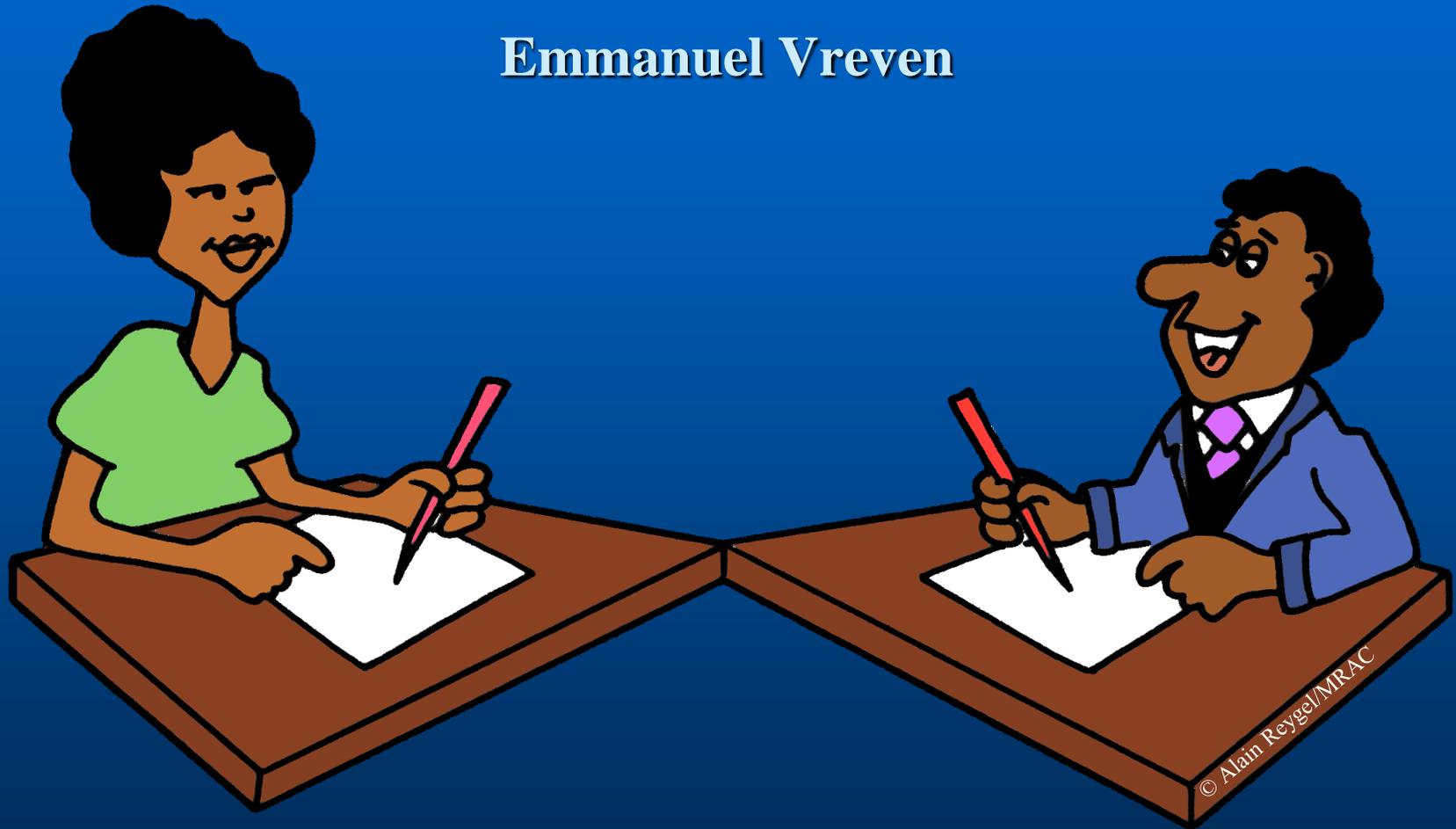


# Fish Taxonomy – Writing an article

Emmanuel Vreven



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# Writing the article

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  - - Analysis: Meristics
  - - Analysis: Morphometrics
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- DISCUSSION
- ACKNOWLEDGEMENTS (institutions, referees, other persons, institutions)
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# Writing the article

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## A new mastacembelid species from Lake Tanganyika: a case of complex evolutionary history

E. J. VREVEN\*† AND J. SNOEKS\*‡

\*Royal Museum for Central Africa, Vertebrate Section, Ichthyology, Leuvensesteenweg 13,  
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(Received 24 August 2006, Accepted 11 June 2009)

A detailed morphometric study of 123 specimens identified as *Mastacembelus albomaculatus* and the six syntypes of *M. tanganyicae* was undertaken. On each specimen, 27 morphometric measurements and 12 meristics were taken. The type series of *M. tanganyicae* contains more than one species, with four specimens attributed to a new species *M. reygeli* sp. nov. A redescription of *M. albomaculatus* and a description of the new species are provided. Both species are endemic to the northern and central part of Lake Tanganyika. They can be distinguished based on the number of caudal vertebrae [47–52 (median 49) in *M. albomaculatus* v. 42–46 (44) in *M. reygeli* sp. nov.], the total number of vertebrae [85–90 (88) v. 78–83 (81)] and the distance from the snout to the last externally visible dorsal spine (S-LDS) [61.8–67.0 (mean 64.0) v. 66.6–71.5 (68.6)%  $L_S$ ]. In addition, intermediate specimens and populations between *M. albomaculatus* and *M. reygeli* were discovered from several parts of the lake, but mainly from the southern part. The latter intermediate populations were provisionally identified as introgressed populations.

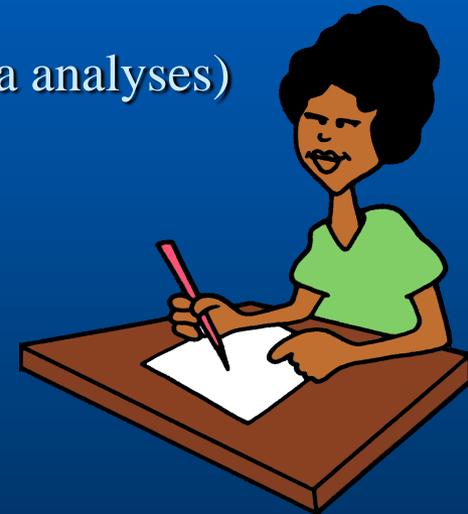
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Key words: Africa; Mastacembelidae; *M. albomaculatus*; introgressive hybridization.

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# Writing the article

**INTRODUCTION**

Lake Tanganyika is the oldest of the East African Rift lakes and, perhaps more important from an evolutionary viewpoint, it may have the longest continuous history (Coulter, 1994). It is well known for its remarkably diverse cichlid fauna estimated at 250 species or more (Snoeks, 2001). This largely endemic fauna [ $>98\%$  (Snoeks, 2001)] shows evidence of complex intralacustrine distribution patterns (Poll & Matthes, 1962; Snoeks *et al.*, 1994; Hanssens *et al.*, 1999) and has received much attention from evolutionary biologists (*e.g.*, see review in Lowe-McConnell, 2003).

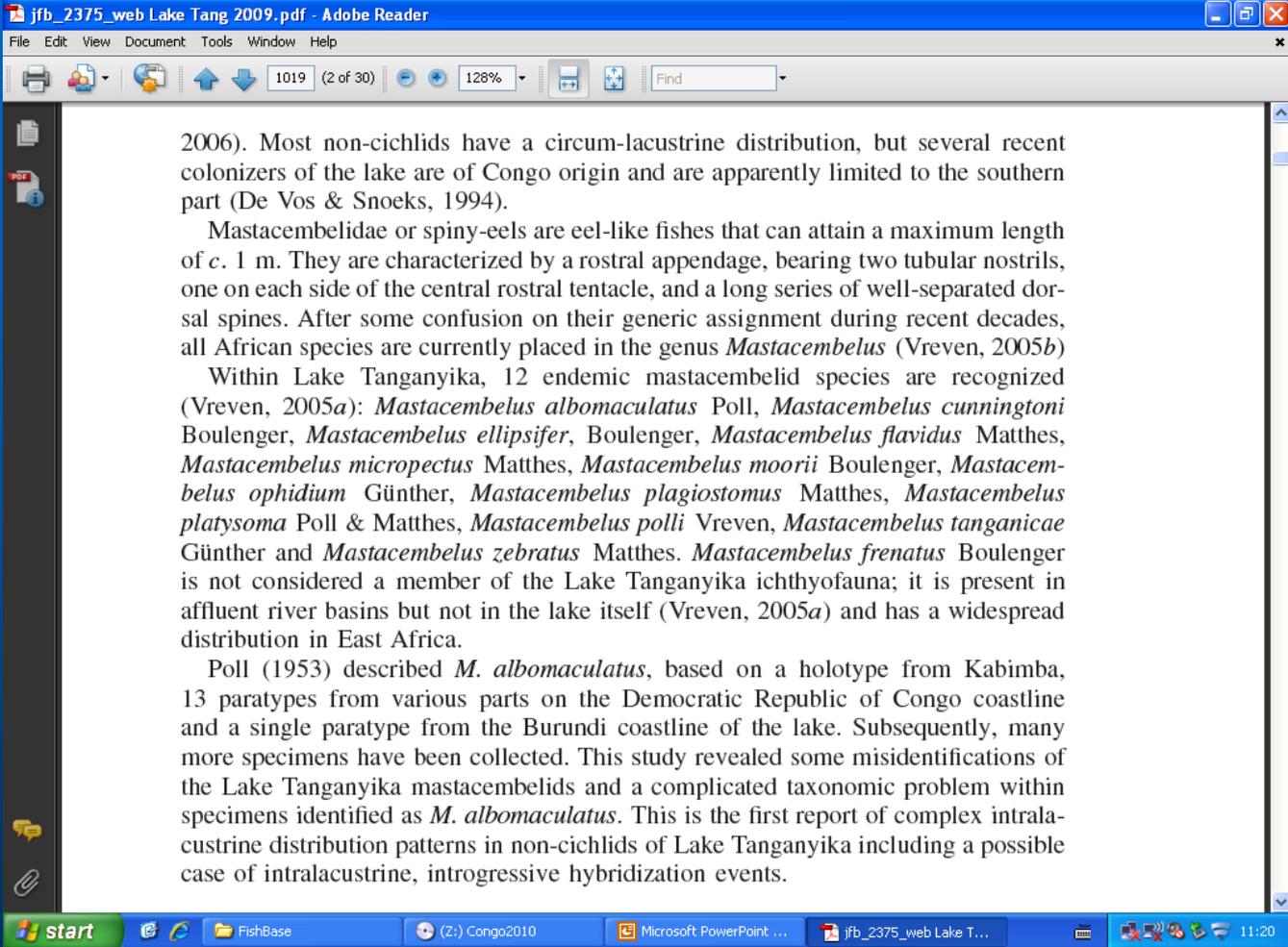
In addition, Lake Tanganyika has the highest number of non-cichlid endemics amongst the African lakes (De Vos & Snoeks, 1994). The largest numbers of these endemics belong to the genera *Mastacembelus* (Mastacembelidae) ( $n = 12$ ), *Synodontis* (Mochokidae) ( $n = 10$ ) and *Bathybagrus* (formerly *Chrysichthys*) (Claroteidae) ( $n = 6$ ) (Mo, 1991; De Vos & Snoeks, 1994; Vreven, 2005a; Wright & Page,

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# Writing the article



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2006). Most non-cichlids have a circum-lacustrine distribution, but several recent colonizers of the lake are of Congo origin and are apparently limited to the southern part (De Vos & Snoeks, 1994).

Mastacembelidae or spiny-eels are eel-like fishes that can attain a maximum length of *c.* 1 m. They are characterized by a rostral appendage, bearing two tubular nostrils, one on each side of the central rostral tentacle, and a long series of well-separated dorsal spines. After some confusion on their generic assignment during recent decades, all African species are currently placed in the genus *Mastacembelus* (Vreven, 2005*b*)

Within Lake Tanganyika, 12 endemic mastacembelid species are recognized (Vreven, 2005*a*): *Mastacembelus albomaculatus* Poll, *Mastacembelus cunningtoni* Boulenger, *Mastacembelus ellipsifer*, Boulenger, *Mastacembelus flavidus* Matthes, *Mastacembelus micropectus* Matthes, *Mastacembelus moorii* Boulenger, *Mastacembelus ophidium* Günther, *Mastacembelus plagiostomus* Matthes, *Mastacembelus platysoma* Poll & Matthes, *Mastacembelus polli* Vreven, *Mastacembelus tanganyicae* Günther and *Mastacembelus zebratus* Matthes. *Mastacembelus frenatus* Boulenger is not considered a member of the Lake Tanganyika ichthyofauna; it is present in affluent river basins but not in the lake itself (Vreven, 2005*a*) and has a widespread distribution in East Africa.

Poll (1953) described *M. albomaculatus*, based on a holotype from Kabimba, 13 paratypes from various parts on the Democratic Republic of Congo coastline and a single paratype from the Burundi coastline of the lake. Subsequently, many more specimens have been collected. This study revealed some misidentifications of the Lake Tanganyika mastacembelids and a complicated taxonomic problem within specimens identified as *M. albomaculatus*. This is the first report of complex intralacustrine distribution patterns in non-cichlids of Lake Tanganyika including a possible case of intralacustrine, introgressive hybridization events.

The taskbar at the bottom shows the Start button, several icons, and open applications: FishBase, (Z:) Congo2010, Microsoft PowerPoint..., jfb\_2375\_web Lake T..., and a system tray with the time 11:20.

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# Writing the article

**MATERIALS AND METHODS**

A total of 123 specimens previously identified as *M. albomaculatus* and the six syntypes of *M. tanganyicae* were examined in detail. Collection data of the examined specimens are given under the species accounts.

Counts and measurements follow Vreven & Teugels (1996, 1997) and Vreven (2004). The total number of dorsal and anal spines includes the last spine, which is very small and often externally invisible (formerly referred to as +1 in Vreven & Teugels, 1996, 1997). The term 'in-between vertebrae' refers to the number of vertebrae between the vertebra whose neural spine supports the pterygiophore of the last externally visible dorsal spine, and the vertebra whose haemal spine supports the pterygiophore of the first anal spine (see Vreven & Teugels, 1996 for more details). The tail region is defined as the region posterior to the anus.

Principal component analysis (PCA) was used as a model-free and distribution-free technique to explore and analyse multivariate pooled-group data sets (Marcus, 1990; Snoeks, 2004). Morphometric measurements and meristics were analysed separately. Morphometric measurements were log transformed or expressed as percentages. With log-transformed data, the first principal component axis (PCI) can be interpreted as a proxy for size (Bookstein *et al.*, 1985). For the percentages of the measurements and the raw meristics, the scores on all axes are taken into account (Snoeks, 2004).

Non-parametric Mann–Whitney *U*-tests were used for univariate comparisons. In order to prevent interference of allometric growth effects, only samples of similar length classes were used.

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# Writing the article

used.

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For the analysis of the data, all localities were organized in a logical geographical sequence within the lake starting from Kigoma (Tanzania), clockwise through Zambia and the Democratic Republic of Congo (DRC), to Nyanza (Burundi). Single quotation marks are used for those geographic locations that actually group several neighbouring sampling localities such as Nyanza. Distribution maps were made with MapInfo Professional, Version 4.0.

Abbreviations:  $L_S$ , standard length;  $L_T$ , total length; S-LDS, distance from snout to last externally visible dorsal spine; S-LAS, distance from snout to last externally visible anal spine; S-FAS, distance from snout to first anal spine. Museum abbreviations follow Eschmeyer (2007).

A pragmatic approach has been used to the species concept. Indeed, while the biological species concept as defined by Mayr *et al.* (1953) and Mayr (1982) appears to be the most used theoretical concept, it has been impossible to verify isolation of the species (re)described in this article. As in most taxonomic studies on fishes, our approach is based on the degree of morphological difference as a working hypothesis for delimiting species. It is most applicable to groups for which the alpha-taxonomy is poorly known and in some cases, as the present one, it is the only approach available (Snoeks, 1994).

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**ANALYSIS OF MERISTICS**

A first PCA was carried out on nine meristics ( $n = 114$ ). Scatterplots of individual meristics used in the PCA against  $L_S$  reveal that none of the included meristics is allometric. The highest loadings on PCI are for the total and caudal numbers of vertebrae, and for the number of soft fin rays in the dorsal and anal fins (Table I). The highest loading on PCII is for the number of dorsal fin spines.

A plot of the PCA scores of the first and the second principal components shows two non-overlapping groups (Fig. 1), one entirely situated in the positive part (*M. albomaculatus*) and one entirely situated in the negative part of the first axis (*M. reygeli* sp. nov.). A large, third group of specimens (referred to below as the intermediate group) is mostly situated between the other two groups.

Mann–Whitney *U*-tests were performed for all nine meristics used in the PCA (Table II). Both species are highly significantly different in numbers of vertebrae and

TABLE I. Loadings for PCI and PCII of a PCA on nine meristics ( $n = 107$ ). The most important loadings are in boldface

	PCI	PCII
Dorsal spines	0.267	<b>-0.912</b>
Dorsal soft fin rays	<b>0.904</b>	0.176
Anal soft fin rays	<b>0.875</b>	0.130
Caudal soft fin rays	0.323	0.265
Predorsal vertebrae	-0.277	0.207
Abdominal vertebrae	0.557	-0.602
Caudal vertebrae	<b>0.895</b>	0.182
In-between vertebrae	0.420	0.346
Total vertebrae number	<b>0.949</b>	-0.032
Explained variance (%)	44.7	16.8

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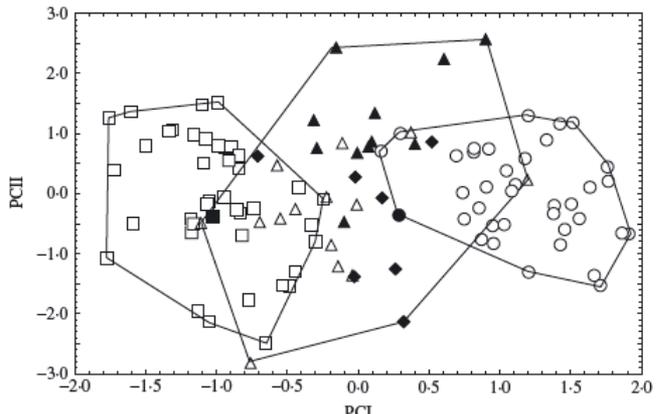
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SYSTEMATICS OF LAKE TANGANYIKA MASTACEMBELIDAE 1021



The figure is a scatter plot showing the results of a Principal Component Analysis (PCA) on nine morphological characteristics for 114 specimens of Mastacembelidae fish from Lake Tanganyika. The x-axis is labeled 'PCI' and ranges from -2.0 to 2.0. The y-axis is labeled 'PCII' and ranges from -3.0 to 3.0. Data points are categorized by species and locality: *Mastacembelus albomaculatus* (solid circles for holotype, open circles for other specimens), *Mastacembelus reygei* (solid squares for holotype, open squares for other specimens), an intermediate group (open triangles from Sumbu, solid triangles from Mpulungu), and other localities (solid diamonds). Full lines connect the points for each species and the intermediate group, showing distinct clusters.

FIG. 1. Plot of scores on the first and second axis of a PCA on nine meristics for all examined specimens ( $n = 114$ ). *Mastacembelus albomaculatus*: ●, holotype; ○, other specimens; *Mastacembelus reygei* sp. nov.: ■, holotype; □, other specimens. Intermediate group: △, from Sumbu; ▲, from Mpulungu; and ◆, other localities. Full lines enclose scores of each species and the intermediate group separately.

numbers of dorsal and anal soft fin rays. Both species are also highly significantly different from the intermediate group in numbers of caudal and total vertebrae, and in numbers of soft dorsal fin rays.

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# ● A species (re)description

- Species name
- Synonyms and citations
- Type specimens
- Etymology
- Diagnosis
- Description
- Distribution
- Ecology
- List of specimens examined
- Illustrations



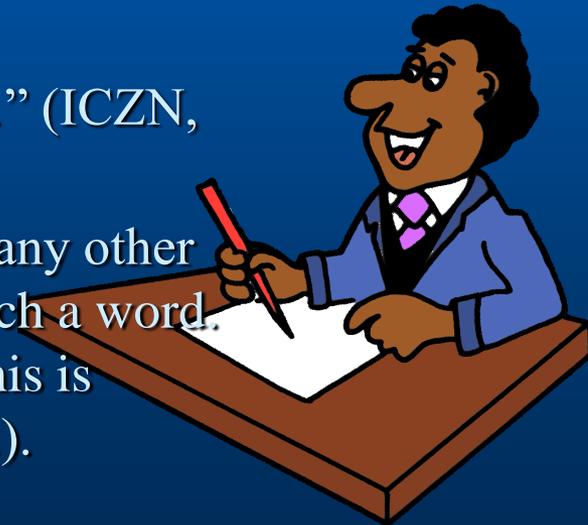
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Carolus Linneaus (1707-1778)



# Species name

- ICZN (1999). <http://www.iczn.org/iczn/index.jsp>
- “The scientific name of a species, ..., is a combination of two names (a binomen), the first being the generic name and the second being the specific name. The generic with a lower-case letter...” (ICZN, 1999: Article 5.1.). name must begin with an upper-case letter and the specific name must begin.
- “A scientific name must, when first published, have been spelled only in the 26 letters of the Latin alphabet...” (ICZN, 1999: Article 11.2.).
- “A species name must be a word of two or more letters...” (ICZN, 1999: Article 11.9.1.).
- “... a name may be a word derived from Latin, Greek or any other language (even one with no alphabet), or formed from such a word. It may be an arbitrary combination of letters providing this is formed to be used as a word.” (ICZN, 1999: Article 11.3.).



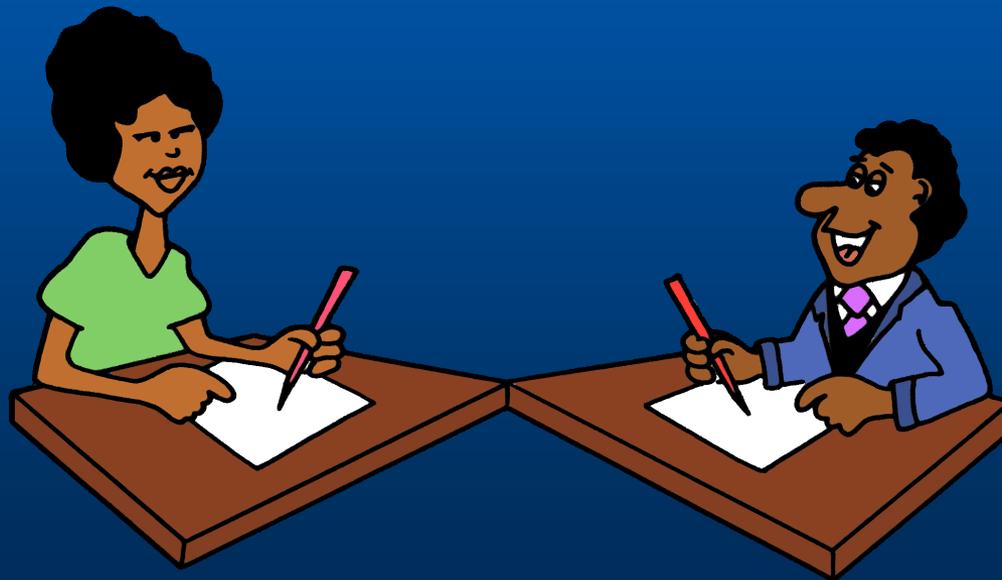
# Species name

- Species name derived from the name of a person: *M. cunningtoni*.
- Species name derived from the name of a river: *M. taiaensis*.
- A diagnostic species name: *M. paucispinis*.
- Species name referring to a local species name: *Anaspidoglanis* “pembetadi” .



# Synonyms and citations

- Synonyms (junior and senior synonyms).
- Citations (Annotated bibliography).
- Principle of Priority (ICZN, 1999: 23.1.).
- Exceptions (ICZN, 1999).



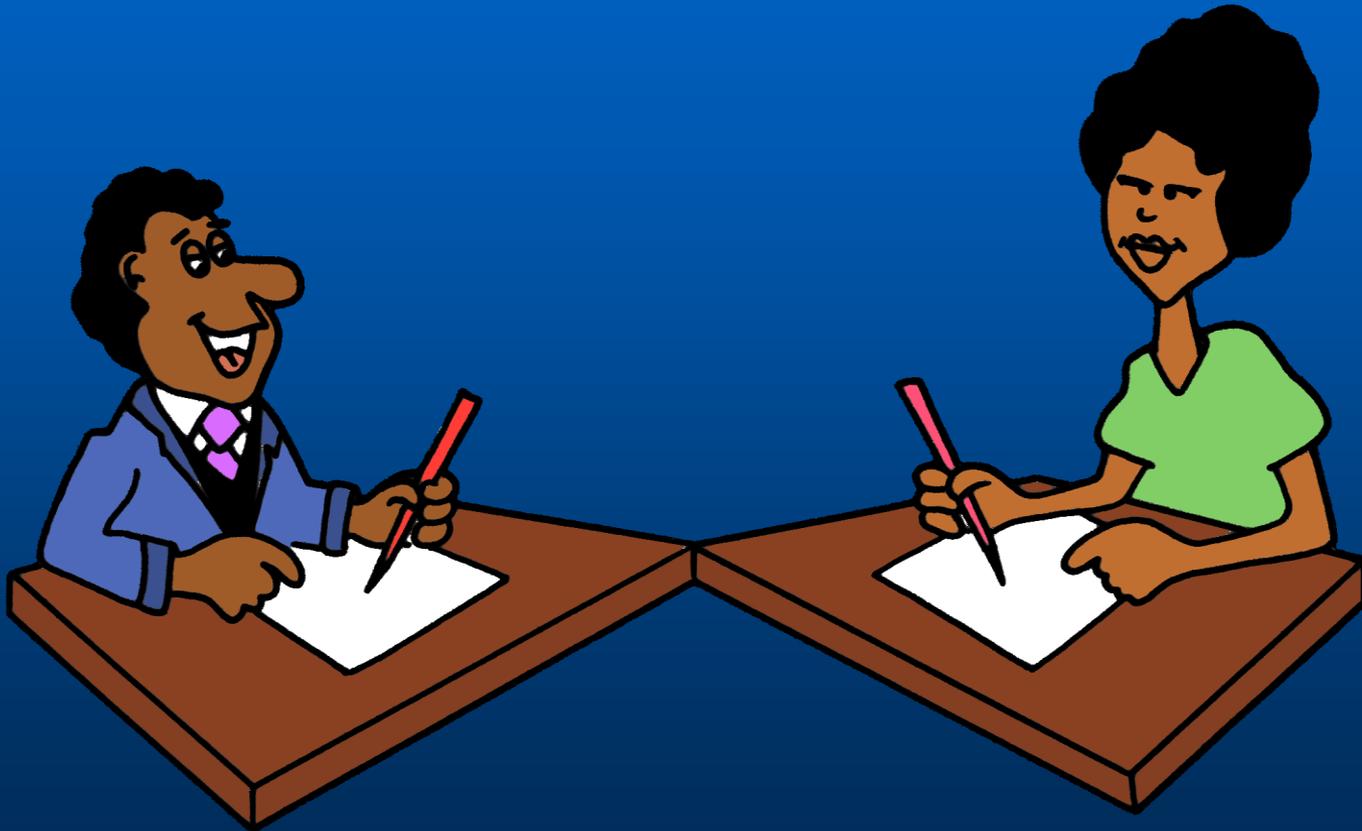
# Type material

- Type material
- Holotype: name bearing specimen
- Paratype(s)
- Additional specimens
- ICZN (1999) Recommendation 16C. Preservation and deposition of type specimens.
- ICZN (1999) Recommendation 16D. Publication of information distinguishing type specimens.



# Etymology

- Meaning and origin of the species name.



# Writing the article

*Mastacembelus reygeli* sp. nov. (Fig. 7)  
Synonyms and citations: *Mastacembelus tanganicæ* Günther (*partim*); *Mastacembelus albomaculatus* Poll (*partim*). Details are provided under other specimens examined.

Type material, holotype: MRAC 73-68-P-552; Zone entre le lieu dit “La chute” à 1 km au sud de Rutungu jusqu’à Magera, lac Tanganika (Burundi) (3° 44′ S to 29° 21′ E), Coll. P. Brichard 1973 (220 mm  $L_T$ ).

Paratypes: MRAC 93326-332; Uvira, lac Tanganika (DRC) (3° 24′ S to 29° 08′ E), Coll. G. Marlier I.R.S.A.C. 18/08/1952 (123–202 mm  $L_T$ ). MCZ 165965 (former 49212); Lake Tanganika, between Mutumba and Magara among rocks, depth 0-10 m (Burundi) (3° 36′ S–29° 21′ E to 3° 44′ S–29° 21′ E), Coll. D. J. Stewart 10/1973 (five specimens, 139–196 mm  $L_T$ ).

Etymology: *reygeli* named after Alain Reygel, artist at the MRAC in Tervuren in appreciation for his numerous beautiful drawings of African fishes.

Diagnosis: within Lake Tanganyika, *M. reygeli* sp. nov. can be distinguished from *M. ophidium* and *M. polli* by its short postanal length [36.6–44.8 (mean 40.8) v.

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# Diagnosis

- Diagnosis [Definition: “In taxonomy, a formal statement of the characters (or most important characters that distinguish a taxon from other or closely related coordinate taxa ... (Mayr & Aslock, 1991: 413)] *versus* Description
- Differential diagnosis
- Binary system : avoidance of generic characters in Diagnosis and Description
- Sequence of characters
- Measurements and counts: references and definitions under Material and Methods



# Writing the article

50.6–60.5 (55.7)%  $L_S$ ]; and from *M. ellipsifer*, *M. plagiostomus* and *M. zebraus* by its brown background colour without or with only a limited and scattered dark brown reticulate pattern (v. yellow background colour with a series of large, saddle-shaped, dark brown spots on the dorso-lateral surface of head, body and tail region). *Mastacembelus reygeli* sp. nov. can be distinguished from *M. platysoma*, *M. cunningtoni* and *M. moorii* by its higher number of dorsal spines [34–38 (median 36) v. <30] and similarly from *M. micropectus* with 26–35 (34) dorsal spines. In addition, *M. micropectus* has generally a shorter pectoral fin [4.8–22.8 (11.3) v. 14.4–25.9 (19.5)%  $L_H$  in *M. reygeli* sp. nov.] a longer postanal length [43.9–49.0 (46.2) v. 37.5–43.1 (39.9)%  $L_S$  in *M. reygeli* sp. nov.], and a unique colour pattern characterized by a light or dark brown background colour mostly with numerous tiny yellowish-white spots. *Mastacembelus reygeli* sp. nov. can be distinguished from *M. tanganicae* by its lower number of dorsal spines [34–38 (median 36) v. 38–43 (41)]. In addition, *M. tanganicae* has a unique colour pattern characterized by a uniform light brown to yellowish background colour with dark brown to black spots on the head, body and tail region forming short zigzag lines on the tail region. *Mastacembelus reygeli* sp. nov. can also be distinguished by colour pattern from *M. flavidus*, which has a uniform light brown to yellowish overall background colour with numerous small, dark brown spots mainly situated on the head, body (above the lateral line) and dorsal fin.

*Mastacembelus reygeli* sp. nov. most closely resembles *M. albomaculatus*, but can be distinguished by its lower number of caudal vertebrae [42–46 (44) v. 47–52 (49)]; lower total number of vertebrae [78–83 (81) v. 85–90 (88)]; shorter S-LDS (%  $L_S$ ) [66.6–71.5 (68.6)%  $L_S$  v. 61.8–67.0 (64.0)] (Fig. 4); longer S-LAS (%  $L_S$ ) [61.9–68.4 (65.5)%  $L_S$  v. 58.1–64.0 (61.0)] (Fig. 5), and generally more blunt snout in specimens  $\leq 160$  mm  $L_S$ . No difference in snout morphology was observed for specimens  $\geq 200$  mm  $L_S$ .

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# Description

- Definition: “In taxonomy, a more or less complete formal statement of the characters of a taxon without special emphasis on those which set limits to the taxon or distinguish it from coordinate taxa” (Mayr & Aslock, 1991: 413).
- Original description: two main objectives 1) recognition and identification and 2) making the new name available.
- Redescription



# Writing the article

Page Navigation

Description: *Mastacembelus reygeli* sp. nov. has an eel-like appearance. [Fig. 7(a)–(c); Tables VII and VIII]. Body oval in cross-section. Tail region relatively short; pre-anal length shows negative allometry with respect to  $L_S$  and is always longer than postanal length, which shows positive allometry with respect to  $L_S$ . Head relatively small, mouth subterminal, eyes of average size for species of *Mastacembelus* and rostral appendage relatively short. Posterior angle of lips situated below region from anterior border of posterior nare up to anterior border of eye, but mostly below posterior nare [Fig. 7(b)]. Position of upper corner of gill opening varying from slightly anterior to dorsal point of pectoral fin base, to clearly anterior to ventral point of pectoral fin base. Dorsal point of pectoral fin base situated far above upper corner of gill opening. Ventral point of pectoral fin base generally below upper corner of gill opening, sometimes distinctly so [Fig. 7(c)].

Number of dorsal spines relatively high, with spines increasing in size from first to last, except for the last spine that is very short and hidden under the skin. Two externally visible anal spines, with first one smaller than second one, and both supported by a single, well-developed anal pterygiophore. One additional very short last spine, hidden under the skin.

Haemal spine supporting pterygiophore of first anal spine situated on first caudal vertebra, and neural spine supporting pterygiophore of last externally visible dorsal spine situated on one of the more posterior caudal vertebrae, both separated by 0–2 ‘in-between vertebrae’. Hence, distance from snout to first externally visible anal spine always somewhat shorter than distance from snout to last externally visible dorsal spine.

Preopercular spine small and well hidden under the skin. In contrast to *M. albomaculatus*, there is no reduction of the preopercular spine with increasing  $L_S$ . Preorbital spine absent.

Maximum size: 254 mm  $L_S$  (265 mm  $L_T$ ).

Colouration: colour pattern variable [Fig. 7(a)]. Brown background colour with no or few, often scattered, light brown to whitish spots on head, belly and tail region. Hence, reticulate pattern absent or very limited and scattered. Some specimens have

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# Distribution

- Distribution based on the available data from your own research
- Revised data (full symbol)
- Literature data (open symbol)
- Collecting locality data as precise as possible
- Coordinates: country gazetteers



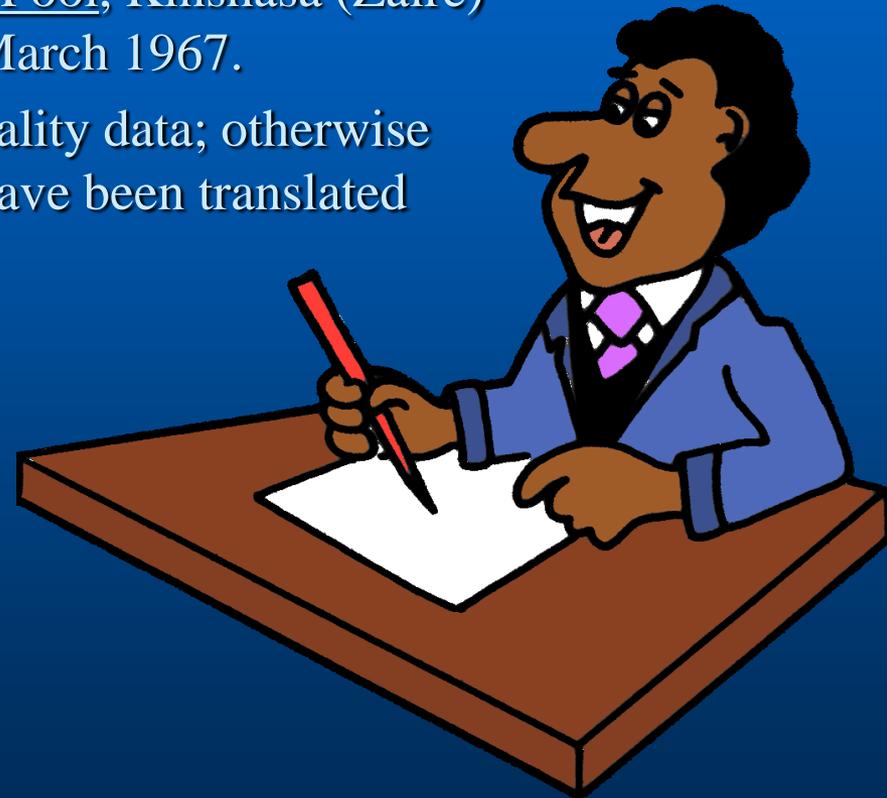
# Ecology

- If available:
- Rapids, pools, riffles etc...
- Physicochemical parameters of the water etc...
- Savanna, Forest etc...



# List of specimens examined

- Future researchers...
- MRAC 177695, 358 mm TL, Stanley-Pool, Kinshasa (Zaire) ( $\pm 4^{\circ}06'S-15^{\circ}15'E$ ), P. Brichard, 23 March 1967.
- By preference, do not translate the locality data; otherwise clearly stipulate that all locality data have been translated
- By species, by basin, by country...



# Writing the article

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Distribution: *masiacembenus reygeni* sp. nov. is endemic to Lake Tanganyika and recorded from the northern to the central parts of the lake (Fig. 8), from Kalemie (formerly Albertville, DRC) to the area of Kigoma (Ujiji or Udjidji) (Tanzania). Most collections are from the northern part of the lake.

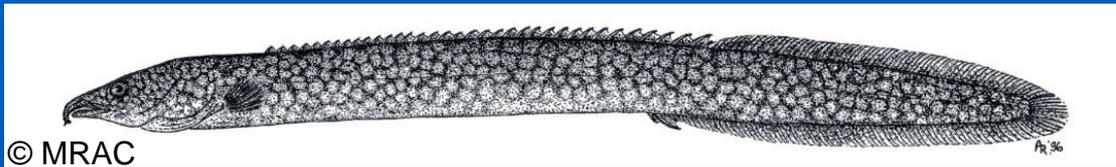
Biology–ecology: caught among rocks between 0 and 10 m depth (based on the capture data).

Other specimens examined: Lake Tanganyika, BMNH uncatalogued; aquarium specimen (180 mm). MRAC 91638-640; Coll. G. Marlier I.R.S.A.C. 1950 (114–169 mm). Burundi: MRAC 53074; Nyanza (4° 20' S to 29° 35' E), Coll. A. Lestrade 1937 (153 mm). MRAC 90980 (paratype of *M. albomaculatus*); Lubindi, station 270, pêche à la ligne (4° 17' S to 29° 33' E), Coll. M. Poll, Explor. Hydr. Tang. 02/05/1947 (155 mm). MRAC 76-9-P-219-221; Lac Tanganyika, côte du Burundi, Coll. M. Schreyen 1975 (74–126 mm). MCZ 165966 (former 49212); between Mutumba and Magara among rocks, depth 0–10 m (3° 36' S–29° 21' E to 3° 44' S–29° 21' E), Coll. D. J. Stewart 10/1973 (four specimens, 44–85 mm).

DRC, BMNH 1955.12.20:1715 (paratype of *M. albomaculatus*); Albertville, plage ateliers C.F.L. (5° 56' S to 29° 12' E), Coll. Inst. Roy. Sci. Nat. Belge 14/11/1946 (104 mm). BMNH 1955.12.20:1716 (paratype of *M. albomaculatus*); Manga, station 249, Ubwari, plage rocheuse, senne (4° 09' S to 29° 13' E), Coll. Inst. Roy. Sci. Nat. Belge 17/04/1947 (124 mm). MRAC 90979 (paratype of *M. albomaculatus*); Manga, station 249, Ubwari, plage rocheuse, senne (4° 09' S to 29° 13' E), Coll. M. Poll Explor. Hydr. Tang. 17/04/1947 (158 mm). MRAC 91631; Uvira (3° 24' S to 29° 08' E), Coll. G. Marlier I.R.S.A.C. 18/06/1949 (113 mm). MRAC 91632-633; same data, Coll. G. Marlier I.R.S.A.C. 07/09/1949 (87–124 mm). MRAC 91641; same data, Coll. G. Marlier I.R.S.A.C. 1950 (112 mm). MRAC 93322; same data, Coll. G. Marlier I.R.S.A.C. 03/1953 (146 mm). MRAC 93333-336; same data, Coll. G. Marlier I.R.S.A.C. 18/08/1952 (three specimens, 65–125 mm). MRAC 93638; same data, Coll. G. Marlier I.R.S.A.C. 20/08/1952 (172 mm). MRAC 94678; same data, Coll. N. Leleup I.R.S.A.C. 1954 (151 mm). MRAC 130384; same data, Coll. H. Matthes I.R.S.A.C. 04/11/1958 (265 mm). MRAC 126269; Lac Tanganika, baie Nord Coll. G. Marlier 1959 (138 mm).

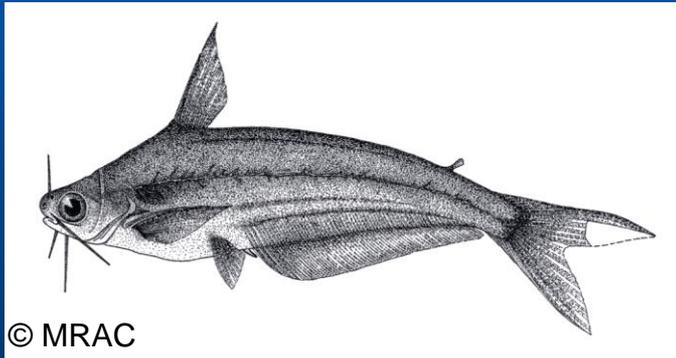
# Illustrations

- “A drawing tells more than a thousand words”
- Standard procedure to illustrate the left side of the fish



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*Mastacembelus albomaculatus* Poll, 1953 (Vreven & Snoeks, 2009)



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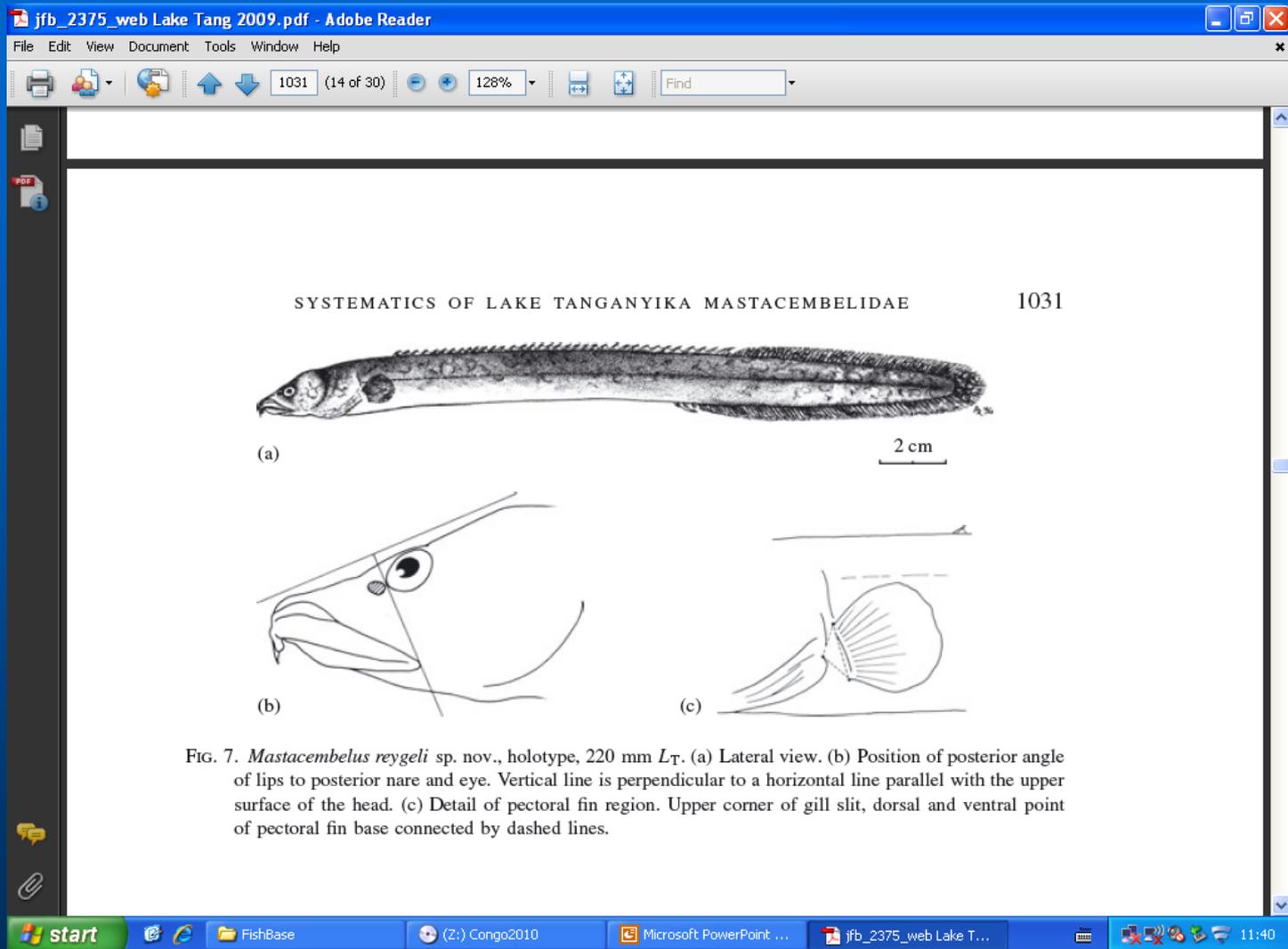
*Schilbe nyongensis* (De Vos, 1981)



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# Illustrations



# Writing the article

- Title
- Authors (\* Author to whom correspondence should be addressed)
- Address
- Abstract
- Key Words
- INTRODUCTION
- MATERIAL AND METHODS (institutions, coordinates, data analyses)
- RESULTS
  - - Historic Overview
  - - Analysis: Meristics
  - - Analysis: Morphometrics
- DESCRIPTIONS (see above) (Generic status)
- **DISCUSSION**
- ACKNOWLEDGEMENTS (institutions, referees, other persons, institutions)
- References (see journal guidelines!!!)



# Writing the article

**DISCUSSION**

During this study, the type series of *M. tanganicæ* was found to be polyspecific, with some confusion over the identity of the type specimens and the status of the lectotype, for which no label, was found. Matthes (1962) designated the specimen illustrated by Boulenger (1916: Fig. 93) as the lectotype of *M. tanganciae*. Based on the scale bar below Boulenger's (1916) drawing, this specimen appears to be

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1040 E. J. VREVEN AND J. SNOEKS

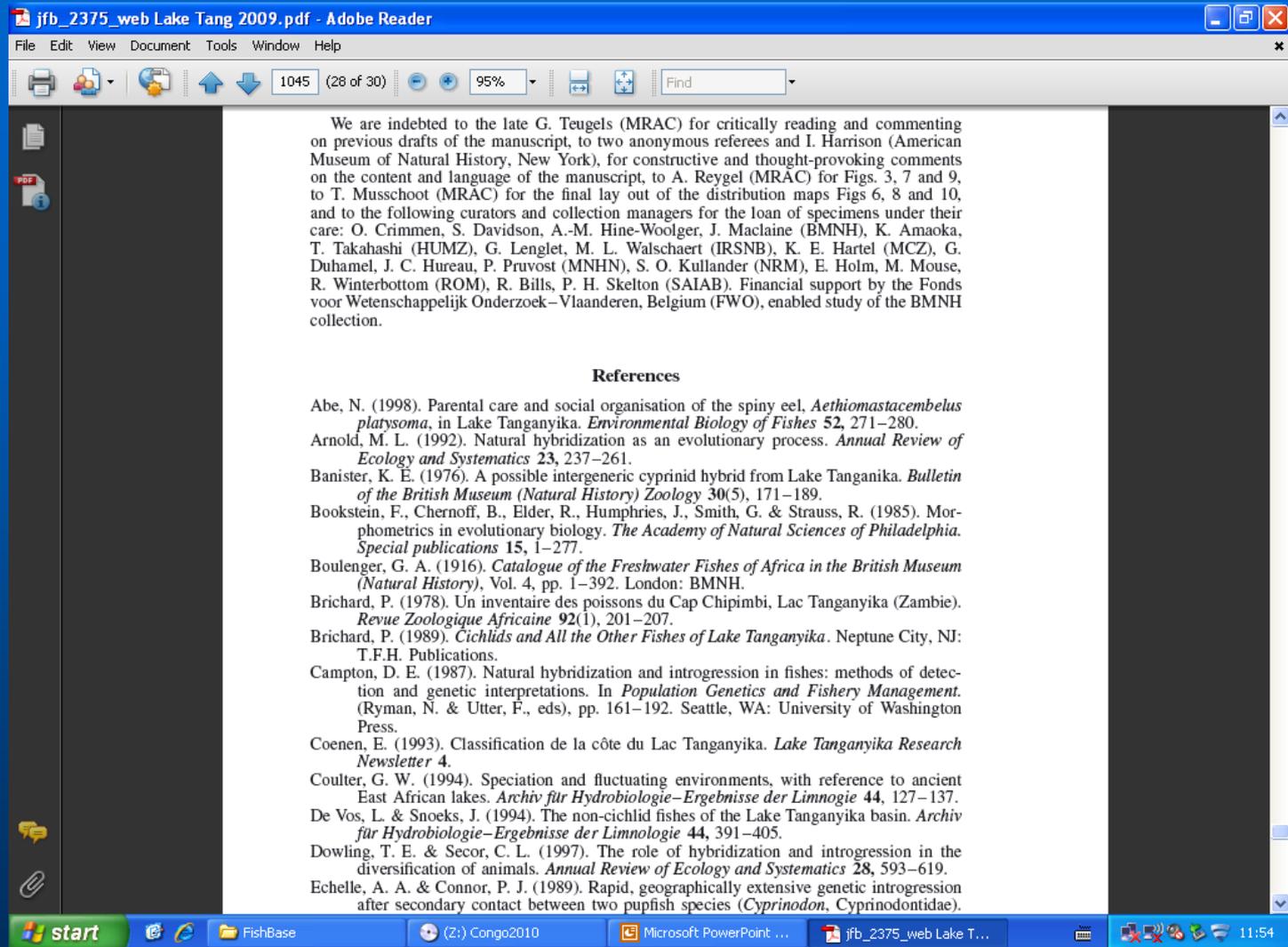
c. 170 mm  $L_T$ , which corresponds to the largest specimen of the original syntype series. Matthes (1962) further mentioned that the lectotype has 39 dorsal spines, while 36 spines were counted both on Boulenger's (1916) illustration and on the syntype of 170 mm  $L_T$  (here identified as *M. reygeli* sp. nov.). Conversely, one of the other syntypes (115 mm  $L_T$ ) has 39 externally visible dorsal spines (and one hidden under the skin) and, therefore, might represent the specimen examined by Matthes (1962), who probably did not take into account the scale bar when he tried to match the specimen he examined with the one illustrated by Boulenger (1916). In addition, Matthes may have based his judgement mainly on the colour pattern, which is best preserved in the smaller syntype of 115 mm  $L_T$  and which corresponds best with Boulenger's illustration. It is possible that, due to the poor state of preservation of the syntypes, Boulenger (1916) used the largest specimen as a basis for the drawing but added the colour pattern of one of the smaller specimens (115 mm  $L_T$ ) to that illustration. This way of illustrating by Boulenger has been reported before (Regan, 1922). Hence, based on the dorsal spine number and colour pattern, it is the smaller (115 mm  $L_T$ ) specimen that most probably corresponds to the lectotype examined by Matthes (1962), and not the largest syntype (170 mm  $L_T$ ). The specimen of 115 mm  $L_T$  is conspecific with a paralectotype of 131 mm  $L_T$  (BMNH 1889.1.30:16-17). The four remaining paralectotypes were identified as *M. reygeli* sp. nov. (see above).

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# Writing the article



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We are indebted to the late G. Teugels (MRAC) for critically reading and commenting on previous drafts of the manuscript, to two anonymous referees and I. Harrison (American Museum of Natural History, New York), for constructive and thought-provoking comments on the content and language of the manuscript, to A. Reygel (MRAC) for Figs. 3, 7 and 9, to T. Musschoot (MRAC) for the final lay out of the distribution maps Figs 6, 8 and 10, and to the following curators and collection managers for the loan of specimens under their care: O. Crimmen, S. Davidson, A.-M. Hine-Woolger, J. Maclaine (BMNH), K. Amaoka, T. Takahashi (HUMZ), G. Lenglet, M. L. Walschaert (IRSNB), K. E. Hartel (MCZ), G. Duhamel, J. C. Hureau, P. Pruvost (MNHN), S. O. Kullander (NRM), E. Holm, M. Mouse, R. Winterbottom (ROM), R. Bills, P. H. Skelton (SAIAB). Financial support by the Fonds voor Wetenschappelijk Onderzoek-Vlaanderen, Belgium (FWO), enabled study of the BMNH collection.

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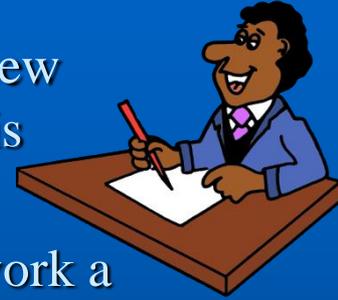
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# Choice of the Journal

- “Obscure” journals
- Referee system
- Citation Index
- Copeia, Cybium, Ichthyological Explorations of Freshwaters, Journal of Fish Biology, Journal of Natural History, Zoological Journal of the Linnean Society and Zootaxa (online).
- Please carefully read the instructions to contributors / authors.

a few examples:

- Two authors: ‘author’ & ‘author’ or ‘author’ and ‘author’
- More than two authors: *et al.*
- Roberts, T.R., 1975. Geographical distribution of African freshwater fishes. *Zool. J. Linn. Soc.*, **57**(4): 249-319.



# A few examples: what is to be avoided?

*Barbus new species* (Type locality: Nyabarongo drainage): number of lateral line scales to the base of caudal fin 27–29 (median 28). PdL 53.1–54.5 in SL. A longer and more pointed head, HL 27.1–30.2, and BdO 22.8–24.6 in SL. Barbels generally longer with anterior one reaching posterior edge of eye orbital (or slightly beyond), while the posterior barbel usually reaching beyond the preopercle. Body colour pattern variable.

ICZN, 1999?

## Conclusion

This study has provided additional morpho-meristic characters useful in distinguishing the two established species *B. neumayeri* and *B. pellegrini*. Specimens from the Nyabarongo drainage were morpho-meristically different as to warrant recognition as a different species; thus, a new species status *B. new species* whose type locality would be the Nyabarongo drainage is proposed.

# A few examples: what is to be avoided?

## Morphological revision of *Ichthyborus besse besse* and *Ichthyborus besse congolensis* (Pisces: Distichodontidae)

### *Ichthyborus besse besse* (proposed)

*Characinus* (*Ichthyborus besse*) *besse* (Joannis, 1835)

*Ichthyborus besse besse* (Boulenger 1909)

*Ichthyborus microlepis* (Gunther 1864)

### Reretences

- ✓ Bailey R.G. (1994) Guide to the fishes of the River Nile in

### *Ichthyborus besse congolensis*

(proposed)

*Ichthyborus besse congolensis* (Giltay 1930)

*Ichthyborus besse congolensis* (Daget 1967)

*Ichthyborus besse congolensis* (Fowler 1975)

*Ichthyborus besse congolensis* (Banister and Bailey 1979).

**Description:** Up to 1675mm silvery grey fish, except for the caudal fin which has worm-like lines and clear empty black circle at the base. Dark spots forming oblique lines on caudal lobes; 19-22 teeth on each side of the upper jaw; 14-18 on the lower jaw; 2 canines at the extremity of the upper jaw and 3 of the lower jaw.

**Measurements:** As in the type species.

Scales in lateral line scale 91-102. Dorsal fin rays 15-17 (III 19-22, in type species); anal 15-18, pectoral 13-17.



# A few additional points to pay attention to

**If you want to publish the result of your FishBase training course, please:**

(1) Your work has been a collaborative effort so please contact your direct supervisor. If not available, please contact somebody else of the FishBase team or Prof. Jos Snoeks as the publication itself should also be a collaborative effort.

(2) Selection of a good journal, i.e. with referees, will be important for yourself but also for the general appeal of the work undertaken within the framework of the FishBase training program.

(3) There is the possibility to obtain a “come back” grant to further work on your case study and to prepare it for publication. Not for next year but for the year after. Maximum two candidates a year.

# Additional Reading

**Blanpain K. 2006.** Academic Writing. A resource for Researchers.  
Acco.242p.