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Reproductive Biology and Histological Studies in Abu Mullet, *Liza abu* in the Water of the Khozestan Province

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To study the reproductive biology of *Liza abu*, 360 samples of this species were collected during the period from February 2007 to January 2008. Reproductive characteristics of *Liza abu* showed that sex ratio is 1: 2.7 male to female, respectively. This means that females predominate males. Monthly variation in GSI of both sexes were quiet apparent. Maximum values were recorded in March (10.26 and 11.51% for males and females, respectively) and reached to the minimum levels in August (0.42 and 1.15% for males and females, respectively). These cyclic changes in GSI indices are considered as a proof that maturation season is started from January and spawning occurs in April. The maturity stages of male and female *Liza abu* are separated to 6 different successive stages. These stages in female are immature, resting, developing, developed, spawning (ripe) and post spawning. The testes maturation classified to virgin (immature), maturing virgin, maturing virgin, developing, developed, ripe and spent. The ova diameter ranged from 16.02 to 470.3 μ . It can be classified into transparent eggs ranging from 16.02 to 106.97 μ in diameter and yolked egg ranging from 126.82 to 470.3 μ in diameter. (*Journal of Fisheries and Aquatic Science* 4 (1): 1-11, 2009; doi: 10.3923/jfas.2009.1.11)

Distribution of Fish Assemblages in Two Floodplain Lakes of North 24-Parganas in West Bengal, India

D.K. Mondal and A. Kaviraj

Assemblage of fish and their seasonal variation in two floodplain lakes in the Bongaon subdivision of the north 24-parganas district of West Bengal in India was investigated during the period 2004 to 2006. These lakes are locally called as baur. Forty nine species belonging to 23 families were recorded from these two bours. Cyprinidae was the most dominant family with eleven species. Overall species composition of the two bours almost resembled each other. But average number of species in a month significantly varied between the bours. Species richness and the total number of individuals caught per each sampling varied significantly between seasons. *Amblypharyngodon mola* (Cyprinidae) and *Gudusia chapra* (Clupeidae) were the most abundant among the eighteen frequently available species from these two bours. But more than fifty percent of the species were sparsely available. (*Journal of Fisheries and Aquatic Science* 4 (1): 12-21, 2009; doi: 10.3923/jfas.2009.12.21)

Increasing in Growth of *Rutilus frisii kutum* Larvae with Using Slurry (Fermented Organic Manure) in Yosefpoor Propagation and Rearing Center (Iran)

M. Fallahi Kapoorchali, S.M. Reza Fatemi, G. Vosoghy, M. Matinfar and M. Sharifian

The main objective of this study is to investigate the effect of slurry on larval growth in comparison with common methods; thus, cow manure was fermented under anaerobic conditions for 40 days. Then the following two treatments were examined: concentrated food as common method and slurry as the new method. To study, the two treatments and each with three replications, 6 ponds were selected, each measuring 1.7 ha with depth of 1.7 m. The larvae population density was 1.7 m ha^{-1} . The results showed that the mean weight and length, in slurry treatments were $77.16 \pm 25.3664 \text{ mg}$ and $22.03 \pm 2.31 \text{ mm}$ and in control treatment were $63.13 \pm 17.8552 \text{ mg}$ and $19.6 \pm 2.296 \text{ mm}$, respectively. Condition factor was found to be 0.9 for slurry and 0.8 for control treatment. During culture period some other factors such as DWG (Daily Weight Gain), DLG (Daily Length Gain), CF (Condition Factor) and SGR (Specific Growth factor Rate) were measured. In comparison with control group, all parameters had higher values in slurry treatment. The statistical analysis indicated that there is a significant difference ($p < 0.001$) for parameters of length and weight for both treatments in the first week of culture and also there was a significant difference ($p < 0.05$) for the items in the 2nd week too. The obtained results showed that the slurry, due to high concentration of nutrients, had more effect on growth and increased the abundance of zooplanktons, which are the main food of larvae in early stages of life cycle. (*Journal of Fisheries and Aquatic Science 4 (1): 22-31, 2009; doi: 10.3923/jfas.2009.22.31*)

Patterns of Reproduction and Spawning of the *Scomberomorus commerson* in the Coastal Waters of Iran

M.S. Sadeghi, F. Kaymaram, S. Jamili, M.R. Fatemi and M.S. Mortazavi

Patterns of reproduction and spawning were studied for the king fish (*Scomberomorus commerson*) in the Persian Gulf (Hormozgan province). During one year of sampling, 599 fish were collected from different landing sites along the Persian Gulf. Analysis of the reproductive stages and gonadosomatic index revealed a single yearly reproductive cycle beginning in March and ending with a single spawning period in August-September. The mean length at first

maturity (Lm 50%) for females was 75 cm. The sex ratio was M/F = 0.97 in the samples. (*Journal of Fisheries and Aquatic Science 4 (1): 32-40, 2009; doi: 10.3923/jfas.2009.32.40*)

The Influence of Photoperiod in Farming Beluga Sturgeon (*Huso huso*): Evaluation by Growth and Health Parameters in Serum

F. Askarian and A. Kousha

Data on the concentrations of some blood constituents of reared Beluga sturgeon, *Huso huso*, including Serum cortisol, glucose, triglyceride, cholesterol, osmolality, Na⁺, K⁺, Ca²⁺, ALP that reared under different light regimes were measured. The light regimes were consist of natural photoperiod (NP), continuous dark (0L:24D), continuous light (24L:0D) and long day regime (16L:8D) and tested on 4 group of 30 one year old reared Beluga for 6 month which sampled four times during the experiment. No significant difference in serum cortisol and ALP levels was found between treatments ($p > 0.05$). Elevations of serum cortisol, glucose, cholestrol and triglyceride concentrations were reported in continues dark regime. Increase of serum osmolality, Na⁺, K⁺ and decrease of Ca²⁺ were also associated with increase of cortisol levels. Results are compared with the few data available in condroestean fish and with those on teleosts. (*Journal of Fisheries and Aquatic Science 4 (1): 41-49, 2009; doi: 10.3923/jfas.2009.41.49*)

Preservative Effect of Quants Water to Reduce Lead Acetate Toxicity (LC₅₀, 96 h) on *Capoeta fusca*

Arash Omid, Sohrab Mazloomi and Homayoon Farhangfar

This study was conducted to determine the acute toxicity of lead acetate on *Capoeta fusca*. A total of 580 fishes with mean length of 12.28±0.14 cm and mean weight of 16.64±0.52 g. were divided into 15 control and treatment groups of fish. The fish were kept in 20 L aquariums and the procedure designed in static condition according to the Organization Economic Cooperation and Development (OECD) method. Mortality rate was recorded in 96 h and lead acetate LC₅₀ was calculated by standard statistical method. LC₅₀ of 10.992, 10.594, 9.338 and 7.575 mg L⁻¹ were determined at 24, 48, 72 and 96 h post exposing respectively. In addition, minimum and maximum lethal concentrations of lead were determined as 4 and 12.5 mg L⁻¹ and MAC was 0.7575 mg L⁻¹. Lead acetate in soft water (Hardness 10 mg L⁻¹) was highly toxic for fish but in hard water (Hardness:

310 mg L⁻¹) had a little toxicity. High trend of lead for interaction with minerals such as calcium and carbonates is the major reason of this phenomenon. Lead toxicity is decreased with increase of water hardness and this is the cause of fish tolerance against some heavy metals pollution in natural environment. Lead intoxicated fish showed abnormal behaviors, restless and rapid circling. (*Journal of Fisheries and Aquatic Science* 4 (1): 50-56, 2009; doi: 10.3923/jfas.2009.50.56)

Feeding and Spawning of *Sphyraena jello* in the North-West of Persian Gulf

S.A. Hosseini, S. Jamili, T. Valinassab, G. Vosoghi and S.M.R. Fatemi

This study, being conducted in 2006-2007, attempts to investigate its biological habit and characteristics in Iran's water of the Persian Gulf. For the sampling purpose, three major landings namely Bushehr, Deylam and Genaveh were selected to obtain samples from commercial catches. The sampling is composed of 655 males and 515 females during a twelve month period. By studying the feeding through the counting method, it is revealed that, *Liza subviridis* characterized by 42.8% and *Sepia pharaonis* by 8.4% made the highest and lowest stomach content, respectively. The findings showed that male fish in smaller size will mature sooner than females specimen but this sex ratio or proportion was not significantly different except during October and September. Such a difference between male and female in different months could be originated from longer residing of female group in spawning ground compared to male group. The earlier spawning lasted during September-October and there was a peak of spawning in feeding in August. The lowest fat proportion for both male and female genders was reported 0.10 and 0.11, respectively in October; but the highest level of condition factor was reported to be 0.59 and 0.63 during November and June. (*Journal of Fisheries and Aquatic Science* 4 (1): 57-62, 2009; doi: 10.3923/jfas.2009.57.62)

Detection of Genetic Variation in the Wild Populations of Indian Major Carps Using Random Amplified Polymorphic DNA Fingerprinting

Sameer R. Phale, Shivkumar Chauhan, Yogesh V. Bhute and Vidya V. Baile

Genetic variations in wild populations of Indian Major Carps (IMCs) from six geographically isolated locations of Central India Rivers were examined using

Randomly Amplified Polymorphic DNA (RAPD). Thirty six specimens of each species from each location were collected. Genomic DNA was isolated from the liver tissues. Out of twenty RAPD primers used, thirteen were found to be scorable on agarose gel, of which 83.33% were polymorphic for *Labeo rohita*, 80.0% for *Cirrhinus mrigala* and 75.0% for *Catla catla*. A total of 576 RAPD bands were amplified. Dendrogram generated for species-specific genetic evaluation revealed that *C. catla* was genetically dissimilar from *L. rohita* and *C. mrigala*. The present investigation is the first report on wild varieties of IMCs while the available data on farmed varieties suggest that *C. catla* and *C. mrigala* are more genetically similar to each other than to *L. rohita*. This study also revealed high intra-specific genetic variation in the wild populations of IMCs. To conclude, the present study suggest high levels of genetic variation and population differentiation required for dynamic evolution and RAPD assay therefore may have potential use for establishing genetic relationship, genome specificity and phylogeny among wild species of IMCs. (*Journal of Fisheries and Aquatic Science* 4 (1): 63-70, 2009; doi: 10.3923/jfas.2009.63.70)

Influence of 17-Alpha Methyl Testosterone on Masculinization and Growth in Tilapia (*Oreochromis mossambicus*)

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In the present study, effect of different dose rates of synthetic androgen 17-alpha Methyl Testosterone (MT) i.e., 50, 75 and 100 mg of hormone in per kg of feed, on sex reversal and growth performance of Mozambique tilapia was evaluated. MT was administrated orally by using pellet dry starter and Ethanol Alcohol, diet to tilapia fry for 21 days in glass aquaria. The fry were also kept for 2 weeks after feeding to monitor its growth performance. At the end of the experiment the sex ratio was determined by examining the gonads after dissecting the fish. Growth performance was monitored by recording the morphometric characteristics. Wet body weight and total length of fish on start of feeding end of feeding and two weeks after feeding were measured. The results of the present study showed that all MT receiving treatment showed a significantly higher male proportion than the control experiment. Dose rate of 75 mg kg⁻¹ MT of feed resulted in maximum male population (98.09%) with 1.91% sterilized fish. The dose rate of 75 mg kg⁻¹ MT gave the maximum gain in body weight i.e., 11.8 g, which is 1.2 times greater than the control. (*Journal of Fisheries and Aquatic Science* 4 (1): 71-74, 2009; doi: 10.3923/jfas.2009.71.74)

Trophic Seasonal Behavior of the Ichthyofauna of Camaronera Lagoon, Veracruz

Carbajal-Fajardo Zuleica Shareet, Franco-López Jonathan, Héctor Barrera Escorcia, Luis Gerardo Abarca Arenas, Carlos Bedia Sánchez, Ángel Moran Silva and Horacio Vázquez-López

The objective of this study was to analyze the seasonal behavior of the ichthyofauna, considering the trophic relationships between the species that live in Camaronera Lagoon, their food composition, diversity and trophic amplitude, as of the captures obtained in Camaronera Lagoon inlet during February-June, 2000. We realized seasonal tables of the fish species and items of identified foods. The data were grouped in diurnal and nocturnal samplings in order to know the abundance, specific richness, evenness and McNaughton's community dominance index. The amplitude of the niche was calculated as of Levin's standardized index. Costello's graphic method was used to evaluate the preference and feeding behavior of any given type. The families with more species were *Cichlidae*, *Eleotridae* and *Gobiidae*. The most representative species regarding biomass and abundance were *Gambusia affinis*, *Petenia splendida*, *Cathorops melanopus*, *Diapterus auratus* and *Bathygobius soporator*. (*Journal of Fisheries and Aquatic Science* 4 (2): 75-89, 2009; doi: 10.3923/jfas.2009.75.89)

Using Reefcheck Monitoring Database to Develop the Coral Reef Index of Biological Integrity

Hai Yen T Nguyen, Ole Pedersen, Kou Ikejima, Kengo Sunada and Satoru Oishi

The coral reef indices of biological integrity was constituted based on the reef check monitoring data. Seventy six minimally disturbed sites and 72 maximally disturbed sites in shallow water and 39 minimally disturbed sites and 37 maximally disturbed sites in deep water were classified based on the high-end and low-end percentages and ratios of hard coral, dead coral and fleshy algae. A total of 52 candidate metrics was identified and compiled. Eight and four metrics were finally selected to constitute the shallow and deep water coral reef indices respectively. The rating curve was applied for each metric to identify two lower a_i and upper b_i threshold values. A set of scores 1, 3 and 5 was used to score and narrate individual metric values. Each metric value at a site presented a poor, moderated or good condition of reefs. The index was calculated by averaging all

selected metric scores. The overall site classification efficiencies were of 65.97 and 66.13% for shallow and deep waters, respectively. Importantly, the strong negative correlation between indices and dynamite fishing -0.286 ($p < 0.01$) and number of yacht within 1 km -0.185 ($p < 0.05$) in shallow water and with poison fishing -0.279 ($p < 0.05$) and coral damaged by other factors -0.283 ($p < 0.05$) in deep water indicated that coral reef indices were sensitive responses to stressors and can be capable to use as the coral reef biological monitoring tool. (*Journal of Fisheries and Aquatic Science* 4 (2): 90-102, 2009; doi: 10.3923/jfas.2009.90.102)

Evaluation of Antifungal Activity of New Combined Essential Oils in Comparison with Malachite Green on Hatching Rate in Rainbow Trout (*Oncorhynchus mykiss*) Eggs

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The aim of this study was introducing a new herbal constitution for malachite green in hatcheries. In this study, antifungal activities of a new Combination of Essential Oils (CEO) from the herbs; *Thymus vulgaris*, *Salvia officinalis*, *Eucalyptus globulus* and *Mentha piperita* in *Oncorhynchus mykiss* eggs and its effects on hatching rate in comparison with malachite green (a specific treatment for the control of saprolegniasis) were studied. After fertilization, eggs were transferred to incubators and then treated with five concentration of the combined essential oils with concentrations: 10, 50, 100, 150 and 200 ppm, respectively and malachite green (1 ppm) using constant flow treatment method for incubation period. One incubator was as control without any treatment The water quality factors were controlled over the study period. In the end of hatching rate, the mold infection and hatching rate were calculated. The hatching percentage in five treatment groups of CEO were 69.99% at 10 ppm, 63.61% at 50 ppm, 62.1% at 100 ppm, 60.53% at 150 ppm, 54.63% at 200 ppm, 60%. 83 at 1 ppm of malachite green group and 53.48% in control group, respectively. The results revealed significant antifungal effects of the combined essential oils in comparison with malachite green on fish eggs so that it could decrease mold infection and increase hatching rate on concentration 10 ppm ($p < 0.05$). This indicated that this combination of essential oils may be a promising antifungal agent in aquaculture. (*Journal of Fisheries and Aquatic Science* 4 (2): 103-110, 2009; doi: 10.3923/jfas.2009.103.110)

Length-Weight Relationship of *Sphyraena obtusata* Cuvier, 1829 (Pisces: Perciformes) from the Jaffna Lagoon, Sri Lanka

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The present study was carried out to gain some knowledge on length-weight relationship parameters, growth pattern and difference between the growth parameters of male and female *Sphyraena obtusata*. The knowledge of length-weight relationship has numerous practical applications in fishery biology. Such a mathematical equation enables conversion of one parameter in to another as is often required during monitoring field measurements. Length-weight regression equations were derived for male and female *Sphyraena obtusata* collected from the Jaffna lagoon, Sri Lanka. Regression coefficients were estimated by using the logarithms of the total lengths and the corresponding weights. The curvilinear relationships of length-weight relationships for male and female were $W = 0.0117 * L^{2.898}$ and $W = 0.0138 * L^{2.843}$, respectively. Covariance analysis for length-weight relationships of males and females revealed that there is no significant difference ($p > 0.05$) between male and female and hence a common formulae of $W = 0.0133 * TL^{2.857}$ was derived for *S. obtusata*. The 'b' values 2.898 and 2.843 obtained for male and female, respectively indicate that the fish follows the cube law and its growth is negative allometry. (*Journal of Fisheries and Aquatic Science* 4 (2): 111-116, 2009; doi: 10.3923/jfas.2009.111.116)

Effect of Rearing Systems (Mono- and Poly-Culture) on the Performance of Freshwater Prawn (*M. rosenbergii*) Juveniles

M.S. El-Sherif and A.M. Ali Mervat

This study was carried out to investigate the effect of mono and polyculture of freshwater prawn with Nile tilapia fry on growth performance and survival rate. Freshwater prawn-juveniles, (*M. rosenbergii*) averaging (0.30±0.02 g) in weight [Trial 1 (monoculture)] were cultured for 90 days, with different stocking densities (50, 100, 150 and 200 prawn m⁻²) using 12 circular fiberglass tanks (0.36 m² and 0.6 m in water depth). Prawns were fed manufactured diet contained 35% protein. Water exchange occurred daily with 20% of water size. Growth measurements of prawn were recorded at 15 days intervals. The results showed that growth performance was significantly ($p \leq 0.05$) decreased with increasing the stocking density. Survival rate was inversely related to stocking density, since there were significant differences among the four densities, while the difference between stocking density of 50 and 100 prawn m⁻² was not significant. The food

conversion ratio FCR increased with increasing the stocking densities, since the fourth density (200 prawn m^{-2}) was significantly higher than that achieved in the first one (50 prawn m^{-2}). Prawn juveniles, of average weight 0.30 ± 0.02 g [Trial 2 (Poly culture)] were stocked (as declared in Trial 1) in poly culture with Nile tilapia fry (average weight 0.3 ± 0.03 g) at stocking density 12 fish per m^2 for each treatment, for 90 days. Growth measurements of prawns and fish were recorded at 15 days intervals. Results showed that growth performance for fish and prawn were significantly ($p \leq 0.05$) decreased with increasing of the stocking density of prawn. Survival rate was inversely related to stocking densities, since, there were significant differences among the four treatments. Also, the food conversion ratio FCR for fish and prawn increased with increasing stocking density, since, the differences were significant among the four stocking densities. Therefore, polyculture system is more suitable at stocking density of 100% prawn m^{-2} for optimum growth and survival rate than of monoculture. (*Journal of Fisheries and Aquatic Science* 4 (3): 117-128, 2009; doi: 10.3923/jfas.2009.117.128)

Causes and Mitigations on Trap Ghost Fishing in Oman: Scientific Approach to Local Fishers' Perception

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This study aims to investigate the ghost fishing problem in Sultanate of Oman. The questionnaire survey on trap ghost fishing in Oman provided information on rates of trap loss, the financial cost to fishers, the cause of trap loss and the circumstances leading to non recovery of fish traps. Each trap fisher in the Omani fishery owned and fished on average 20.4 traps per fishing day and each trap had a mean useful lifetime of 5.7 months. The study revealed that a total of 15,390 traps or 18 traps per fisher are lost every year in the study area. Once lost, these traps remain functional and on average continue to ghost fish for a period of 3.1 months per year. The three main causes of trap loss were gear interference, theft and/or vandalism, and collisions with boats and ships. Economic losses resulting from ghost fishing by traps was estimated to be 1,011,594 O.R. (US\$ 2.63 million), equivalent to 2.1% of the total landing value of the Omani fishery in 2006. To reduce ghost fishing it is recommended that traps be better marked, that they be equipped with timed-release or degradable sections or panels, and that openings be included in the traps for the release of sub legal size fish. Conflicts with other fishing vessels and other types of gear could be reduced by implementing a zonation policy. (*Journal of Fisheries and Aquatic Science* 4 (3): 129-135, 2009; doi: 10.3923/jfas.2009.129.135)

The Fluctuation of Coralline Fish Larvae of Khark and Kharko (Persian Gulf)

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This study was undertaken due to identification, abundance and diversity, temporal and spatial fluctuation of coralline fish larvae in Khark and Kharko Islands water. Khark and Kharko Islands are the last Northern point for fringing coral reefs in Iranian side of the Persian Gulf. These Coralline habitats are the Protected Area and Wildlife Refugees with the total area of 2400 ha which located in the territory of Bushehr Province. This research carried out during 2006-2007 with monthly sampling from 9 stations, which selected around Islands inshore waters with maximum depth of 20 m. Sampling was conducted using by Bongo-Net plankton sampler with 500 μ of mesh size. Totally 494 specimens from: 22 coralline fish larva families were identified in studied area, such as pelagic and demersal fishes. The results was shown that coral reef diversity in coral reefs (Khark and Kharko Islands) is more than other habitats such as estuary and river mouth, creeks, mangrove forest sites and off shore water of the Persian Gulf and Oman Sea Iranian side. The pick of fish larvae abundance family were estimated in spring. (*Journal of Fisheries and Aquatic Science* 4 (3): 136-142, 2009; doi: 10.3923/jfas.2009.136.142)

Reproductive Biology of the Japanese Threadfin Bream, *Nemipterus japonicus*, in the Northern of Persian Gulf

M. Kerdgari, T. Valinassab, S. Jamili, M.R. Fatemi and F. Kaymaram

Since the *N. japonicus* comprises the most abundant commercial fish in the Persian Gulf, an evaluation of the stock status of this species is needed. Reproductive biology of *Nemipterus japonicus* in the northern part of Persian Gulf is described, based on 595 specimens collected between November 2006 and October 2007. Length range of females was 11.0-26.3 cm FL and their weight range was 21.7-325.65 g. Males ranged from 9.4-27.3 cm FL and 14.04-351.89 g in weight. The relationship between Body Weight (BW) and Fork Length (FL) for all individuals was estimated as $BW = 0.0181 \times FL^{3.0001}$ ($r^2 = 0.9797$, $n = 503$). The overall sex ratio was estimated as M: F = 1.0: 2.6. The length at 50% maturity was estimated to be 19.1 cm for females and 19.6 cm for males. The smallest size at first maturity was 9.4 cm for males and 11.0 cm for females. The spawning behavior was investigated based on macroscopic observations of gonads and determination of gonadosomatic index.

The maximum GSI values were recorded in April (2.70%) and September (0.45%) for females and males, respectively. Spawning occurs in spring and autumn seasons. (*Journal of Fisheries and Aquatic Science* 4 (3): 143-149, 2009; **doi**: 10.3923/jfas.2009.143.149)

Effects of Pollutants on Some Aquatic Organisms in Tamsah Lake in Egypt

M.S. El-Sherif, M.T. Ahmed, M.A. El-Danasoury and Nagwa H.K. El-Nwishy

Tamsah lake is considered one of the wild life features in Egypt in general and in the Suez Canal region in particular. Through field experiment, concentrations of some pesticides which are used around the area, were monitored in the tissues of some birds of prey (wild birds), some species of algae, fish and crustaceans. The results obtained revealed: (1) The presence of some Organochlorines (OC) in the tissues of many of the tested birds represented in (DDE, Heptachlore, HCH, Dicofole). (2) The presence of high residues of Organophosphorus (OP) pesticides represented in malathion and diazinon in most of the tested birds. But they were not detected with high levels in any of fish, crustaceans or algae. (3) The presence of high concentrations of (OC) compounds in the tissues of algae, crab, mullet and some birds (moorhen-cormorant and gulls). Meanwhile, none of those compounds was detected in the water samples. (4) The presence of high levels of all detected pesticides in the tissues of crab makes it the very acceptable bioindicator to mirror the pollution of the lake, then followed by algae. (5) Pollutants can be transferred through the food chain which causes biomagnification of them in the bodies of the higher organisms in the food chain. It could be concluded that implementation of the environmental management practices in Lake Tamsah is still needed to protect these ecosystems from more pollutions which could affect human health and environment. (*Journal of Fisheries and Aquatic Science* 4 (3): 150-160, 2009; **doi**: 10.3923/jfas.2009.150.160)

Population Genetic Structure of Pikeperch (*Sander lucioperca* Linnaeus, 1758) in the Southwest Caspian Sea Using Microsatellite Markers

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The aims of this study were to analysis the population genetic structure and genetic diversity among and between populations of *Sander lucioperca* based on microsatellite markers. For this purpose, 149 samples of adult pikeperch from

three regions of Southwest Caspian Sea (Talesh Coasts, Anzali Wetland and Chaboksar Coasts) were collected. DNA was extracted and using 13 pairs of microsatellite primers, Polymerase Chain Reaction (PCR) was conducted. DNA bands were analysed using Biocapt and GenAlex software package. Out of 13 microsatellite primers, 11 loci were produced, in which 6 of them were polymorphic and 5 monomorphic. Analysis revealed that the average number of alleles per locus and observed heterozygosities were not statistically significant ($p > 0.05$) for all 3 populations. The F_{ST} value between populations was low but significant ($p < 0.01$), suggesting that the 3 populations are genetically differentiated. Deviation from Hardy-Weinberg equilibrium was obvious in most cases, mostly due to the deficiency of heterozygosities. The highest genetic distance was between Anzali Wetland and Chaboksar Coast populations. The data generated in this study provide useful information on the genetic variation and differentiation in populations of Southwest Caspian Sea pikeperch. (*Journal of Fisheries and Aquatic Science* 4 (3) 161- 168, 2009; **doi:** 10.3923/jfas.2009.161.168)

Evaluation of Diazinon Toxicity on Nile Tilapia Fish (*O. niloticus*)

M.S. El-Sherif, M.T. Ahmed, M.A. El-Danasoury and Nagwa H.K. El-Nwishy

Diazinon was used in the laboratorial study to investigate its biochemical effect on tilapia as it is the most popular fish in Egypt. Two hundred and twenty appeared 40 ± 2 g adult male Nile tilapia were reared in glass aquaria of 60 L capacity, provided with a good air supply and dechlorinated tap water, Fish were maintained under suitable condition for the fish growth. Results of the study are summarized as follow: (1) The bioassay test revealed that the LC_{50} for tilapia after 96 h of exposure was 2.8 ppm, (2) Fish was very excited after being exposed to lethal concentrations of diazinon (5, 10, 200 ppm) for 96 h. Meanwhile, fish exposed to sublethal concentrations of diazinon for 30 days didn't cause mortality to fish and (3) Exposing fish to 0.28 and 1.87 ppm for 30 days caused the following changes: (A) A reduction in total protein content in muscles up to 13.69 and 21.5% for 0.28 and 1.87 ppm, respectively, (B) A reduction in total protein content in blood serum up to 22.23 and 24.32% for 0.28 and 1.87 ppm, respectively and (c) 52, 27 and 6.8 kDa proteins were not scanned in the treated or the recovered samples in both treatments, a slight reduction in the 33.55, 31.72, 24.31 and 20.8 kDa proteins in both treatments, (4) Exposing the treated fish to 7 days of recovery in un poisoned water caused the following changes: (A) A recovery in total protein content in muscles up to 95.59 and 90.58% for 0.28 and 1.87 ppm, respectively, (B) A recovery in total protein content in blood serum up

to 89.36 and 95.14% for 0.28 and 1.87 ppm, respectively and (C) 52.27 and 6.8 kDa proteins were still not scanned after recovery of both treatments. A slight increase in the rest of affected proteins after recovery of both treatments was recorded. Therefore, it can be emphasized for good environmental administration of the water bodies to save human health and environment from the dangerous pesticides. (*Journal of Fisheries and Aquatic Science* 4 (4): 169-177, 2009; doi: 10.3923/jfas.2009.169.177)

Protective Effect of Antioxidant Medicinal Herbs, Rosemary and Parsley, on Subacute Aflatoxicosis in *Oreochromis niloticus*

Manal Ibrahim El-Barbary and Ahmed Ismail Mehrim

The object of this study was to conduct the ability of two medicinal herbs, namely rosemary and parsley, for amelioration of aflatoxicosis in *Oreochromis niloticus*. Two herbs' extracts at three concentrations of either (0, 2 and 4 g kg⁻¹ b.wt. divided into 2 doses at the start and the 6th day of the experiment) and three concentrations of aflatoxin B₁, (AFB₁ 0, 9 and 18 mg kg⁻¹ b.wt. as a single intraperitoneal administration) were tested either individually or in combination. The herbs and AFB₁ were dissolved in Dimethylsulphoxide (DMSO 25%) and injected to fish groups. Sixteen groups of fish were investigated in this study, where A group (control) was injected with saline 0.89%, group B injected with DMSO (control solvent), groups F₁ and F₂ were injected with AFB₁ alone (9 and 18 mg kg⁻¹ b. wt., respectively), R₁ and R₂ groups were injected with rosemary alone (2 and 4 g kg⁻¹ b. wt., respectively), groups F₁R₁, F₁R₂, F₂R₁ and F₂R₂ were injected with AFB₁ + rosemary, while groups P₁ and P₂ were injected with parsley alone (2 and 4 g kg⁻¹ b. wt., respectively); however, F₁P₁, F₁P₂, F₂P₁ and F₂P₂ groups were injected with AFB₁ + parsley. At the 12th day of the experiment, blood and liver samples were taken from each group. The results indicated that the AFB₁ injected groups revealed a significant increase in mortality rate (MR%) compared with AFB₁-not injected, group F₂ was the highest while F₁R₁ and F₁P₁ were the lowest in MR% among all AFB₁ injected fish groups. Also, AFB₁ led to reduction of haemoglobin (Hb), total protein (TP) and globulin (GL) concentrations and increase in activity of aspartate aminotransferase (AST) and alanine aminotransferase (ALT). These alterations were significantly ameliorated when fish were injected with herbs' extracts. AFB₁ residues showed that the herbs level of 2 g kg⁻¹ b.wt. have higher potency of reducing the AFB₁ residues than the level of 4 g kg⁻¹ b.wt. in case of AFB₁ level 9 mg kg⁻¹ b.wt. While, in case of AFB₁ level 18 mg kg⁻¹ b.wt., the groups F₂ and F₂P₁ showed absence of AFB₁ residues. Microscopically, AFB₁ presented histopathological changes in

hepatopancrease which increased in severity with increasing AFB₁ level. These lesions may become less severer in all fish groups injected with AFB₁ combined with herbs' extracts especially with the lowest levels of herbs' extracts and AFB₁. So, this study concluded that either of rosemary or parsley was found to be safe and successful in protection from aflatoxicosis, particularly at the low level. (*Journal of Fisheries and Aquatic Science* 4 (4): 178-190, 2009; *doi: 10.3923/jfas.2009.178.190*)

Accumulation of Lipofuscin and Preliminary Estimation of Age-Structure in Wild Mud Crab (*Scylla paramamosain*) Population in Tropical Mangrove Swamps, Thailand

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The age structure of wild mud crab (*Scylla paramamosain*) was explored using autofluorescent age pigment, lipofuscin. Samples were collected from the mangrove swamp area in Pak Phanang mangrove swamps, Thailand. The carapace width-frequency distribution did not show any distinct modes of the sample population, whereas lipofuscin concentration showed positive correlation with carapace width. Lipofuscin concentration in the Olfactory Lobe Cell Mass (OLCM) of the brain was measured using image analysis of fluorescent micrographs. The lipofuscin concentration (% of area fraction) ranged from 0.06 to 0.26 with the formation of three regularly-spaced modes developed by modal analysis that could be regarded as distinct age classes. Strong correlation was found between lipofuscin concentration and modes observed in the lipofuscin concentration histogram ($R^2 = 0.99$) and the lipofuscin accumulation rate was almost constant (0.08% of area fraction) in each year. Although, existence of wide size ranged population in a lipofuscin concentration mode, the analysis suggested that *S. paramamosain* live in the mangrove ecosystem at best of 2⁺ year class. (*Journal of Fisheries and Aquatic Science* 4 (4): 191-202, 2009; *doi: 10.3923/jfas.2009.191.202*)

Effects of Different Protein and Energy Levels on Growth Performance of Caspian Brown Trout, *Salmo trutta caspius* (Kessler, 1877)

Hamid Ramezani

The objective of this study is to assess the effects of protein and energy levels of diet on fish performance and growth efficiency of Caspian brown trout in order to

develop optimum protein and energy level during the preparation of diet for this species. Fish were fed with six experimental diets containing three protein levels (45, 50 and 55%) and two energy levels (3.5 and 4 kcal g⁻¹) according to a 3×2 factorial design. The diet was assigned to 18 tanks with 50 fish each, with three replicates for each diet. The experiment was conducted for 8 weeks with Caspian brown trout with an initial body weight of around 7 g. Protein content of diet influenced feed conversion ratio ($p < 0.05$) and specific growth rate statistically ($p = 0.052$). Caspian brown trout demonstrated a better feed conversion ratio and a larger specific growth rate at lower protein levels (45 and 50%) in comparison to high protein level (55%). Protein efficiency ratio improved by a decrease in protein content of the diet ($p < 0.05$), but energy content of diets does not affect any growth related parameter such as feed conversion ratio, specific growth rate and protein efficiency ratio. There was also no interaction between protein and energy levels in the growth related parameters, suggesting the effect of protein on the growth parameters in Caspian brown trout did not depend on energy levels of diet. In conclusion diet containing 50% protein can support the maximum growth and protein sparing by the use of high-energy diet did not occurred in this study. (*Journal of Fisheries and Aquatic Science* 4 (4): 203-209, 2009; doi: 10.3923/jfas.2009.203.209)

First Remarks on Abalone Biology (*Haliotis pustulata*) on the Northern Coast of Aden Gulf, Yemen

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Abalone has been exploited by humans around the ocean coasts of the world. On contrary, it is still neglected in the Gulf of Aden. This study is a first attempt to explore the biological and ecological status of the absolutely unexploited abalone *Haliotis pustulata* in the Aden Gulf, Yemen. Between Jan 2004 and June 2006, about 700 abalones were collected and analyzed from Intertidal and sublittoral zones along 6 sites of Hadhramout coast. It is revealed that the studied species is relatively small, measuring up to 62 mm, with a slow growth rate of 4-10 mm year⁻¹ and has moderate fertility compared with many other species in other localities. The highest GSI as well as the highest proportion of mature Sufaylah were prevailed from March to May. Morphological traits, spread, age-size structure and reproduction behavior are discussed in the light of the absence of local similitude studies and well documented world wide haliotids. Results call for necessity of more detailed studies. (*Journal of Fisheries and Aquatic Science* 4 (5): 210-227, 2009; doi: 10.3923/jfas.2009.210.227)

Calcium Pre-Exposure Reducing Histopathological Alteration in Nile Tilapia (*Oreochromis niloticus*) After Lead Exposure

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This study was evaluated the influence of calcium to reduce the toxicity of sub-lethal lead concentration in Nile tilapia with emphasis on histopathological analysis. The values of 24, 48, 72 and 96 h LC₅₀ of lead to tilapia were 247.51, 197.47, 183.74 and 182.38 mg L⁻¹, respectively. Fish were pre-exposed to vary dosages of calcium carbonate: 0 (G1 and G2); 20 (G3 and G4) and 60 (G5 and G6) mg L⁻¹ for 4 days. After that, fish were post-exposed to 45 mg L⁻¹ lead, which correspond to 25% of the 96 h LC₅₀ (G2, G4 and G6) for 96 h. Histopathological changes were especially most evident in the group (G2) exposed to lead without calcium pre-exposure. The gills were observed edema, lamellar cell hyperplasia, epithelial lifting, lamellar fusion and aneurysm. There were blood congestion in sinusoids, vacuolation of hepatocytes and necrosis. Glomerulus's atrophy, tubular swelling and also necrosis were seen. However, the only observable lesion in the muscle was the infiltration of inflammatory cells and there were no histopathological changes observed in the brain and intestine of the lead treated fish. Fish with pre-exposed calcium (G4 and G6) showed slightly alteration when compare the only lead treatment groups. The results suggested that calcium pre-exposure may play an important role in the reduction of lead toxicity in fish. (*Journal of Fisheries and Aquatic Science* 4 (5): 228-237, 2009; *doi: 10.3923/jfas.2009.228.237*)

Response to Increased Sediment Load by Three Coral Species from the Gulf of Suez (Red Sea)

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This study examines the hypothesis that sedimentation, as a result of anthropogenic activities, has a measurable effect on the growth rate (in terms of linear extension) of branching corals of a subtropical site in the northern Gulf of Suez. Three of the dominant branching coral species; *Stylophora pistillata* (Esper) 1792, *Acropora pharaonis* (Milne Edwards and Haime) 1860 and *A. hemprichi* (Ehrenberg) 1834 were chosen for monitoring their growth rate after the cessation of construction works. At the beginning of the study, the three study species had very low rates of growth in response to increased sediment load. Over time sedimentation rates decreased significantly while linear extension rate per branch of the three study species showed a significant gradual increase. The study

reaches the conclusion that coral growth is negatively related to sedimentation. (*Journal of Fisheries and Aquatic Science* 4 (5): 238-245, 2009; doi: 10.3923/jfas.2009.238.245)

Hematological Parameters and Erythrocyte Osmotic Fragility in Rainbow Trout, *Oncorhynchus mykiss*, Experimentally Infected with *Pseudomonas putida*

S. Bektas and O. Ayik

In the present study, selected hematological and osmotic fragility values in rainbow trout, following experimental *Pseudomonas putida* infection have been described. Blood samples were collected at day, 1, 3, 7, 14 and 21 post inoculation and examined for the above parameters. Erythrocyte values were significantly decreased at all days. Hematocrit values at day 14 was significantly higher than other days. Hemoglobin values revealed significant decrease from day first onwards. Among red blood cell indices, MCV were found significantly higher from day 1 to 21. Significant decrease in MCHC were also reported. MCH remain unchanged in all days examined. Leukocyte values at day 21 were significantly higher than at day 7. In addition, thrombocytes values at day 21 were significantly higher than at day 7 and 14 . On the other hand, erythrocyte osmotic fragility values were significantly increased at day 14 and 21 post infection. Interpreted hematological data in the present study, can be used to assess an abnormality or disease process in pseudomonas infected rainbow trout. (*Journal of Fisheries and Aquatic Science* 4 (5): 246-253, 2009; doi: 10.3923/jfas.2009.246.253)

Effects of Pre-Drying on Quality of Fried Breaded Black Pomfret (*Parastromateus niger*) Fillet

Y. Moradi, J. Baker, Y. Che Man and S. Kharidah

The objective of this study was to investigate the effects of pre-drying process on quality of fried breaded fish fillets. For this study, breaded black pomfret (*Parastromateus niger*) fillets were pre-dried in conventional oven at 180°C for 0, 30, 60, 90 and 120 sec. The pre-dried fillets were pre-fried in sunflower oil and stored at -20°C for 1 week. They were then finally cooked in the combination oven. Fat, moisture, texture and color of the cooked fillets were evaluated. Results indicated that moisture loss and the fat uptake of cooked fillets decreased with

increasing pre-drying time. Instrumental texture analysis showed that hardness of the pre-dried samples increased as compared to the control. Results from color evaluation showed that the b^* (yellowness) values of the samples increased, while L^* (whiteness) and a^* (redness) values did not change significantly ($p < 0.05$). The best quality product was prepared when 90 sec pre-drying time was applied. (*Journal of Fisheries and Aquatic Science* 4 (5): 254-260, 2009; doi: 10.3923/jfas.2009.254.260)

Effect of Dietary Supplementation of Biogen® (Commercial Probiotic) on Mono-Sex Nile tilapia *Oreochromis niloticus* under Different Stocking Densities

A.I. Mehrim

The present study was carried out to evaluate the effects of dietary supplementation of a commercial probiotic Biogen® on growth performance, carcass composition, blood hematological and biochemical parameters, histometric characteristics of fish dorsal muscles and economic efficiency of mono-sex Nile tilapia *Oreochromis niloticus* under different stocking densities. Therefore, fish with similar body weight (12.71 ± 0.17 g) were distributed randomly into seven treatments at different stocking densities, being 10 fish m^{-3} which fed a basal diet without Biogen® (T_1), 10 fish m^{-3} (T_2), 20 fish m^{-3} (T_3), 30 fish m^{-3} (T_4), 40 fish m^{-3} (T_5), 50 fish m^{-3} (T_6) and 60 fish m^{-3} (T_7), which were fed the basal diet but supplemented with 3 g Biogen® kg^{-1} diet for 14 weeks. The obtained results indicated that T_4 was the best treatment which realized significantly ($p \leq 0.05$) increases of all growth performance parameters (final weight, AWG, ADG and SGR), hematological parameters (hemoglobin, RBCs count, PCV, blood platelets and WBCs count), plasma proteins (total protein, albumin, globulin and albumin/globulin ratio), improved FCR, blood indices (MCV, MCH and MCHC), differentiation of leukocytes, carcass composition, histometric characteristics of fish dorsal muscles and best economic efficiency. There were no adverse effects on water quality criteria among all experimental treatments. Consequently, from the obtained results, it could be concluded that the inclusion of the commercial probiotic Biogen® at a level of 3 g kg^{-1} diet at stocking density rate of 30 fish m^{-3} of mono-sex Nile tilapia *O. niloticus* is useful to get the best fish performance with friendly effects on the environment. (*Journal of Fisheries and Aquatic Science* 4 (6): 261-273, 2009; doi: 10.3923/jfas.2009.261.273)

The Use of Stable Isotopes and Stomach Contents to Identify Dietary Components of the Spotted Rose Snapper, *Lutjanus guttatus* (Steindachner, 1869), off the Eastern Coast of the Southern Gulf of California

Arturo Tripp-Valdez and Francisco Arreguín-Sánchez

The food habits of the spotted rose snapper, *Lutjanus guttatus* (Steindachner, 1869), living off of the Eastern coast of the Southern Gulf of California (off the coast of Nayarit) are described based on their stomach contents and isotopic analysis. Fish were collected from the bycatch of shrimp trawling during the 2005-2007 shrimp fishing seasons. Twenty-six taxa were identified in the stomach contents and the geometric importance index suggested xanthid crabs and engraulidae fish are the most important species in the *L. guttatus* diet. Isotopic analysis and mixing models also led to the identification of crustaceans as important species in diets, but fish were considered only as secondary prey in these models. Notably, the diet and trophic level of the spotted rose snapper tend to change as it matures; young fish mainly feed on crustaceans, while larger *L. guttatus* can incorporate fish into their diets. Furthermore, Morisita-Horn index suggests that there are significant differences between the diets of juvenile and adult fish. The estimates of the trophic level for *L. guttatus* from stomach contents ($TL_{sc} = 3.7$) and isotopic analysis ($TL_{iso} = 3.5$) are very similar. (*Journal of Fisheries and Aquatic Science* 4 (6): 274-284, 2009; doi: 10.3923/jfas.2009.274.284)

Median Lethal Concentration (LC₅₀) for Suspended Sediments in Two Sturgeon Species, *Acipenser persicus* and *Acipenser stellatus* Fingerlings

M.Y. Garakouei, Z. Pajand, M. Tatina and H. Khara

Median lethal concentration (LC₅₀) of suspended sediments in the Sepidrud River on two sturgeon species *Acipenser persicus* and *Acipenser stellatus* were determined to provide reliable criteria and guidelines for the protection of aquatic resources. Static bioassays were performed for 24 and 96 h periods on *A. persicus* and *A. stellatus* one control was used for *A. persicus*. Three replicates were used for each trial. Ten fish were stocked in each aquarium (35×30×35 cm²) containing 30 L of water. pH, dissolved oxygen concentration and water temperature was measured and recorded throughout the experimental period. The LC₅₀ for 24 and 96 h for median lethal concentration were determined

following Probit analysis. The LC_{50} for 24 and 96 h for suspended sediments was 46294 and 8539 $mg L^{-1}$ in *A. stellatus* fingerlings, respectively. However, *A. persicus* fingerlings showed higher tolerance and median lethal concentration for suspended sediments but this species LC_{50} was 15367 $mg L^{-1}$ for 96 h and 60802 $mg L^{-1}$ for 24 h. (*Journal of Fisheries and Aquatic Science* 4 (6): 285-295, 2009; doi: 10.3923/jfas.2009.285.295)

Stability of Effective *Edwardsiella tarda* Vaccine Developed for Japanese Eel (*Anguilla japonica*)

Md. Mer Mosharraf Hossain and Kenji Kawai

This study aimed to design to evaluate the immunogenicity as well as the stability of inactivated bacterins in storage conditions to prevent edwardsiellosis in fish species. Three vaccine formulations, formalin (0.4%, FKC), pressure (600 $kgf cm^{-2}$ for 5 min, PKC) and electric current (100 mA at 12v DC for 5 sec, ECKC) killed bacterin and a routes of administration with intraperitoneal injection (i.p.) was tested. The effectiveness of the immunization strategies was evaluated in terms of Relative Percent Survival (RPS) and antibody levels. On the basis of the results pressure inactivated vaccine via i.p. which confers RPS values over 85% at least 6 months post-vaccination. In the search for a more stable bacterin, inactivated *E. tarda* antigen was subjected to different storage temperatures. Storage at 4°C did not significantly affect the titer of PKC and antigenic potency remained stable for 6 month. However, with the bacterins FKC and ECKC there is a considerable loss of potency during stored at 4°C. Bacterins were discarded if exposed to temperature of 0°C or below, because the precise freezing point is not established. Bacterins loosed significant potency after 1 month when stored at 25°C. (*Journal of Fisheries and Aquatic Science* 4 (6): 296-305, 2009; doi: 10.3923/jfas.2009.296.305)

The Relation Between Egg Viability, Selected Aspects of Egg and Ovarian Fluid Composition and Time of Stripping in Endangered Caspian Brown Trout (*Salmo trutta caspius*)

M. Bahrekazemi, A. Matinfar, M. Soltani, B. Abtahi, I. Pusti and A. Mohagheghi

The effects of egg retention time in the abdominal cavity after ovulation on egg viability were studied in Caspian brown trout (*Salmo trutta caspius*). Eggs were retained in the parental abdominal cavity for 40 days post ovulation. Partial volumes of eggs stripped from 10 individually identified females and fertilized with

fresh semen obtained from 8 males at 10 days intervals for 4 stages. The biochemistry of the eggs and ovarian fluid were studied to investigate possible links with post-ovulatory oocyte aging. The eyeing and hatching rate of the eggs declined with over-ripening time: that is, the expected amounts ($90.60 \pm 6.28\%$ for eyeing and $86.33 \pm 6.82\%$ for hatching) in newly ovulated eggs (0-10 days post ovulation) decreased to $0.67 \pm 1.34\%$ and $0.49 \pm 0.98\%$, respectively, in over-ripened eggs (30-40 days post ovulation). However, larval abnormalities remained constant for 30 days after ovulation. Over the course of post-ovulation oocyte aging, the pH of the ovarian fluid significantly decreased and the concentration of glucose, protein, calcium, iron and aspartate aminotransferase activity significantly increased. Moreover, the concentration of protein, triglycerides and aspartate aminotransferase activity in the eggs also changed. The present study demonstrated that the best time to take Caspian brown trout eggs after ovulation at $7 \pm 0.6^\circ\text{C}$ was up to 10 days post ovulation. Also, egg viability was related to both ovarian fluid parameters (e.g., pH, protein, aspartate aminotransferase, glucose, cholesterol, triglycerides, iron, calcium) and egg parameters (e.g., cholesterol, triglycerides, iron, aspartate aminotransferase) which can be used to detect egg quality defects associated with oocyte post-ovulatory aging. (*Journal of Fisheries and Aquatic Science* 4 (6): 306-315, 2009; doi: 10.3923/jfas.2009.306.315)

Population Genetic Study of *Rutilus frisii kutum* (Kamansky 1901) from the Caspian Sea; Iran and Azerbaijan Regions, using Microsatellite Markers

L.S. Kavan, S.R. Gilkolaei, G. Vossoughi, S.M.R. Fatemi, R. Safari and S. Jamili

The genetic diversity and population structure of *Rutilus frisii kutum* from three regions in the Iranian coastline and one region from Azerbaijan were investigated using microsatellite DNA markers. Genomic DNA from 140 specimens was extracted and using PCR approach nine loci with reasonable polymorphism were amplified. The results showed that the lowest mean number of alleles per locus (5.22) was observed in Tonekabon River and the highest (5.77) in Azerbaijan population. The observed heterozygosity in the Tonekabon River (0.625) population was higher than those of the other two populations in Iran and Azerbaijan population (0.473). Significant deviations from HWE were found at more loci in the Iranian populations than Azeri population. In spite of geographical distance, both the highest and lowest population differentiation (F_{st}) value was between Iranian populations not among the Iranian and Azerbaijan populations. The highest and significant was between Khoshkrud and Tonekabon (0.098) and

the lowest and significant was between Khoshkrud and Gorganrud (0.062). The genetic distance was the lowest (0.27) between the Khoshkrud and Gorganrud populations, whereas the highest distance (0.493) was between Khoshkrud and Tonekabon River. The AMOVA analysis with consideration of 2 sampling regions (Iran and Azerbaijan) and 4 sampling locations (Iran: Khoshkrud, Tonekabon, Gorganrud and Azerbaijan: the Kura mouth) revealed that almost all of the variance in data namely 86% ($p = 0.01$) was within locations, genetic variances among locations was 12% ($p = 0.01$) and among regions was 2% ($p = 0.01$). The reported results could be of interest for management and conservation programmes of this species in the Caspian Sea. (*Journal of Fisheries and Aquatic Science* 4 (6): 316-322, 2009; doi: 10.3923/jfas.2009.316.322)

Effect of Pb and Cd on the Iron Solute in Blood (*Chalcalburnus chalcoides*)

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This study was carried out within inland Aquaculture Research Center Bandar Anzali (Guilan Province) through Southwestern part of the Caspian Sea; to examine the effect of two heavy metals (lead, cadmium) on (Fe) amount in blood of *Chalcalburnus chalcoides*. This fish is widespread and lives through Southern and Western part of the Caspian. The sampling was randomly done in two stages. The size of fish was 15-16 cm. After transferring fish to the pool, in order to adaptation, has been provided 12 aquariums in which 9 fish were released to each one. Regarding to the lowest capacity (LC50) for these fish, chose the selective densities to pollute aquariums' environs. In such a way that for each aquarium cell with a constant density, we account 0.05, 0.15 and 0.03 ppm for lead and 0.15, 0.25 and 0.75 ppm for cadmium, respectively; while a stereotype aquarium was considered as a non-polluted environ. In each stage, we left 3 fish out of them to take blood from their heart and tail-stem, then we transferred the frozen samples to the lab. This experiment was repeated for the second metal as the same. Acid nitric digested the blood to provide a transparent and colorless solution for the atomic absorption device. With respect to the obtained absorptions by Pb, Cd and Fe in lab, the variance analysis (ANOVA) was carried out in (SPSS) and (Excel) systems. Based on statistical results, cadmium with ratio $p < 0.05$ replaced with ferritin (Fe) over the time, but metal (Pb) couldn't so. The results indicated that by increase in lead density within various times, this metal was absorbed by other fish's tissues. (*Journal of Fisheries and Aquatic Science* 4 (6): 323-329, 2009; doi: 10.3923/jfas.2009.323.329)

Isolation and Characterization of Saprolegniaceae from Rainbow Trout (*Oncorhynchus mykiss*) Eggs in Iran

H.A.E. Mousavi, M. Soltani, A. Khosravi, S.M. Mood and M. Hosseinifard

The goal of the this study was to identify Saprolegniaceae fungi isolated from affected rainbow trout eggs in six hatcheries in Mazandaran Province (Northern Iran) from December 2006 to February 2007. The isolated oomycetes were classified according to their morphological characteristics on hemp seed media at 18-24°C. Seven fungal species belonging to three genera of *Saprolegnia*, *Achlya* and *Brevilegnia* were identified. The fungal species were morphologically characterized as *S. parasitica*, *S. mixta*, *S. monilifera*, *Saprolegnia* sp., *A. oblongata*, *Achlya* sp. and *Brevilegnia* sp. This is the first recorded oomycetes infection in rainbow trout hatcheries in Iran. (*Journal of Fisheries and Aquatic Science* 4 (6): 330-333, 2009; **doi**: 10.3923/jfas.2009.330.333)