

First record of the spawning capable climbing perch

Anabas testudineus

(Teleostei: Anabantidae)

during the dry season

Dmitry D. Zworykin*

The reproductive state of the climbing perch *Anabas testudineus* was studied for the first time in situation when its sexual activity is least expected (in the main stem of a large river, during the dry season and in the arid area). Most of examined specimens in riparian zone of the upper Đă Răng River (Central Highlands in Vietnam) were spawning capable. All variants of the spawning capable females were found: ready to spawn, partially spent and running ripe, indicating their current spawning. This result contributes to a better understanding of timing and seasonality in the climbing perch reproduction.

Introduction

Timing and duration of the spawning are two critical factors in reproductive biology and life history strategy of teleosts (Wootton & Smith, 2015). Most freshwater tropical fish spawn in the rainy season when environmental factors act as a trigger for breeding (Lowe-McConnell, 1987). However, some fish species exhibit reproductive plasticity, and the distinctive temporal patterns of reproduction can be found even in groups of related species inhabiting the same biotopes (Kramer, 1978; Waddell et al., 2019). Although the peak spawning date may not vary much from year to year, significant variations in the distribution of the times of reproduction within year exist across years and habitats (Wootton & Smith, 2015; Rizzo & Bazzoli, 2020). Knowing how

reproductive strategy is implemented under different environments is an important contribution to a better understanding of the organization of life history.

Anabas testudineus, the climbing perch, is one of the most widely distributed freshwater fish in South and Southeast Asia. It is generally agreed that its reproduction usually occurs during a rainy season (Poulsen & Valbo-Jørgensen, 2000). The histological examination of gonads also leads to a conclusion that peak of spawning occurs in a wet season, even in the case of batch spawning (Jacob, 2005; Bernal et al., 2015). At the same time the presence of mature oocytes in gonads most of the year implies to the potentially prolonged pattern of reproduction (Bernal et al., 2015). One wonders, therefore, if the climbing perch is able to spawn several times a year, then could the fish

* Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences, 33 Leninsky prospect, 119071 Moscow, Russia. E-mail: d.zworykin@gmail.com

Literature cited

- Bernal, R. A. D., F. A. Aya, E. G. T. De Jesus-Ayson & L. M. B. Garcia. 2015. Seasonal gonad cycle of the climbing perch *Anabas testudineus* (Teleostei: Anabantidae) in a tropical wetland. Ichthyological Research, 62: 389–395.
- Brown-Peterson, N. J., D. M. Wyanski, F. Saborido-Rey, B. J. Macewicz & S. K. Lowerre-Barbieri. 2011. A standardized terminology for describing reproductive development in fishes. Marine and Coastal Fisheries, 3: 52–70.
- Hafijunnahar, A. Rahman & M. M. Hossain. 2016. An investigation on breeding biology of Vietnam strain of climbing perch, *Anabas testudineus* (Bloch) reared in a commercial hatchery. International Journal of Fisheries and Aquatic Studies, 4: 8–12.
- Halls, A. S., D. D. Hoggarth & K. Debnath. 1998. Impact of flood control schemes on river fish migrations and species assemblages in Bangladesh. Journal of Fish Biology, 53 (Supplement A): 358–380.
- Hoang, H. T. T., Q. H. Truong, A. T. Nguyen & L. Hens. 2018. Multicriteria evaluation of tourism potential in the Central Highlands of Vietnam: combining geographic information system (GIS), analytic hierarchy process (AHP) and principal component analysis (PCA). Sustainability, 10: 3097.
- Jacob, P. K. 2005. Studies on some aspects of reproduction of female *Anabas testudineus* (Bloch). PhD dissertation. Cochin University of Science and Technology, Kochi, 245 pp.
- Kramer, D. L. 1978. Reproductive seasonality in the fishes of a tropical stream. Ecology, 59: 976–985.
- Lowe-McConnell, R. H. 1987. Ecological studies in Tropical fish communities. Cambridge, Cambridge University Press, 382 pp.
- Poulsen, A. F. & J. Valbo-Jørgensen. 2000. Fish migrations and spawning habits in the Mekong mainstream: a survey using local knowledge. Mekong River Commission, Vientiane, 150 pp.
- Rizzo, E. & N. Bazzoli. 2020. Reproduction and embryogenesis. Pp. 287–313 in: B. Baldissarotto et al. (eds.), Biology and physiology of freshwater Neotropical fish. Elsevier.
- Van, N. K., P. T. Ly & N. T. Hong. 2014. Bioclimatic map of Tay Nguyen at scale 1: 250,000 for setting up sustainable ecological economic models. Vietnam Journal of Earth Sciences, 36: 504–514.
- Vicaya, D. S., D. Efizon & Windarti. 2014. Reproductive biology of *Anabas testudineus* living in the palm tree plantation canal, Tapung Kiri River, Bencah Kelubi Village, Riau Province. Jurnal Online Mahasiswa, 1: 1–10 [in Indonesian].
- Waddell, J. C., S. M. Njeru, Y. M. Akhiyat, B. I. Schachner, E. V. Correa-Roldán & W. G. R. Crampton. 2019. Reproductive life-history strategies in a species-rich assemblage of Amazonian electric fishes. PLOS ONE, 14: e0226095.

- Wootton, R. J. & C. Smith. 2015. Reproductive biology of teleost fishes. Chichester, John Wiley & Sons, 472 pp.
- Zworykin, D. D. 2012. Reproduction and spawning behavior of the climbing perch *Anabas testudineus* (Perciformes, Anabantidae) in an aquarium. Journal of Ichthyology, 52: 379–388.
- Zworykin, D. D. 2017. Phylogenesis of reproductive strategies in labyrinth fishes (Anabantoidei) and their sister groups. Biology Bulletin Reviews, 7: 428–441.
- Zworykin, D. D. 2020. [Are terrestrial movements of amphibious fish lateral migrations?] Zhurnal obshchei biologii, 81: 444–457 [in Russian].

Received 22 December 2020

Revised 8 March 2020

Accepted 22 April 2021

The whole contribution can be purchased as PDF file.

Availability

Generally all our publications are available as PDF files; full publications as a general rule after the printed version is out of print. If you have questions concerning particular contributions please contact us by e-mail:
pdf@pfeil-verlag.de.

The PDF files are protected by copyright.

The PDF file may be printed for personal use. The reproduction and dissemination of the content or part of it is permitted. It is not allowed to transfer the digital personal certificate or the password to other persons.

Prices

Books: Prices are to be found in the catalog.

Articles in journals and single contributions or chapters in books:

10 EURO basic price per order (including the first 10 pages),
and

0,50 EURO per page, beginning with the 11th page.

Page numbers are found in the contents of the publications.

Orders

Use our order form for PDF files or send your order informal per e-mail (pdf@pfeil-verlag.de). The only accepted payment is by credit card. While using the order form for PDF files, your data will be transmitted by secure link (ssl). You also may send the informations informally by e-mail, fax, phone or mail.

Handling

As soon as possible, depending on our business hours and your order, you will receive your PDF file together with the certificate and password by e-mail.

Larger PDF files can be downloaded from our webspace, if necessary.

Your invoice will be sent out by e-mail after we charged your credit card.

To open the encrypted PDF files you have to install your personal certificate after your first order. All PDF files with the same certificate can be opened from that time on.

Dieser Beitrag kann als PDF-Datei erworben werden.

Verfügbarkeit von PDF-Dateien

Prinzipiell sind von allen unseren Publikationen PDF-Dateien erhältlich. Komplette Publikationen in der Regel erst nachdem die gedruckte Version vergriffen ist. Anfragen bezüglich bestimmter Beiträge richten Sie bitte per E-Mail an pdf@pfeil-verlag.de.

Die PDF-Dateien sind urheberrechtlich geschützt.

Ein Ausdruck der PDF-Dateien ist nur für den persönlichen Gebrauch erlaubt.

Die Vervielfältigung von Ausdrucken, erneutes Digitalisieren sowie die Weitergabe von Texten und Abbildungen sind nicht gestattet.

Das persönliche Zertifikat und das Passwort dürfen nicht an Dritte weitergegeben werden.

Preise

Bücher: Die Preise sind dem Katalog zu entnehmen. Zeitschriftenbeiträge und einzelne Kapitel aus Sammelbänden bzw. Büchern:

10 EURO Grundbetrag pro Bestellung (einschließlich der ersten 10 Seiten),
und

0,50 EURO pro Seite ab der 11. Seite.

Den Umfang der Beiträge entnehmen Sie bitte den Inhaltsverzeichnissen.

Bestellungen

Bestellungen sind mit dem PDF-Bestellformular oder formlos per E-Mail (pdf@pfeil-verlag.de) an uns zu richten. Die Bezahlung ist ausschließlich per Kreditkarte möglich. Bei Verwendung unseres Bestellformulars werden die Kreditkartendaten über eine gesicherte Verbindung (ssl) übermittelt. Sie können die Daten aber auch formlos per E-Mail, Fax, Post oder telefonisch übermitteln.

Abwicklung

So bald wie möglich, aber abhängig von unseren Bürozeiten und der gewünschten Bestellung, schicken wir Ihnen die PDF-Datei(en) zusammen mit Ihrem persönlichen Zertifikat und dem zugehörigem Passwort per E-Mail. Größere Dateien bieten wir Ihnen gegebenenfalls zum Herunterladen an.

Der fällige Betrag wird von Ihrer Kreditkarte abgebucht und Sie erhalten die Rechnung ebenfalls per E-Mail.

Um die verschlüsselten PDF-Dateien öffnen zu können, muss bei der ersten Bestellung das passwortgeschützte persönliches Zertifikat installiert werden, welches anschließend auf dem Rechner verbleibt. Alle mit diesem Zertifikat verschlüsselten Dateien können anschließend auf diesem Rechner geöffnet werden.