EDITORIAL

This issue of *Naga*, devoted to Africa, provides this *Fishbyte* editor an opportunity to focus on fisheries research on the Continent.

Being, through my African-American father, a member of the African diaspora, I have always been interested in Africa, and acted on this as early as 1971, by performing in Ghana the six months worth of field work that led to my MS thesis. Subsequently, I visited several African countries, mainly to lecture in various fish stock assessment training courses.

One of these, devoted to the fisheries of Lake Victoria, sponsored by the Haplochromis Ecology Study Team (HEST) and FAO/DANIDA, and held at the Tanzanian Fisheries Research Institute (TAFIRI) in early 1988 in Mwanza, Tanzania, was particularly successful in that the participants wrote papers which the lecturers felt were suitable for publication in book form. We contacted various agencies, but never succeeded in securing the required support.

This issue of *Fishbyte* presents one of the papers from that course (by Wandera and Wanink) plus one (by Morales-Nin) originally meant to complement, in the planned book, the papers written during the course.

The idea here is that if two to three of these papers could be included in each of this year's issues of *Fishbyte*, the commitment to help publish these papers would be met (and the published papers could still be assembled later, and issued as a slim volume - anyone to volunteer the required funds?).

For political reasons, one country I did not visit earlier was South Africa (the late Philip Sluczanowski, whose eulogy may be found on p. 51 had left his native country for these same reasons). These reasons have now been overcome, and indeed the right thing now is to do whatever we can to help that country complete its transition to democracy (see article by K. Cochrane, p. 4). Hence, I did accept an invitation to go to South Africa to join an international panel which, in September 1994, reviewed 70 proposals submitted by South African scientists to an imaginative new program designed by SANCOR to help them adjust their research to the needs and realities of the new South Africa (see also p. 7).

This experience was rather instructive, and we shall return to this theme in a next issue of *Naga*.

I conclude this by extending my best wishes to the nearly 200 African members of the NTFS. ***D. Pauly***

Length-weight Relationships of Fishes from Tributaries of the Volta River, Ghana: Part I Analysis of Pooled Data Sets

M. ENTSUA-MENSAH
A. OSEI-ABUNYEWA
M.L.D. PALOMARES

Abstract

The parameters a and b of length-weight relationships of the form $W = a \cdot L^b$ were estimated for 45 fish species sampled in the Oti, Pru and Black Volta rivers, Ghana. Also, the slope and intercepts of regression enabling standard to total length conversions were estimated for each of these same species. The estimates of b, which ranged from 2.35 to 3.27 have a mean of 2.98, with a s.e. of 0.036. These results are complemented with a brief discussion of the need for data summaries such as presented here.

Introduction

The length-weight relationship of fish is an important piece of information, required for most computations performed in fisheries stock assessment, but often not available when needed. In fact, not enough attention is generally given to the analysis of the field data from which the parameter of such relationships can be estimated.

This contribution is based on data gathered in the frame of the 1987-1990 Onchocerciasis Control Programme by staff of the Institute of Aquatic Biology (AIB) in rivers of the Volta basin (Anon. 1990), devoted to identifying ways of reducing the blackfly populations of the *Simulium damnosum* complex.

Materials and Methods

The individual length (standard and total) and weight measurements used here are based on fish sampled by

Table 1. Length-weight and standard-total length regression statistics of 46 fish species from three tributaries of Volta River, Ghana.

Family	Length range (SL cm)			L/W relationship			SL:TL (cm)	
	min	max	n[a]	a	b	r	α	β
Polypteridae								
Polypterus endlicheri	14.7	44.0	88/80	0.00848	3.015	0.983	1.651	1.085
Polypterus senegalus	13.3	32.3	159/154	0.0277	2.568	0.971	1.720	1.038
Bagridae								
Auchenoglanis occidentalis	6.3	25.5	39/39	0.0112	3.235	0.993	0.247	1.26
Bagrus bajad	9.7	37.5	76/69	0.00980	3.080	0.993	0.910	1.290
Bagrus docmak	8.4	32.0	123/65	1.00	2.987	0.978	1.507	1.194
Chrysicthys auratus	7.0	19.3	185/198	0.0216	2.944	0.976	-0.859	1.397
Chrysicthys nigrodigitatus	6.0	23.8	275/261	0.0197	3.010	0.968	-0.416	1.389
Mochokidae								
Synodontis arnoulti	10.0	19.3	25/25	0.0165	3.135	0.995	-0.133	1.323
Synodontis filamentosus	6.9	19.0	90/82	0.0200	2.989	0.968	0.786	1.298
Synodontis gambiensis	4.2	18.5	296/204	0.0188	3.073	0.984	-0.053	1.385
Synodontis ocellifer	3.5	16.2	278/163	0.0228	2.992	0.978	0.233	1.364
Synodontis sorex	6.4	21.6	62/47	0.0238	3.002	0.988	0.925	1.329
Synodontis velifer	5.3	18.5	224/201	0.0258	2.994	0.978	-0.529	1.463
Cyprinidae								
Barbus macrops	5.6	16.9	247/235	0.0786	2.348	0.892	0.670	1.20
Labeo coubie	6.6	22.8	125/30	0.0166	3.162	0.994	-0.309	1.356
Labeo parvus	7.1	21.2	198/182	0.0138	3.206	0.993	0.114	1.292
Labeo senegalensis	6.4	28.0	270/145	0.0167	3.082	0.992	0.984	1.264
Raiamas senegalensis	7.7	18.0	75/77	0.00865	3.233	0.979	0.772	1.196
Characidae								
Alestes baremoze	8.7	26.5	92/91	0.00613	3.266	0.991	-0.250	1.329
Brycinus leuciscus	5.2	9.8	496/476	0.00000670	2.749	0.936	0.799	1.188
Brycinus macrolepidotus	7.0	19.2	281/241	0.0193	2.967	0.986	0.476	1.243
Brycinus nurse	5.7	17.5	471/454	0.0231	2.959	0.986	0.543	1.211
Hydrocynus forskalii	9.0	28.5	94/93	0.00873	3.145	0.990	-0.061	1.291
Mormyridae								
Hippopotamyrus pictus	7.8	24.6	269/246	0.0145	2.916	0.977	0.030	1.174
Marcusenius cyprinoides	9.3	16.0	33/23	0.0161	2.888	0.969	-0.186	1.179
Marcusenius senegalensis	7.9	19.4	334/296	0.0111	3.033	0.954	-0.124	1.171
Mormyrops deliciosus	12.8	54.0	20/6	0.0418	2.398	0.971	-1.323	1.191
Mormyrus hasselquisti	14.0	21.2	28/7	0.0169	2.745	0.928	-0.202	1.130
Mormyrus macrophthalmus	9.5	23.1	33	0.00483	3.119	0.967		
Mormyrus rume	13.0	24.7	17	0.0512	2.286	0.993		
Petrocephalus simus-simus	5.8	11.3	216/198	0.0214	2.908	0.967	0.328	1.174
Schilbeidae								
Schilbe niloticus	6.0	19.0	431/400	0.0102	2.981	0.972	0.402	1.199
Parailia pellucida	6.5	9.2	78/71	0.00431	3.371	0.795	1.222	1.022
Schilbe mystus	4.9	23.3	320/255	0.00769	3.154	0.979	0.397	1.171
Siluranodon auritus	6.2	13.0	125/109	0.0212	2.634	0.868	0.417	1.152
Cichlidae								
Chromidotilapia guentheri	5.0	10.0	58/49	0.0269	3.163	0.983	-0.500	1.359
Hemichromis bimaculatus	5.1	13.6	23/20	0.0325	3.017	0.993	-0.096	1.262
Hemichromis fasciatus	5.6	17.7	95/93	0.0192	3.218	0.988	-0.067	1.263
Steatocranus irvinei	5.4	10.7	27/27	0.0213	3.099	0.979	0.445	1.215
Sarotherodon galilaeus	6.4	11.2	9/8	0.0370	3.049	0.992	0.061	1.321
Tilapia zilli	5.0	14.8	36/36	0.0279	3.176	0.992	-0.083	1.292
Anabantidae								
Ctenopoma kingsleyae	5.2	12.9	78/81	0.0429	2.953	0.987	-0.110	1.282
Lates niloticus	7.2	22.0	58/50	0.0198	3.045	0.993	-0.341	1.263
Clariidae								
Clarias anguillaris	14.5	43.0	128/42	0.00827	3.062	0.976	0.502	1.118
Clupeidae								
Cynothrissa mento	6.3	11.6	253/262	0.0383	2.456	0.878	1.180	1.093
Distichodontidae								
Distichodus rostratus	6.4	34.5	300/293	0.0168	3.078	0.997	0.093	1.260

[a] Number of fish used for L/W relationship/number of fish used for SL:TL relationship.

members of the Hydrobiological Monitoring Group of AIB, using gill nets (mesh size 12.5-40 mm) in the Oti, Pru and Black Volta rivers, three tributaries of the Volta River (Fig. 1).

On site, length was measured to the nearest millimeter and weight to the nearest 0.1 gram. The data were then computerized (at AIB) and analyzed (at AIB and ICLARM) using a commercial spreadsheet software (Borland Quattro Pro).

The analysis consisted of the following steps:

1) display a scatterplot of the L-W data pairs to identify and delete obvious outliers (mainly due to recording errors);
2) perform regression analyses using

$$\log_{10} W_i = \log(a) + b \cdot \log L_i \quad ...1)$$

where W_i and L_i are the weight (WW, in g) and length (SL, in cm) respectively of a given fish i,

3) plot, for each fish (i) the total length (TL, in cm) against the standard length (SL, in cm) to obtain a predictive regression *viz*

$$TL_i = \alpha + \beta\, SL_i \quad ...2)$$

4) tabulate results (a and b estimates, α and β estimates) and ancillary statistics (number and length range of fish used for each regression, and coefficient of the (log) linear regression, r)

Steps 1-4 were performed after pooling the data from the three rivers (not all species were represented in samples from all rivers). Part II of this contribution will analyze differences among rivers, not discussed here.

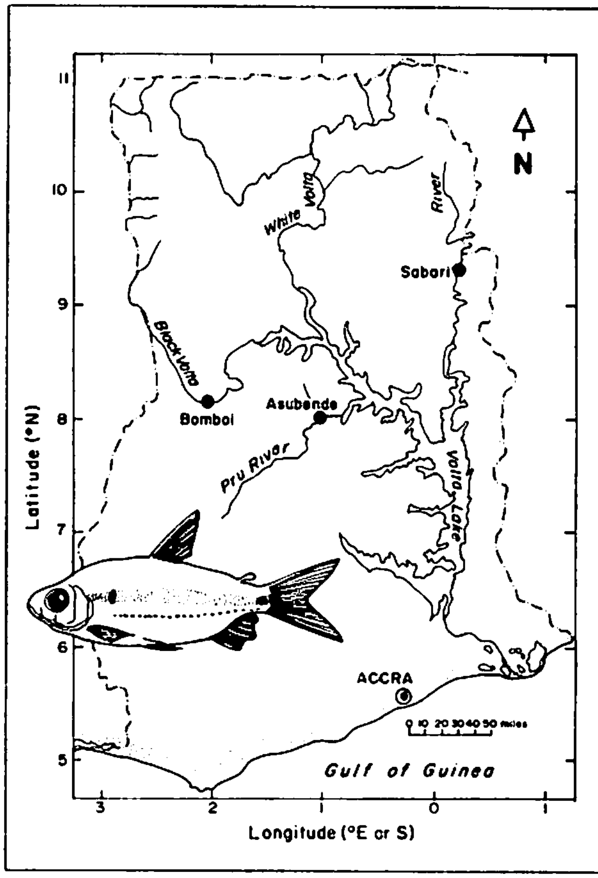

Fig. 1. *Map of Ghana showing the sampling locations (dots) and the rivers mentioned in the text; the fish illustration refers to* **Brycinus leuciscus** *(Günther 1867), an abundant characid.*

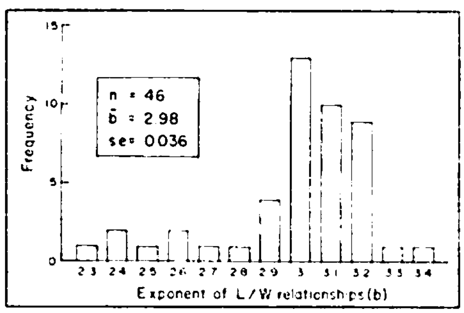

Fig. 2. *Distribution of b-values of fishes from the Volta River Basin, Ghana.*

Results and Discussion

Table 1 summarizes the key results of our analyses; the length-weight and SL:TL relationships therein may be used for various conversions. They also will be available through FishBase, the computerized encyclopedia of fishes (Palomares et al. 1991; Froese and Pauly 1994).

The estimated values of b ranged from 2.34 to 3.27, with mean and mode near 3, as for most fishes (Carlander 1969, 1977). That the plot is not more symmetrical may be attributed to the low number of cases.

The results in Table 1 should be useful to anyone studying any of the 46 species of fish covered here. The analyses supporting these results, although extremely time-consuming (nearly 150 separate files of L/W data pairs were created and manipulated) are simple and should be performed by anyone with access to a personal computer which performs monitoring surveys, as very little can be done with raw data such as compiled by Anon. (1990).

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M. Entsua-Mensah *and* **A. Osei-Abunyewa** *are from the Institute of Aquatic Biology (IAB), PO Box 38, Achimota, Ghana.* **M.L.D. Palomares** *is an ICLARM Postdoctoral Fellow.*