

## Review of the *Nothobranchius ugandensis* species group from the inland plateau of eastern Africa with descriptions of six new species (Teleostei: Nothobranchiidae)

Béla Nagy\*, Brian R. Watters\*\*, Pieter D. W. van der Merwe\*\*\*,  
Fenton P. D. Cotterill\*\*\*\* and Dirk U. Bellstedt\*\*\*\*

The *Nothobranchius ugandensis* species group from the inland plateau of Kenya, Tanzania and Uganda is reviewed. Members of this group are characterized in males by the combination of characters of a light blue body coloration with red to red-brown scale margins; a frontal part of head red-brown; throat light blue or red; a uniform red or yellow caudal fin; and a light blue or yellow anal fin with red-brown spotted pattern. Six new species are identified, to raise total species richness to eleven. *Nothobranchius albertinensis*, Nagy, Watters & Bellstedt, new species, from the Albert Nile drainage in western and north-western Uganda, is characterized by a yellow dorsal fin with stripes in medial part parallel to fin rays; yellow anal fin without markings; and anal fin positioned anterior to dorsal fin. *Nothobranchius attenboroughi* Nagy, Watters & Bellstedt, new species, from the Grumeti and other lesser systems east of Lake Victoria in northern Tanzania, is characterized by a light blue anal fin with red-brown dots proximally and medially, and becoming yellow distally with narrow red-brown stripes parallel to fin rays. *Nothobranchius hoermanni* Nagy, Watters & Bellstedt, new species, from the upper Wembere drainage in central Tanzania, is characterized by a red throat; light blue anal fin with red-brown spots and stripes proximally and medially, and with a broad light blue distal zone without markings; pectoral fin hyaline with red-brown stripes parallel to fin rays; and exposed branchiostegal membrane red-brown, with cream distal margin. *Nothobranchius itigiensis* Nagy, Watters & Bellstedt, new species, from the uppermost Ruaha drainage and the Bahi Swamp area in central Tanzania, is characterized by a yellow anal fin with red-brown spots proximally, that merge medially to a pattern parallel to fin rays and are fused distally to form a marginal band. *Nothobranchius moameensis* Nagy, Watters & Bellstedt, new species, from the Moame system south of Lake Victoria in northern Tanzania, is characterized by a light blue anal fin with red-brown dots proximally and medially, and with light blue or yellow distal zone without markings. *Nothobranchius venustus* Nagy, Watters & Bellstedt, new species, from lesser systems in south-western Lake Victoria basin in north-western Tanzania, is characterized by a dorsal fin with a narrow light blue subdistal band and a narrow red-brown to black distal band; a light blue anal fin with irregular red-brown stripes perpendicular to fin rays proximally and medially, and orange with red-brown stripes parallel to fin rays in distal zone. The species group on the inland plateau in eastern Africa also includes *N. derhami*, *N. kardashevi*, *N. streltsovi*, *N. torgashevi* and *N. ugandensis*; furthermore *N. nubaensis* from southern Sudan and western Ethiopia is also included. Phylogenetic analysis of the sequences of their mitochondrial ND2 and COI, and nuclear Glyt, MyH6 and SNX33 gene sequences supports the genetic distinction of the six new species and confirms their position, together with all known members in the *N. ugandensis* species group.

---

\* 30, rue du Mont Ussy, 77300 Fontainebleau, France. E-mail: [bela.nagy@neuf.fr](mailto:bela.nagy@neuf.fr) (corresponding author)

\*\* 6141 Parkwood Drive, Nanaimo, British Columbia V9T6A2, Canada.

\*\*\* Department of Biochemistry, University of Stellenbosch, Private Bag X1, Matieland 7602, South Africa.

\*\*\*\* Department of Earth Sciences, University of Stellenbosch, Private Bag X1, Matieland 7602, South Africa.







- Van Damme, D. & M. Pickford. 2003. The late Cenozoic Thiaridae (Mollusca, Gastropoda, Cerithioidea) of the Albertine Rift valley (Uganda-Congo) and their bearing on the origin and evolution of the Tanganyikan thalassoid malacofauna. *Hydrobiologia*, 498: 1–83.
- Walch, R. 1995. Ein Jewel unter den *Nothobranchius*: *Nothobranchius* spec. 'Odyna K 86/9'. Deutsche Killifisch Gemeinschaft Journal, 27: 93–95.
- Watters, B. R. 1991. *Nothobranchius* species/populations in the hobby – past and present. *Journal of the American Killifish Association*, 24: 245–248.
- Watters, B. R. 2009. The ecology and distribution of *Nothobranchius* fishes. *Journal of the American Killifish Association*, 42: 37–76.
- Watters, B. R. 2014. A classification of *Nothobranchius* fish habitats. *Journal of the American Killifish Association*, 47: 152–180.
- Watters, B. R., R. H. Wildekamp & K. M. Shidlovskiy. 2015. Description and biogeography of *Nothobranchius capriviensis*, a new species of annual killifish from the Zambezi Region of Namibia (Cyprinodontiformes: Nothobranchiidae). *Journal of the American Killifish Association*, 47 (2014 [2015]): 97–133.
- Watters, B. R., B. Nagy, P. D. W. van der Merwe, F. P. D. Cotterill & D. U. Bellstedt. 2019. Review of the *Nothobranchius taeniopygus* species group from central and western Tanzania with descriptions of five new species and redescription of *Nothobranchius taeniopygus* (Teleostei: Nothobranchiidae). *Ichthyological Exploration of Freshwaters*, IEF-1110: 1–41.
- Wildekamp, R. H. 1978. Redescription of *Nothobranchius brieri* Poll, 1938 and the description of three new *Nothobranchius* species (Pisces, Cyprinodontidae) from the province of Shaba, Zaire. *Revue de Zoologie Africaine*, 92: 341–354.
- Wildekamp, R. H. 1980. Investigations into the identity of *Nothobranchius taeniopygus* Hilgendorf, 1891, with reclassification of the subgenus *Zononothobranchius* Radda, 1969. *Journal of the American Killifish Association*, 13: 32–36.
- Wildekamp, R. H. 1989. Fisch-Safari in Uganda. *Die Aquarien und Terrarien Zeitschrift*, 42: 358–362.
- Wildekamp, R. H. 1990. Redescription of two lesser known *Nothobranchius* from central Tanzania, *N. taeniopygus* and *N. neumanni* (Cyprinodontiformes: Aplocheilidae). *Ichthyological Explorations of Freshwaters*, 1: 193–206.
- Wildekamp, R. H. 1994. The *Nothobranchius* species from Uganda, with description of a new polymorphic species (Cyprinodontiformes: Aplocheilidae). *Ichthyological Explorations of Freshwaters*, 5: 193–206.
- Wildekamp, R. H. 2004. A world of killies: atlas of the oviparous cyprinodontiform fishes of the world. Volume IV: the genera *Garmanella*, *Gnathohlebias*, *Hubbsichthys*, *Hylopanchax*, *Hypsopanchax*, *Jordanella*, *Laciris*, *Lamprichthys*, *Leptolebias*, *Leptolucania*, *Lucania*, *Maratecoara*, *Megalebias*, *Megupsilon*, *Micromoema*, *Millerichthys*, *Moema*, *Neofundulus*, *Nothobranchius*, *Orestias*, *Oxyzygonectes*, *Pachypanchax*, *Pantanodon*, *Papiliolebias*, *Pituna*, *Plataplochilus*, *Platypanchax*, and *Plesiolebias*. The American Killifish Association, Elyria, 398 pp.
- Wildekamp, R. H., B. R. Watters & K. M. Shidlovskiy. 2014. Review of the *Nothobranchius neumanni* species group with descriptions of three new species from Tanzania (Cyprinodontiformes: Nothobranchiidae). *Journal of the American Killifish Association*, 47: 2–30.
- Wiley, E. O. 1978. The evolutionary species concept reconsidered. *Systematic Zoology*, 27: 17–26.
- Williams, M. A. & M. R. Talbot. 2009. Late Quaternary environments in the Nile basin. Pp. 61–72 in: H. J. Dumont (ed.), *The Nile: origin, environments, limnology, and human use*. Monographiae Biologicae, Volume 89. Springer, Dordrecht.
- Wilson, E. O. 1984. *Biophilia: the human bond with other species*. Harvard University Press, Cambridge, 160 pp.
- Wourms, J. B. 1965. Comparative observations on the early embryology of *Nothobranchius taeniopygus* (Hilgendorf) and *Aplocheilichthys pumilus* (Boulenger), with special reference on the problem of naturally occurring embryonic diapauses in Teleost fishes. *East African Freshwater Fisheries Research Organisation, Annual Report*, 1964: 68–73.
- Zar, J. H. 2010. *Biostatistical analysis*. Fifth edition. Pearson/Prentice-Hall, Upper Saddle River, xii + 944 pp.
- Zuur, A. F., E. N. Ieno & G. M. Smith. 2007. *Analysing ecological data (statistics for biology and health)*. Springer, New York, xxvi + 672 pp.

Received 20 October 2019  
 Revised 23 January 2020  
 Accepted 3 April 2020



## 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 11<sup>th</sup> 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 webpage, 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.