappen, Seyed M. Razavi Rouhani, Patrick Sorgeloos-2007

Abstract :
We studied the Artemia populations existing in Lake Urmia (north-western Iran), one of the largest habitats of Artemia in the world, in order to settle the long-standing controversy over the sexual status of the endemic Artemia populations. Experiments were carried out in the laboratory and in the field. Cysts, collected from different sites of the lake and peripheral lagoons, were hatched and cultured to adults in the laboratory. Adult sexual and parthenogenetic animals were isolated and newly hatched nauplii from them were cultured to maturity in different salinities, ranging from 15-80 ppt. Survival levels and percentage of animals attaining adulthood were measured over a period of 30 days. In the field experiment, cysts taken from Lake Urmia were hatched and the resulting nauplii were inoculated into six earthen ponds (80-140 ppt) constructed in the vicinity of the lake. Population composition in each pond was determined over a period of two years. Results indicated that both sexual and parthenogenetic Artemia coexist in Lake Urmia. While the lake itself is dominated by sexual Artemia, the asexual populations were found to be restricted to particular areas in or near the lake. Artemia appearing seasonally in the lagoons adjacent to the lake were exclusively parthenogenetic. Parthenogens could grow, mature and reproduce at very low salinities (15-33 ppt), whereas higher salinities (above 50 ppt) were required for A. urmiana to attain sexual maturity. We consider salinity to be a major abiotic factor determining the distribution of these sexually different populations within and outside the lake.

(Laboratory of Aquaculture & Artemia Reference Center, Ghent University, Rozier 44, B-9000, Ghent, Belgium; email of Naser Agh: n.agh@mail.urmia.ac.ir

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SYNECHOCYSTIS MCCB 114 AND 115 AS PUTATIVE PROBIONTS FOR PENAEUS MONODON POST-LARVAE

R. Preetha, N. S. Jayaprakash, I. S. Bright Singh-2007

Diseases of Aquatic Organisms 74(3):243-247

Abstract:
Synechocystis MCCB 114 and 115 were segregated as putative probionts for shrimp larvae from a collection of 54 cyanobacterial cultures enriched from seawater. On feeding Penaeus monodon post-larvae with the cyanobacteria, the generic diversity of the intestinal bacterial flora could be enhanced with substantial reduction or total absence of Vibrio spp. A significant difference ($p < 0.001$) in the percent survival of batches of post-larvae fed on the cyanobacterial cultures was observed and, on repeated challenge with V. harveyi, the relative percent survival of those batches of larvae fed on Synechocystis MCCB 114 and 115 was significantly higher. The Synechocystis MCCB 114 and 115 cultures were found to contain high levels of protein (34 to 43%), in addition to carotenoids.

(National Centre for Aquatic Animal Health, Cochin University of Science and Technology, Lakeside Campus, Fine Arts Avenue, Cochin 682016, India *Corresponding author; email of I. S. Bright Singh: bsingh@md3.vsnl.net.in)

PATHOGENESIS OF A THAI STRAIN OF WHITE SPOT SYNDROME VIRUS (WSSV) IN JUVENILE, SPECIFIC PATHOGEN-FREE LITOPENAEUS VANNAMEI

C. M. Escobedo-Bonilla, M. Wille, V. Alday Sanz, P. Sorgeloos, M. B. Pensaert, H. J. Nauwynck-2007

Diseases of Aquatic Organisms 74(2):85-94

Abstract:
White spot syndrome virus (WSSV) causes disease and mortality in cultured and wild shrimp. A standardized WSSV oral inoculation procedure was used in specific pathogen-free (SPF) Litopenaeus vannamei (also called Penaeus vannamei) to determine the primary sites of replication (portal of entry), to analyze the viral spread and to propose the cause of death. Shrimp were inoculated orally with a low (101.5 shrimp infectious dose 50% endpoint [SID50]) or a high (104 SID50) dose. Per dose, 6 shrimp were collected at 0, 6, 12, 18, 24, 36, 48 and 60 h post inoculation (hpi). WSSV-

infected cells were located in tissues by immunohistochemistry and in hemolymph by indirect immunofluorescence. Cell-free hemolymph was examined for WSSV DNA using 1-step PCR. Tissues and cell-free hemolymph were first positive at 18 hpi (low dose) or at 12 hpi (high dose). With the 2 doses, primary replication was found in cells of the foregut and gills. The antennal gland was an additional primary replication site at the high dose. WSSV-infected cells were found in the hemolymph starting from 36 hpi. At 60 hpi, the percentage of WSSV-infected cells was 36 for the epithelial cells of the foregut and 27 for the epithelial cells of the integument; the number of WSSV-infected cells per mm2 was 98 for the gills, 26 for the antennal gland, 78 for the hematopoietic tissue and 49 for the lymphoid organ. Areas of necrosis were observed in infected tissues starting from 48 hpi (low dose) or 36 hpi (high dose). Since the foregut, gills, antennal gland and integument are essential for the maintenance of shrimp homeostasis, it is likely that WSSV infection leads to death due to their dysfunction.

(Laboratory of Aquaculture & Artemia Reference Center, Faculty of Bioscience Engineering, Ghent University, Rozier 44, 9000 Ghent, Belgium; email of Hans Nauwynck: hans.nauwynck@ugent.be)