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UDC 639.512

Asda Laining, Ike Trismawanti, Muhammad Chaidir Undu, Andi Sahrijanna, and Andi Indra Jaya Asaad (Research Institute for Coastal Aquaculture and Fisheries Extension)

Carotenoid-enriched diet for prematuration stage of pond-reared tiger shrimp, *Penaeus monodon*: part II. effect on gonadal maturation and biochemical profiles of oocytes, spermatophores and hepatopancreas

Indonesian Aquaculture Journal, 17 (1), 2022, 1-11

Two-phase feeding trials were conducted to evaluate the effect of the carotenoid mixture on gonadal development and biochemical properties of several tissues of tiger shrimp. The treatments were diet enriched with (PC) and without carotenoid mixture (PO). Shrimp with an initial body weight of 31.7 ± 1.3 g were allocated among four of 1,000 m² concrete ponds with a density of 1 shrimp/m² and fed tested diets for five months. Selected shrimps from the pond with a minimum weight of 80 g for females and 60 g for males were stocked into four 10-m³ concrete tanks at 15 pairs per tank. Natural mating rate and ovary development were not stimulated by the carotenoid supplement. However, it significantly improved ($P < 0.05$) both ovary maturation and spermatophore formation of tiger shrimp from 76.7 ± 1.4 to $86.7 \pm 0.0\%$ and from 69.9 ± 4.5 to $82.3 \pm 4.0\%$, respectively. Total carotenoid content in meat, oocyte and hepatopancreas of female tiger shrimp significantly ($P < 0.05$) increased by supplementing carotenoid compared to the control diet. The total amino acid content in the spermatophore of shrimp fed the PC diet was significantly higher (73.82%) than in the PO diet (66.09%). The present study revealed the important effect of carotenoid feed during the pre-maturation stage on the reproductive performances of pond-reared tiger shrimp.

KEYWORDS: prematuration; carotenoid; gonadal maturation; pond-reared tiger shrimp

UDC 639.2.091

Qoriatul Ilma, Achmad Dinoto, Ninu Setyaningrum, Mulyadi, Dwi Agustyani, Nani Radiastuti, and Heddy Julistiono (Research Center for Biology, Indonesian Institute of Sciences)

Isolation and identification of bacteria removing nitrite, nitrate, and ammonium from bioballs filter

Indonesian Aquaculture Journal, 17 (1), 2022, 13-22

The presence of effective bacteria removing nitrite, nitrate, and ammonia in a recirculating aquaculture system (RAS) is necessary to attenuate their toxicity to fish. The research was conducted to find bacteria that can be cultured and reduce nitrite, nitrate, and ammonium. Sixteen bacterial colonies were isolated from bioballs of RAS biofilter and tested for their ability to reduce nitrite or nitrate concentrations. Using a simple indicator paper for nitrite and nitrate, four isolates that reduced nitrite and nitrate concentrations, namely K1NA3, K2NA3, CNA1, and PRO4NA1 were selected. The four isolates were then evaluated for the metabolism of nitrate, nitrite, and ammonium compounds using the spectrophotometry method. Results showed that the isolates K1NA3, CNA1, and PRO4NA1 reduced nitrite concentration but produced ammonium, whereas K1NA3 isolate was able to reduce nitrate concentration but produced both nitrite and ammonium. Experiments in reducing ammonium levels in the synthetic waste media showed the ability of four isolates to reduce ammonium levels after six days despite producing nitrite. Based on the 16S rRNA gene analysis, these isolates have a close relationship to *Pseudomonas otitidis* (K1NA3 and K2NA3), *Acinetobacter cumulans* (CNA1), and *Vogesella perlucida* (PRO 4NA1).

KEYWORDS: ammonia removal; nitrogenous compounds; aquaculture bioremediation; biofilter bacteria; nitrification bacteria

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Effect of bioactive protein ingredients (motivtm) on total hemocyte and survival rate of vannamei shrimp, *Litopenaeus vannamei*

Indonesian Aquaculture Journal, 17 (1), 2022, 23-28

One of the problematic factors in the cultivation of vannamei shrimp is the outbreak of bacteria and viruses. One way to prevent infection is by strengthening the shrimp's immune system. MOTIV™ is a fermented corn protein concentrate that has been reported to possess probiotic properties that can positively increase the disease resistance of shrimp. Therefore, this study aimed to determine the effect of bioactive protein (MOTIV™) on the total hemocyte count and shrimp survival rate. The study used an experimental method with a completely randomized design with five treatments and three replications: A (commercial feed), B (7.5% MOTIV add of 1.5% krill meal instead of 9% fish meal), C (7.5% MOTIV™ add of 1% krill meal to replaces of 2% poultry meal and 6.5% fish meal), D (7.5% MOTIV™ to replaces of 3.5% poultry meal and 4% fish meal), and E (7.5% MOTIV™ to replaces of 7.5% poultry flour). Feeding was done four times/day based on shrimp biomass and weekly feed counts based on daily shrimp survival. The vannamei shrimp used was one gram with a population density of 15 shrimps/aquarium with an aquarium volume of 100 liters. Total shrimp hemocytes, survival, and water quality were all measured. Treatment C had the highest total hemocyte, averaging 4.1×10^7 cells/mL, whereas treatment B had the lowest, averaging 1.4×10^7 cells/mL. During the trial, only treatment C supported 100% survival.

KEYWORDS: *L. vannamei*; *THC*; survival rate; MOTIV™; corn

UDC 639.3.034

Teuku Fadlon Haser, Fauziah Azmi, Muh. Saleh Nurdin, Suri Purnama Febri, Tri Heru Prihadi, Joel Aubin, Bahtiar Sah Putra, Riris Yuli Valentine, Deni Radona, Kurniawan, and Muhammad Haritza Laitte (Faculty of Agriculture, Samudra University)

Optimizing embryonic development, egg hatchability, and larval survival of asian seabass, *Lates calcarifer* using papaya leaf extract (*Carica papaya*) treatments

Indonesian Aquaculture Journal, 17 (1), 2022, 29-36

Embryonic development of Asian seabass, *Lates calcarifer* is a critical phase in the success of larval rearing production in a hatchery. Low production of larvae has been the drawback of the Asian seabass aquaculture owing to diseases and microbial infection to the eggs, causing low egg viability. This study aims to evaluate the effect of different doses of papaya leaf extracts during embryonic development to improve egg hatchability and larval survival. Six different doses of papaya leaf extracts of 2, 4, 6, 10, 20, and 25 mL were used as treatments arranged triplicates in five liter aquaria. The newly fertilized eggs (99 eggs) were immersed in each treatment for five minutes and fifteen seconds. Subsequently, the eggs were moved into 10 L incubation tanks, and samples were collected for embryogenesis observation. The hatchability of eggs was significantly different among treatments. The hatchability of larvae in group with dose of 4 mL was the best treatment ($93.94 \pm 0.1\%$) followed by 2 mL ($93.88 \pm 3\%$), and 6 mL ($90.91 \pm 3.0\%$). The different doses of papaya leaf extract significantly affected larval survival. The highest survival rate of larvae was 2 mL (93%) followed by 4 mL (90%) and 6 mL (70%). There was no significant difference in the hatching time of larvae. The fastest hatching time occurred at the dose of 6 mL about 13 hours and 30 minutes, followed by 2 mL and 4 mL treatment for about 14 hours. This study recommends that the doses of 2 mL or 4 mL of papaya leaf extracts have potential impacts on the improvement of larval rearing production for Asian seabass hatchery.

KEYWORDS: Asian seabass; hatchability; survival rate; larval production; embryogenesis

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UDC 639.3.043

Azam Bachur Zaidy, Yuke Eliyani, and Toni Ruchimat (Jakarta Technical University of Fisheries, Jakarta)

Effects of feed reduction on growth performance, water quality, and hematology status of African catfish, *Clarias gariepinus* reared in biofloc pond system

Indonesian Aquaculture Journal, 17 (1), 2022, 37-43

Biofloc technique is a method of fish culture using minimal water exchange and microbial aggregates formed within the culture media as fish supplementary feed. Biofloc as a protein source is currently not being considered part of the feeding dosage in catfish culture. This present work aimed to determine the effects of commercial feed reduction on growth performance, water quality, and hematology of catfish cultured in biofloc ponds. Fish with an average body weight of 7.53 ± 0.47 g were stocked in nine ponds with a stocking density of 100 fish/pond and reared for nine weeks. The experiment was arranged in a completely randomized design, with the following treatments: full feed + non-biofloc (C100) as control; 10% less feed + biofloc (B90); 20% less feed + biofloc (B80). As such, the total feed doses given daily per each treatment fish biomass were: 5% for C100, 4.5% for B90, and 4.0% for B80. Each treatment was arranged in triplicates. The results showed that all water quality parameters (dissolved oxygen, pH, TAN, and nitrite) and biofloc concentrations did not differ significantly among the treatments ($P > 0.05$). Specific growth rate, survival rate, weight gain, and feed conversion ratio of the fish were also not significantly different ($P > 0.05$). The weight gain of biofloc-treated fish in B90 and B80 reached 2.71% and 12.65%, respectively; which were higher than the control treatment during the treatment period. The feed conversion ratios of B90 and B80 were 14.39% and 7.58%, respectively; lower than the control treatment. The biofloc treatment did not adversely alter the fish's blood cell profiles. This study revealed that feed reduction did not affect water quality in the ponds and blood cell profiles of the fish. Moreover, fish in the biofloc-treated ponds had higher weight gain and lower food conversion ratios compared to fish cultured in the non-treated biofloc ponds. This study suggests that using the biofloc system in catfish rearing can reduce the use of feed up to 10%-20% with similar biomass yield compared to the non-biofloc system.

KEYWORDS: biofloc; feeding rate; food habit; catfish

UDC 639.3.043

Rina Puji Astuti, Alim Isnansetyo, Rarastoeti Pratiwi, and Suwarno Hadisusanto (Universitas Gadjah Mada)

Comparison of nutritional and protease activity profiles of two live feed candidates of *Pseudodiaptomus* species

Indonesian Aquaculture Journal, 17 (1), 2022, 45-51

Pseudodiaptomus species are one of the copepods species as a superior live feed to date due to their nutrition and digestive enzyme contents. Some of them have been used as natural food for rearing marine fish larvae. The purposes of this study were to compare the nutritional and protease activity between two species of *Pseudodiaptomus* originated from Indonesian waters, and to determine more superior species to cultivate. Two different feeds i.e. *Thalassiosira* sp. and milk powder were used to grow the *Pseudodiaptomus* species. Analysis of amino acids (AAs) and fatty acids (FAs) profiles were carried out for both the *Pseudodiaptomus* species samples and the feeds, while the protease activity assay was carried out only for the *Pseudodiaptomus* species samples. Results indicated that the nutritional and protease activity profiles of *Pseudodiaptomus* were affected by the types of feed. *Pseudodiaptomus* code P61 was more superior to *Pseudodiaptomus* code P71. This code P61 species contained a wide variety of essential fatty acids and exhibited stable protease activity under the different feeding treatments. However, P61 contained a lower total AA content than P71. Both of them could be cultivated because they were complementary in nutrients to each other.

KEYWORDS: copepods; fatty acid; amino acid; enzyme activity; microcrustacea

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Isabelle Leite Bayona Perez, Ana Paula dos Santos, and Bárbara Araújo Martins (Centro de Aquicultura da UNESP, CAUNESP, Universidade Estadual Paulista, UNESP, Jaboticabal, SP, Brazil)

Maintenance of the butterflyfish *Chaetodon striatus* (perciformes: chaetodontidae) in a recirculation system

Indonesian Aquaculture Journal, 17 (1), 2022, 53-60

The high extractivism of marine fish to supply the demand of the aquarium market has worried the researchers and, in this context, the aquaculture consists of an alternative to the problem. The family Chaetodontidae represents one of the main families of ornamental marine fish and has not received enough attention on their cultivation research. Considering the absence of this information about the butterflyfish *Chaetodon striatus*, the present work had the objective of obtaining information about the species in captivity. The fishes were kept in tanks of 100, 200, 300 and 1,000 L, with 6 fishes in each tank, with 3 repetitions for each volume, totaling 72 individuals and were observed for 30 days, being offered living small invertebrates and frozen and fresh mussels for the feeding. Also, for the attempt of reproduction in captivity, two couples, collected directly from the sea, with the entry of only two adults in the trap at a time, were used. Each couple was acclimated in a 100 L tank and we observed their behaviors for 8 hours a day. There was no mortality in tanks of 300 and 1,000 L and, for feeding, small invertebrates and fresh mussels were well accepted. Some behaviors were observed, most of which were already described for chaetodontids. This is the first report of *C. striatus* in captivity and this contribution may provide subsidies for a future technological package.

KEYWORDS: Aquarism; behavior; ornamental marine fish; *Chaetodon striatus*

UDC 639.55

Yuni Puji Hastuti, Moh. Burhanuddin Mahmud, Yuli Siti Fatma, Ridwan Affandi, and Kukuh Nirmala (Department of Aquaculture, Faculty of Fisheries and Marine Science, IPB University)

Effect of the use of *Gracilaria* sp. on water quality, physiological and growth performance of *Holothuria scabra* in culture tank

Indonesian Aquaculture Journal, 17 (1), 2022, 61-72

Sea cucumber *Holothuria scabra* was reared on a small scale with the addition of seaweed *Gracilaria* sp. as a phytoremediation agent. This research aimed to determine the effect of *Gracilaria* sp. on water quality, physiological response, and growth performance of *H. scabra*. Ten individuals of *H. scabra* with an initial length of 5 ± 0.09 cm and an initial weight of 7.6 ± 0.2 g were reared in a culture tank (20 cm x 30 cm x 20 cm) with 15 cm of water depth. *Gracilaria* sp. was floated on the culture tank at three weight levels with three replicates, i.e., low (15 g); medium (30 g); and high seaweed density (45 g), with the control (0 g), during the 30-day rearing period. Results showed no significant difference in water temperature, dissolved oxygen (DO), salinity, and total ammonia nitrogen (TAN) between all treatments except for pH. There were no significant differences in ammonia and nitrite concentrations and significant differences in nitrate concentration and total organic matter (TOM) between all treatments and the control. On day 30, the application of *Gracilaria* sp. exhibited a lower nitrate concentration than the control. *Gracilaria* sp. maintained the water quality in the culture tank within a tolerable range for *H. scabra*. On the physiological response of *H. scabra*, high seaweed density exhibited the lowest blood cholesterol and glucose levels on day 30 and the highest specific growth rate (SGR) in weight ($0.59 \pm 0.2\%$) and length ($1.16 \pm 0.09\%$). The survival rate of *H. scabra* in all treatments reached 100%, suggesting the indoor cultivation system in this experiment did not negatively affect the growth of *H. scabra*.

KEYWORDS: algae; environment; mariculture; phytoremediation; sandfish

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UDC 639.2.091

Tatik Mufidah, Sukenda, Widanarni, Huda Salahudin Darusman, and Angela Mariana Lusiastuti
(Department of Aquaculture, Faculty of Fisheries and Marine Science, IPB (Bogor Agricultural University, Indonesia)

Analysis of the pathogenesis of *Aeromonas hydrophila* in the African catfish (*Clarias gariepinus*) and involvement of the TNF- α in response to the infection

Indonesian Aquaculture Journal, 17 (1), 2022, 73-85

This research aimed to study the pathogenesis of *Aeromonas hydrophila* infection through two different routes of infection in African catfish and to find out the involvement of TNF- α in response to the infection. The experimental infection model was performed by clipping the caudal fin and immersing the fish in a medium with *A. hydrophila* and by intramuscular injection. Total plate count were used to investigate total and the distribution of *A. hydrophila* in the organs and TNF- α were observed using immune histochemistry. The results showed that the two types of infection were able to show typical *A. hydrophila* symptoms in experimental fish. Histological observation indicated that the two types of experimental infection resulted in systemic aeromoniasis infection. Total bacterial count results showed that *A. hydrophila* were detected three hours post-infection (hpi) in all organs, except for the kidney, in which detection started since hour 0, both in control and challenge fish. TNF- α were detected in all experimental fish and influenced by the number of bacteria, the function and tissue structure and of the organs. It can be concluded that artificial infection by clipping the caudal fin of *Clarias gariepinus* and immersing the fish in a medium with active *A. hydrophila* isolates cause systemic aeromoniasis infection in organs. Acute infection with *Aeromonas hydrophila* causes an increase in TNF- α production.

KEYWORDS: *Aeromonas hydrophila*; histology; immune histochemistry; TNF- α ; *Clarias gariepinus*

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SEND INSTRUCTIONS FOR WRITING AND PUBLISHING ARTICLES OF INDONESIAN AQUACULTURE JOURNAL 2016 (12pt Bold)

I Nyoman Adiasmara Giri[#], Ketut Sugama^{**}, Alimuddin^{***}, and Anang Hari Kristanto^{****}

^{*}) Research and Development Institute for Mariculture, Gondol

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ABSTRACT (12pt Bold)

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KEYWORDS: Author guidelines; research journal; aquaculture; article template

1. Introduction

Indonesian Aquaculture Journal has a p-ISSN 0215-0883; e-ISSN: 2502-6577 with Accreditation Number: 591/AU2/P2MI-LIPI/03/2015 (period April 2015-April 2018). First published in 2006, with the publication frequency of twice a year, in June and December. (<http://ejournal-balitbang.kkp.go.id/index.php/iaj>) is a peer-reviewed Journal Indonesian Aquaculture accept manuscripts or articles in the field of aquaculture various academics and researchers nationally.

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Tables and Figures placed in the group after the text of the referenced tables or figures. Each image must be given the title of the image (Figure Caption) on the bottom of the image and numbered in Arabic numerals followed by the title picture in Indonesian and English. Each table should be titled table (Table Caption) and numbered in Arabic numerals on the top of the table followed by the title of the table in Indonesian and English. The pictures should be printed clearly warranted (font size, resolution and size of the line to be sure printed clearly). Figures and tables and diagrams / schematics should be placed among the groups corresponding column of text, or if too much is placed in the middle of the page. Tables should not contain vertical lines, while the horizontal lines are allowed but only the essentials only.

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CONCLUSION: The conclusion describes the response of hypotheses and / or research purposes. Conclusions not contain looping of results and discussion, but rather to a summary of the research results.

Table 1. Response to selection and final mean body weight of the third generation compared to the control population of the African catfish *Clarias gariepinus* at the end of larval rearing, nursery and grow-out phases

Phases	Periods (days)	Final mean body weight (g)		Response to selection	
		Third generation	Control	Gram (g)	Percentage (%)
Larval rearing	25	0.19 ± 0.10	0.19 ± 0.07	-	-
Nursery	30	6.12 ± 2.93	5.80 ± 3.50	-	-
Grow-out	60	198.67 ± 82.82	165.22 ± 71.09	33.45	20.24

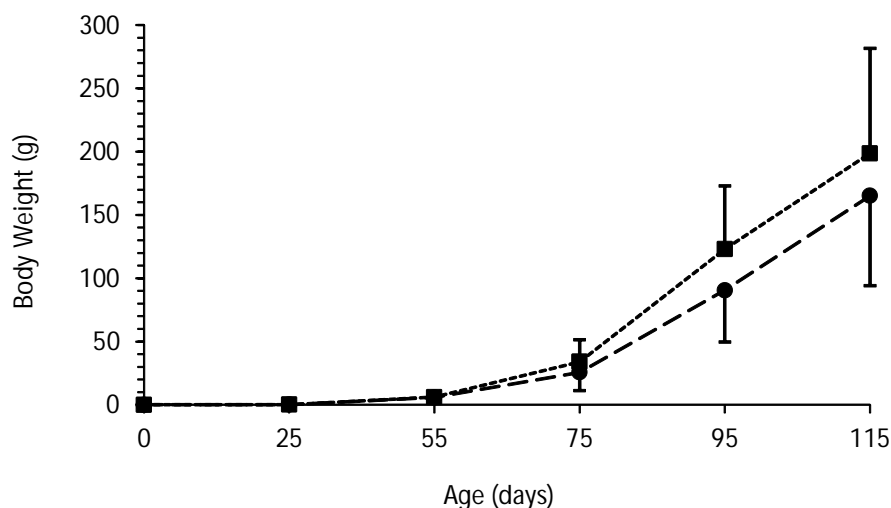


Figure 1. Growth performances based on body weight during 25 days of larval rearing phase, 30 days of nursery phase and 60 days of grow-out phase (based on samplings of 2% populations) of the third generation (■) and control population (●) of the African catfish (*Clarias gariepinus*) genetic improvement program held at Research Institute for Fish Breeding, Sukamandi. Vertical lines represent its each standard deviation

ACKNOWLEDGEMENTS: thanks mainly devoted to research funders. Acknowledgements can also be delivered to the parties that support the implementation of the research and writing of the manuscript.

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$$RPS = \left(1 - \frac{\% \text{ fish mortality of vaccinated}}{\% \text{ Fish mortality of control}} \right) \times 100$$

6. Free Writing Citations / References In Text Articles

Each fetch data or quoted from other references, the author must write the reference source. References or citations written in the description / text by the author's name and the year (Irwan & Salim, 1998). If the author of more than two, then just write the name of the first author followed by "et al." (Bezuidenhout et al., 2009; Roeva, 2012). All referenced in the text must be listed in the References section.

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The format of writing a list of references following the format 6th Edition APA (American Psychological Association). Download

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Ariyanto, D., Hayuningtyas, E.P., & Syahputra, K. (2009). The relationship between the presence of genes Major Histocompatibility Complex Class II (MHC-II) disease resistance and growth in the population of carp strains rajadanu. Indonesian Aquaculture Journal, 10 (4), 461-469.

A reference in the form of titles:

Fridman, A. (2008). Plasma Chemistry (p. 978). Cambridge: Cambridge University Press.

In the form of reference Proceedings of the Seminar:

Roeva, O. (2012). Real-World Applications of Genetic Algorithm. In International Conference on Chemical and Materials Engineering (pp. 25-30). Semarang, Indonesia: Department of Chemical Engineering, Diponegoro University.

A reference in the form of a dissertation / thesis / theses:

Istadi, I. (2006). Development of A Hybrid Artificial Neural Networks - Genetic Algorithm for Modeling and Optimization of Dielectric-Barrier Discharge Plasma Reactor. PhD Thesis. Universiti Teknologi Malaysia.

A reference in the form of patent:

Primack, H.S. (1983). Method of Stabilizing polyvalent Metal Solutions. US Patent No. 4,373,104.

Handbook of reference in the form:

Hovmand, S. (1995). Fluidized Bed Drying. In Mujumdar, USA (Ed.) Handbook of Industrial Drying (pp.195-248). 2nd Ed. New York: Marcel Dekker.

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11. References

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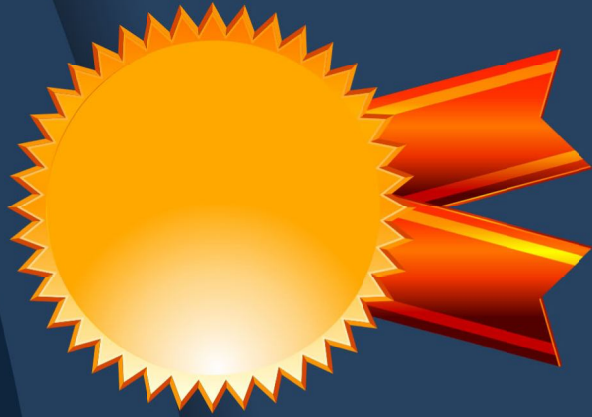
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