# LENGTH-WEIGHT RELATIONSHIPS OF FISHES FROM ANAMBRA RIVER, SOUTHEASTERN NIGERIA

**EZENWAJI, Henry Maduka Godfrey**
Fisheries and Hydrobiology Research Unit, Department of Zoology,
University of Nigeria, Nsukka, Enugu State, Nigeria.

**ABSTRACT**

***Length-weight relationships (LWR) and standard-total length relationships (STR) were estimated for 87 populations of fishes in Anambra river belonging to 18 families. 33 genera and 45 species The exponent, b , ranged from 2.007 to 3.750 and had a mean of 2.764 ± 0.338, which is significantly less than 3, indicating negative allometric LWR for the multispecies populations studied. The distributions of b and In a were normal and the correlation between them was negative (r = -0.864) and highly significant. STR permits conversion of standard to total length of each population***.

**Keywords:** Length-weight relationships, fishes, Anambra river

## INTRODUCTION

Out of about 268 species of fish in the inland waters of Nigeria only the length-weight relationships (LWR) of 43 (16.04%) species have been reported (King, 1996; King and Udo, 1996; Ezenwaji, 1999; Anibeze, 2000; Olaosebikan and Raji, 1998). As LWR may vary geographically, it is important to obtain and use local LWR values (Sparre *et al.,* 1989; Merella *et al.,* 1997). LWR have many uses particularly in estimating the mean weight of a given length class, in comparing species and populations in different geographic areas and in estimating the condition or "well being" of the fish ( Petrakis and Stergiou,1995; Garcia *et al.*,1998). This contribution from the Anambra river adds to the existing LWR data on Nigerian freshwater fishes.

## MATERIALS AND METHODS

Fish collections were made from the Anambra river from August 1997 to January 2002 using a variety of fishing gears, including experimental set of gill nets of different mesh sizes (2.5, 3.8, 5.1, 7.6, 8.9, 10.2, 12.7, 17.8, 22.9 cm), cast nets, traps and *atalla* lift nets. The fishes were identified employing Daget *et al.* (1984, 1986a, b), Leveque *et al.* (1990,1991,1992), Teugels *et al.* (1992), and Olaosebikan and Raji (1998) and the length (cm; total length, TL; and standard length, SL) and weight (g) of each fish were measured using a metre rule measuring board and a spring balance respectively. The sex of each fish was also determined whenever possible. The parameters a and $a_1$ (intercepts) and b and $b_1$ (slopes) of the LWR and standard–total length relationships (STR) of the form: W = $a_{(1)}L^{b(1)}$ , were estimated through base–10 logarithmic transformation of the L-W and SL-TL data pairs, i.e. Log W = log $a_{(1)}$ + $b_{(1)}$ log L, with a and $a_1$, and b and $b_1$ estimated by ordinary least square regression. The parameters of the LWR and STR were sometimes determined separately for both sexes of a species, and for the same species collected at different periods. These different estimates were considered separate 'populations' (King, 1996). In order to verify if calculated b was significantly different from 3, the Student's t-test was employed. The frequency distribution of the intercept, a, was expressed as In a. Correlation analyses were conducted between b and In a to determine significance (Caillouet, 1993) and between log a and b in *Pellonula leonensis* to determine outliers (Stergou and Moutopoulos, 2001), if any. The coefficient of variation (CV) was determined as: $CV = \left\{100\, x\, S / \bar{X}\right\}\%,$ where S = standard deviation and $\bar{X} =$ population mean. The Kurtosis coefficient (KC) was estimated using: KC = $\mu_4 / \sigma^4 - 3,$ where $\mu_4 = \sum (y - \eta)^4 / N$ and $\sigma^4 =$ fourth moment of the standard deviation.

**Table 1: Length-weight relationship and related statistics of fish in Anambra river, Nigeria**

| | | | Total length (cm) | | | | TL - Wt relationship | | | SL - TL relationship | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Family/species** | **Sex** | **N** | **Mean** | **S.d** | **Min** | **Max** | **a** | **b** | **r** | $a_1$ | $b_1$ | **r** |
| **Polypteridae** | | | | | | | | | | | | |
| *Polypterus senegalus* | | 39 | 19.07 | 1.98 | 16.0 | 25.7 | 0.0065 | 2.966 | 0.955 | 4.0012 | 0.556 | 0.798 |
| **Clupeidae** | | | | | | | | | | | | |
| *Pellonula leonensis* | | 104 | 6.12 | 1.07 | 3.4 | 8.5 | 0.0088 | 2.878 | 0.916 | 1.2132 | 0.997 | 0.993 |
| *Pellonula leonensis* | M | 14 | 5.84 | 0.60 | 5.0 | 7.1 | 0.0132 | 2.655 | 0.926 | 1.2955 | 0.950 | 0.969 |
| *Pellonula leonensis* | F | 36 | 6.07 | 0.69 | 5.1 | 8.4 | 0.0092 | 2.865 | 0.951 | 1.2977 | 0.953 | 0.975 |
| *Pellonula leonensis* | | 50 | 6.00 | 0.67 | 5.0 | 8.4 | 0.0099 | 2.821 | 0.946 | 1.2891 | 0.956 | 0.974 |
| *Pellonula leonensis* | M | 23 | 5.05 | 0.76 | 3.4 | 6.3 | 0.0176 | 2.350 | 0.864 | 1.3287 | 0.942 | 0.988 |
| *Pellonula leonensis* | F | 13 | 6.61 | 0.66 | 5.9 | 8.5 | 0.0132 | 2.658 | 0.970 | 1.2788 | 0.980 | 0.980 |
| *Pellonula leonensis* | M | 14 | 6.51 | 0.47 | 6.0 | 7.7 | 0.0089 | 2.880 | 0.924 | 1.2733 | 0.977 | 0.984 |
| *Pellonula leonensis* | | 27 | 6.56 | 0.56 | 5.9 | 8.5 | 0.0117 | 2.730 | 0.948 | 1.2715 | 0.981 | 0.980 |
| *Pellonula leonensis* | | 45 | 6.80 | 0.46 | 6.1 | 8.2 | 0.0141 | 2.685 | 0.904 | 1.3169 | 0.950 | 0.963 |
| *Pellonula leonensis* | M | 20 | 6.72 | 0.41 | 6.1 | 7.5 | 0.0088 | 2.940 | 0.894 | 1.4427 | 0.897 | 0.955 |
| *Pellonula leonensis* | F | 25 | 6.86 | 0.50 | 6.2 | 8.2 | 0.0167 | 2.590 | 0.920 | 1.2307 | 0.989 | 0.968 |
| *Pellonula leonensis* | M | 18 | 5.43 | 0.55 | 4.6 | 6.5 | 0.0112 | 2.885 | 0.926 | 1.4421 | 0.886 | 0.969 |
| *Pellonula leonensis* | F | 13 | 5.48 | 0.66 | 4.8 | 7.3 | 0.0410 | 2.111 | 0.882 | 1.3468 | 0.932 | 0.974 |
| *Pellonula leonensis* | | 31 | 5.45 | 0.59 | 4.6 | 7.3 | 0.0206 | 2.521 | 0.900 | 1.3989 | 0.906 | 0.970 |
| *Pellonula leonensis* | | 48 | 6.43 | 0.60 | 5.6 | 8.3 | 0.0363 | 2.257 | 0.939 | 1.3526 | 0.937 | 0.964 |
| *Pellonula leonensis* | F | 25 | 6.50 | 0.68 | 5.6 | 8.3 | 0.0268 | 2.415 | 0.951 | 1.3944 | 0.919 | 0.962 |
| *Pellonula leonensis* | M | 22 | 6.00 | 0.43 | 4.9 | 6.7 | 0.0142 | 2.674 | 0.951 | 1.2874 | 0.956 | 0.947 |
| *Pellonula leonensis* | F | 24 | 6.08 | 0.42 | 5.3 | 7.3 | 0.0146 | 2.663 | 0.909 | 1.3098 | 0.947 | 0.935 |
| *Pellonula leonensis* | | 46 | 6.04 | 0.43 | 4.9 | 7.3 | 0.0142 | 2.676 | 0.930 | 1.2947 | 0.953 | 0.941 |
| *Pellonula leonensis* | | 47 | 4.54 | 0.51 | 3.8 | 6.0 | 0.0142 | 2.592 | 0.960 | 1.1965 | 1.011 | 0.978 |
| *Pellonula leonensis* | F | 28 | 4.45 | 0.38 | 3.8 | 5.9 | 0.0121 | 2.695 | 0.944 | 1.2211 | 0.997 | 0.964 |
| *Pellonula leonensis* | M | 19 | 4.67 | 0.66 | 4.0 | 6.0 | 0.0157 | 2.528 | 0.970 | 1.1703 | 1.026 | 0.984 |
| *Pellonula leonensis* | | 49 | 5.78 | 0.81 | 4.7 | 8.0 | 0.0117 | 2.854 | 0.966 | 1.2478 | 0.983 | 0.990 |
| *Pellonula leonensis* | M | 23 | 5.81 | 0.77 | 5.0 | 8.0 | 0.0144 | 2.743 | 0.967 | 1.2662 | 0.973 | 0.985 |
| *Pellonula leonensis* | F | 26 | 5.75 | 0.86 | 4.7 | 7.9 | 0.0102 | 2.923 | 0.966 | 1.2344 | 0.990 | 0.994 |
| *Pellonula leonensis* | F | 32 | 6.12 | 0.41 | 5.5 | 7.2 | 0.0134 | 2.794 | 0.891 | 1.3622 | 0.932 | 0.928 |
| *Odaxothrissa mento* | | 49 | 12.15 | 1.47 | 6.0 | 14.5 | 0.0097 | 2.911 | 0.969 | 1.4038 | 0.929 | 0.976 |
| **Osteoglossidae** | | | | | | | | | | | | |
| *Heterotis niloticus* | | 76 | 5.39 | 1.55 | 4.0 | 8.6 | 0.0089 | 3.026 | 0.994 | 1.2199 | 0.966 | 0.992 |
| **Notopteridae** | | | | | | | | | | | | |
| *Papyrocranus afer* | | 20 | 21.36 | 7.47 | 11.2 | 37.0 | 0.0052 | 2.997 | 0.997 | 0.8677 | 1.068 | 0.997 |
| **Mormyridae** | | | | | | | | | | | | |
| *Hippopotamyrus psittacus* | | 19 | 9.31 | 1.79 | 8.0 | 13.8 | 0.0766 | 2.156 | 0.975 | 1.0023 | 1.086 | 0.973 |
| *Petrocephalus bovei* | | 16 | 8.31 | 1.24 | 7.0 | 12.2 | 0.0392 | 2.408 | 0.837 | 2.2038 | 0.725 | 0.923 |
| *Petrocephalus ansorgii* | | 64 | 8.47 | 0.63 | 7.6 | 12.2 | 0.0910 | 2.007 | 0.787 | 1.6988 | 0.808 | 0.913 |
| *Hyperopisus bebe* | | 15 | 16.04 | 8.92 | 11.7 | 32.0 | 0.0065 | 2.997 | 0.999 | 0.9213 | 1.076 | 0.999 |
| **Characidae** | | | | | | | | | | | | |
| *Brycinus longipinnis* | | 38 | 9.46 | 1.57 | 6.2 | 11.5 | 0.0106 | 3.212 | 0.942 | 1.0028 | 1.097 | 0.924 |
| *Brycinus nurse* | | 43 | 10.93 | 4.89 | 6.1 | 28.1 | 0.0570 | 2.383 | 0.964 | 1.1404 | 1.020 | 0.994 |
| *Hydrocynus vittatus* | | 13 | 17.83 | 3.87 | 14.0 | 25.3 | 0.0251 | 2.496 | 0.941 | 1.6907 | 0.893 | 0.927 |
| **Hepsetidae** | | | | | | | | | | | | |
| *Hepsetus odoe* | | 13 | 17.02 | 4.25 | 13.0 | 28.5 | 0.0011 | 3.643 | 0.979 | 1.3150 | 0.966 | 0.981 |
| *Hepsetus odoe* | | 15 | 17.10 | 4.42 | 5.0 | 21.6 | 0.0188 | 2.681 | 0.996 | 1.4133 | 0.954 | 0.998 |
| **Distichodontidae** | | | | | | | | | | | | |
| *Distichodus brevipinnis* | | 17 | 12.69 | 2.82 | 9.2 | 17.4 | 0.0050 | 3.354 | 0.996 | 1.4124 | 0.788 | 0.983 |
| *Distichodus rostratus* | | 59 | 13.38 | 5.94 | 6.5 | 47.2 | 0.0153 | 2.888 | 0.981 | 1.2977 | 0.979 | 0.991 |
| *Ichthyoborus monodi* | | 17 | 16.80 | 1.78 | 15.1 | 20.5 | 0.0011 | 3.508 | 0.962 | 1.5679 | 0.891 | 0.963 |
| *Phago loricatus* | | 14 | 12.08 | 3.46 | 8.4 | 15.5 | 0.0028 | 3.088 | 0.970 | 1.3434 | 0.917 | 0.999 |
| **Cyprinidae** | | | | | | | | | | | | |
| *Labeo coubie* | | 19 | 21.31 | 5.80 | 14.3 | 30.0 | 0.0103 | 3.078 | 0.988 | 1.1598 | 1.029 | 0.979 |
| *Barbus callipterus* | | 106 | 4.72 | 0.88 | 3.2 | 7.1 | 0.0290 | 2.940 | 0.972 | 0.9049 | 1.082 | 0.981 |

Table 1 continued

| Family/species | Sex | N | Mean | S.d | Min | Max | a | b | r | $a_1$ | $b_1$ | r |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Bagridae** | | | | | | | | | | | | |
| *Auchenoglanis biscutatus* | | 15 | 14.56 | 5.77 | 9.0 | 23.8 | 0.0076 | 3.164 | 0.984 | 1.8824 | 0.863 | 0.998 |
| *Bagrus bajad* | | 17 | 27.80 | 7.61 | 19.7 | 38.3 | 0.0051 | 3.049 | 0.978 | 1.7871 | 0.885 | 0.983 |
| *Chrysichthys auratus* | | 64 | 11.08 | 1.50 | 9.0 | 16.2 | 0.0151 | 2.862 | 0.824 | 3.3760 | 0.548 | 0.786 |
| *C. nigrodigitatus* | | 43 | 13.12 | 4.01 | 9.2 | 26.2 | 0.0651 | 2.273 | 0.869 | 1.0609 | 1.068 | 0.976 |
| **Clariidae** | | | | | | | | | | | | |
| *Clarias macromystax* | M | 49 | 18.80 | 4.19 | 9.9 | 30.1 | 0.0386 | 2.419 | 0.977 | 1.1905 | 0.981 | 0.998 |
| *Clarias macromystax* | F | 55 | 18.27 | 6.21 | 9.7 | 28.5 | 0.0317 | 2.521 | 0.982 | 1.2066 | 0.980 | 0.999 |
| *Clarias macromystax* | | 104 | 18.52 | 5.34 | 9.7 | 30.1 | 0.0345 | 2.475 | 0.978 | 1.2061 | 0.979 | 0.998 |
| *Clarias agboyiensis* | | 112 | 17.81 | 4.64 | 9.6 | 29.0 | 0.0077 | 2.967 | 0.982 | 1.2451 | 0.965 | 0.999 |
| *Clarias agboyiensis* | M | 61 | 18.41 | 4.70 | 9.6 | 29.0 | 0.0101 | 2.858 | 0.986 | 1.2231 | 0.971 | 0.998 |
| *Clarias agboyiensis* | F | 51 | 17.10 | 4.51 | 9.8 | 26.8 | 0.0046 | 3.166 | 0.985 | 1.2734 | 0.956 | 0.999 |
| *Clarias buthupogon* | | 142 | 16.01 | 4.49 | 6.4 | 28.1 | 0.0174 | 2.705 | 0.982 | 1.2114 | 0.975 | 0.999 |
| *Clarias buthupogon* | M | 62 | 16.96 | 4.12 | 11.3 | 27.5 | 0.0279 | 2.542 | 0.973 | 1.1740 | 0.985 | 0.998 |
| *Clarias buthupogon* | F | 80 | 15.23 | 4.65 | 6.4 | 28.1 | 0.0149 | 2.757 | 0.985 | 1.2141 | 0.976 | 0.999 |
| *Clarias albopunctatus* | | 46 | 19.11 | 4.67 | 10.0 | 29.5 | 0.0874 | 2.126 | 0.894 | 1.2685 | 0.957 | 0.997 |
| *Clarias ebriensis* | M | 56 | 21.41 | 7.65 | 5.9 | 34.3 | 0.0256 | 2.550 | 0.985 | 1.1980 | 0.981 | 0.999 |
| *Clarias ebriensis* | F | 56 | 17.93 | 6.40 | 5.4 | 28.5 | 0.0251 | 2.582 | 0.977 | 1.2072 | 0.976 | 0.999 |
| *Clarias ebriensis* | | 112 | 19.67 | 7.24 | 5.4 | 34.3 | 0.0267 | 2.548 | 0.981 | 1.1978 | 0.980 | 0.999 |
| **Mochokidae** | | | | | | | | | | | | |
| *Brachysynodontis batensoda* | | 15 | 22.22 | 7.00 | 14.0 | 29.8 | 0.0237 | 2.821 | 0.983 | 1.2617 | 0.996 | 0.976 |
| *Synodontis clarias* | | 17 | 14.13 | 5.44 | 10.0 | 23.5 | 0.0893 | 2.331 | 0.980 | 1.1292 | 1.051 | 0.973 |
| *Synodontis gobroni* | | 17 | 15.16 | 6.00 | 10.5 | 26.5 | 0.0205 | 2.835 | 0.993 | 1.1457 | 1.099 | 0.997 |
| **Schilbeidae** | | | | | | | | | | | | |
| *Schilbe intermedius* | | 15 | 12.80 | 2.68 | 10.7 | 17.2 | 0.0088 | 2.932 | 0.976 | 1.2841 | 0.956 | 0.991 |
| *Schilbe mystus* | | 64 | 14.43 | 4.20 | 5.6 | 25.5 | 0.0066 | 3.003 | 0.954 | 1.0711 | 1.052 | 0.982 |
| *Schilbe mystus* | | 11 | 5.95 | 2.20 | 4.4 | 12.3 | 0.0204 | 2.402 | 0.982 | 1.1503 | 1.022 | 0.996 |
| *Parailia pellucida* | | 412 | 6.90 | 1.25 | 4.7 | 10.8 | 0.0082 | 2.772 | 0.794 | 1.2282 | 0.966 | 0.968 |
| *Parailia pellucida* | | 49 | 6.35 | 0.58 | 5.1 | 7.3 | 0.0029 | 3.276 | 0.913 | 1.3146 | 0.930 | 0.958 |
| *Parailia pellucida* | | 50 | 6.63 | 1.37 | 4.7 | 9.2 | 0.0067 | 2.834 | 0.937 | 1.1254 | 1.014 | 0.984 |
| *Parailia pellucida* | | 33 | 9.36 | 0.99 | 6.5 | 10.8 | 0.0182 | 2.422 | 0.886 | 1.2833 | 0.944 | 0.976 |
| *Parailia pellucida* | | 20 | 7.97 | 0.98 | 6.8 | 10.3 | 0.0151 | 2.537 | 0.877 | 1.1277 | 1.007 | 0.953 |
| *Parailia pellucida* | | 12 | 7.51 | 1.09 | 6.3 | 9.6 | 0.0094 | 2.733 | 0.866 | 1.1331 | 1.005 | 0.971 |
| *Parailia pellucida* | | 15 | 5.66 | 0.38 | 5.0 | 6.0 | 0.0019 | 3.750 | 0.956 | 1.0835 | 1.043 | 0.880 |
| *Siluranodon auritus* | | 49 | 8.49 | 0.96 | 6.4 | 11.3 | 0.0089 | 2.861 | 0.877 | 1.3375 | 0.928 | 0.934 |
| *Siluranodon auritus* | | 50 | 8.19 | 1.18 | 5.5 | 11.3 | 0.0098 | 2.811 | 0.896 | 1.0749 | 1.044 | 0.958 |
| **Channidae** | | | | | | | | | | | | |
| *Parachannna obscura* | | 16 | 17.85 | 2.76 | 14.5 | 22.0 | 0.0106 | 2.971 | 0.946 | 1.9528 | 0.818 | 0.979 |
| **Centropromidae** | | | | | | | | | | | | |
| *Lates niloticus* | | 14 | 12.18 | 2.75 | 8.4 | 12.8 | 0.0276 | 2.724 | 0.981 | 1.3321 | 0.936 | 0.969 |
| **Cichlidae** | | | | | | | | | | | | |
| *Chromidotilapia guntheri* | | 82 | 10.38 | 1.33 | 6.8 | 13.1 | 0.0252 | 2.895 | 0.939 | 1.2098 | 1.015 | 0.977 |
| *Hemichromis fasciatus* | | 45 | 9.67 | 2.08 | 6.4 | 17.4 | 0.0294 | 2.779 | 0.905 | 1.3487 | 0.956 | 0.959 |
| *Hemichromis bimaculatus* | | 16 | 7.85 | 1.36 | 6.5 | 11.0 | 0.0577 | 2.481 | 0.979 | 1.2524 | 0.996 | 0.984 |
| *Tilapia mariae* | | 26 | 9.41 | 2.96 | 6.3 | 18.7 | 0.0192 | 3.066 | 0.986 | 1.2273 | 1.000 | 0.995 |
| *Tilapia zillii* | | 11 | 15.25 | 3.41 | 10.5 | 22.8 | 0.0383 | 2.788 | 0.994 | 1.0463 | 1.083 | 0.967 |
| *Oreochromis niloticus* | | 16 | 15.32 | 2.90 | 11.1 | 20.1 | 0.0033 | 3.689 | 0.997 | 1.8407 | 0.841 | 0.994 |
| **Nandidae** | | | | | | | | | | | | |
| *Polycentropsis abbreviata* | | 16 | 6.26 | 0.97 | 5.2 | 8.5 | 0.0304 | 2.897 | 0.972 | 1.3220 | 0.949 | 0.931 |
| **Anabanntidae** | | | | | | | | | | | | |
| *Ctenopoma kingsleyae* | | 13 | 10.13 | 4.00 | 6.0 | 21.7 | 0.1268 | 2.165 | 0.938 | 1.2195 | 1.012 | 0.972 |

## RESULT AND DISCUSSION

A total of 87 populations of freshwater fish in the Anambra river were identified. The results of the LWR and STR analyses of these 87 populations of fish are summarized in Table 1. All correlations were highly significant ($P<0.05$) with coefficients ranging from 0.786 to 0.999 for both the LWR and STR. Apart from the LWR of P*apyrocranus afer, Petrocephalus ansorgi, Brycinus longipinnis, B. nurse, Hepsetus odoe, Barbus callipterus, Chrysichthys auratus, Clarias* *macromystax, C. buthupogon, Schilbe mystus, Parachanna obscura, Chromidotilapia guntheri, Hemichromis fasciatus, Tilapia mariae, T.zillii and Ctenopoma kingsleyae* (King, 1996) and the LWR and STR of *Clarias agboyiensis* (Ezenwaji, 1999), the LWR of the other 28 species as well as the STR of the remaining 44 species of this study are reported for the first time in Nigerian freshwater systems.

The intercept, a, of the LWR showed high heterogeneity among the populations (CV = 102.86%) and varied from 0.0011 (*Hepsetus odoe* and *Ichthyoborus monodi*) to 0.1268

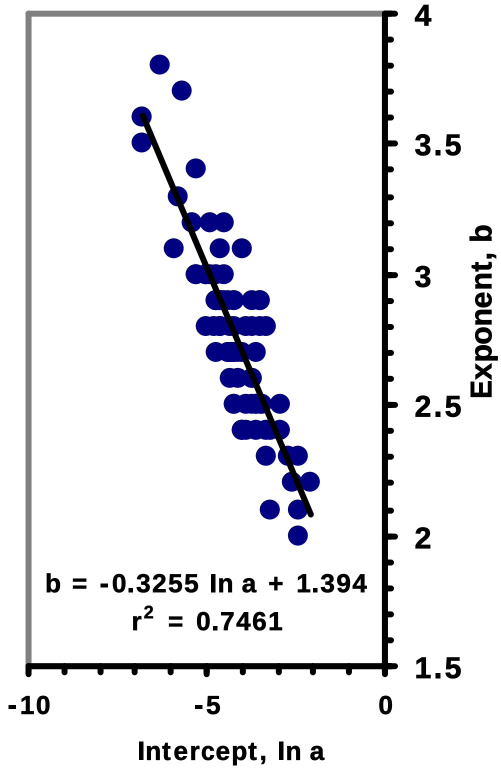


**Fig. 1: The relationship between the exponent, b, and the intercept, ln a, in the multispecies samples of fishes from the Anambra river**

(*Ctenopoma kingsleyae*). Conversely, the exponent, b, showed low variation among the populations (CV = 12.24%) and ranged from 2.007 in *Petrocephalus ansorgii* to 3.750 in *Parailia pellucida.* The estimates of the b–values obtained fall within the limits reported by Lagler et *al.* (1977), King (1996) and Stergiou and Moutopoulos (2001).

The mean exponent ($\bar{b}$ = 2.764; s.d. = 0.338) is significantly less than 3 (t - test, df =86, p< 0.05) indicating negative allometric LWR for the multispecies populations studied. Similar negative allometric LWR have been reported by Torres (1991) and King (1996) in multispecies samples of fishes, in contrast to Carlander (1969) and Ruiz-Ramirez et al. (1997) who reported a mean exponent of 3.

As Caillouet (1993) observed in multispecies groups, the plot of exponent, b, versus intercept, In a, for the 87 populations showed very strong, highly significant but negative correlation (r = -0.864, P<0.05) (Fig.1); such relationships were attributed to variations in the maximum size of individuals of each species.

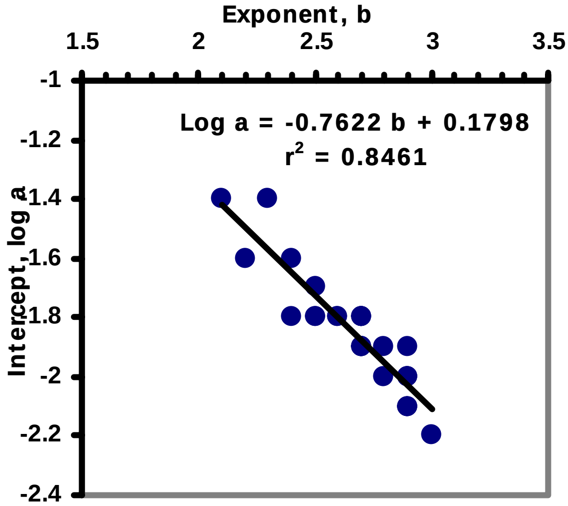


**Fig. 2: The relationship between the intercept, log a, and the exponent, b, in *Pellonula leonensis* from Anambra river.**

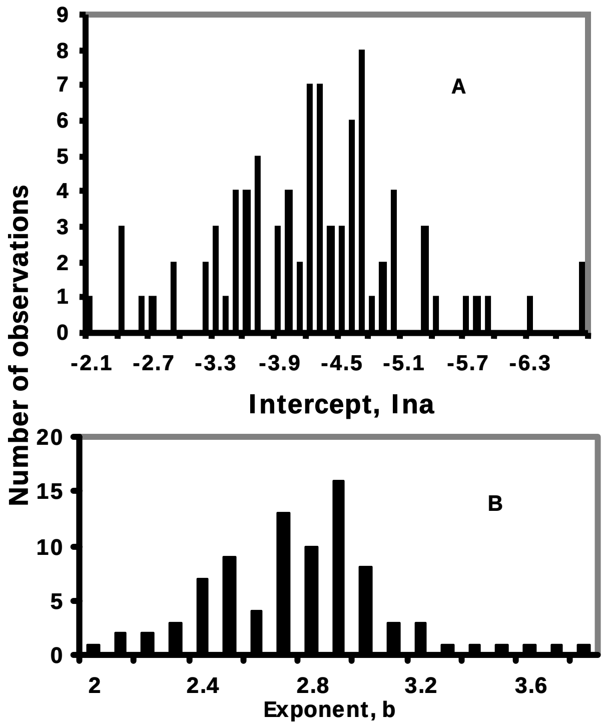


**Fig. 3: Frequency distribution of the intercept, In a (A) and exponent, b (B) of the LWR of fishes from Amanbra river**

A plot of log a versus b for the 26 LWR of *Pellonulla leonensis* revealed no outliers (Fig.2). Stergiou and Moutopoulos (2001) employed this type of plot to show outliers in *Cepola rubescens* and *Pagelius erythrinus.*

The frequency distributions of In a values (Fig. 3A) and b-values (Fig. 3B) were normal as indicated by the Kurtosis coefficients (KC) of 0.77 and 0.76 respectively which approach zero, whereas the distribution of a-values was not normal (KC = 6.68). Similar results were obtained by Torres (1991).

In the STR, the exponent, $b_1$, was homogenous (CV = 9.54%) and varied from 0.548 in *Chrysichthys auratus* to 1.099 in *Synodontis gobroni.* The mean exponent ($\overline{b}_1$ = 0.959) was not different from 1 indicating that, as an assemblage, the linear model, TL = $\alpha + \beta$SL, is also valid for the estimation of the parameters of the LWR.

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