

Length-weight Relationship and Relative Condition Factor in *Daysciaena albida* (Cuv.) and *Gerres filamentosus* (Cuv.)

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The length-weight relationship of *Daysciaena albida* and *Gerres filamentosus* were calculated separately for indeterminants, mature males and mature females. The logarithmic regression equation obtained for *D. albida* - males: $\log w = -1.5055 + 2.8618 \log l$; females: $\log w = -0.9260 + 2.4089 \log l$; indeterminants: $\log w = -1.7188 + 3.0616 \log l$. The regression co-efficients between males and females, males and indeterminants and female and indeterminants showed significant differences. In *G. filamentosus* the relationship can be expressed as males: $\log w = -1.3224 + 2.8740 \log l$; females: $\log w = -1.2874 + 2.8381 \log l$; indeterminants: $\log w = -0.8167 + 2.2558 \log l$. The difference in regression co-efficients between male and female are insignificant at 5% level whereas significant differences were observed between males and indeterminants and females and indeterminants. The relative condition factor (Kn) was calculated for the above two species. In *D. albida* the reasons for the fluctuations of Kn values can be attributed to both spawning cycle as well as feeding intensity whereas in *G. filamentosus* it synchronises mainly with spawning cycle.

The study of the relationship of weight to length is an important diagnostic indication of the well being of fish and serves two fold purposes (Le Cren, 1951) (1) to provide a mathematical relationship between two variables, length and weight (2) to measure the variations from the expected weight or length of individual fish or groups of fishes as indication of fatness, general well being or gonadal development. The length-weight relationship in fishes can also be used in setting up yield equations (Beverton & Holt, 1957; Ricker, 1958), in estimating the number of fish landed and in comparing populations in space and time (Sekharan, 1968), growth studies and for comparison of body form of different groups of fishes. Weight of a fish is a function of its length and the general expectation is that the weight of fishes would vary as the cube of length (Brody, 1945; Lagler, 1952; Brown, 1957). But the actual relationship may depart significantly from this (Le Cren, 1951), as fishes normally

do not retain the same shape or body outline throughout their life span and the specific gravity of tissues may not remain constant. The study on the relative condition factor (Kn) can be used to compare the plumpness of fish and so permit a fish culturist to compare the weight of fish against a standard calculated weight to determine if the fishes are in better or poorer condition than the standard. The relative condition factor can also be used to compare the general well-being, fatness or the state of development of gonad (Thomas, 1969). The ponderal index (K) was used for understanding the changes in weight for length assuming that the length-weight relationship obeys the cube law. Le Cren (1951) recommended a study on relative condition factor (Kn) in preference to the ponderal index (K) as the latter will be highly influenced by many environmental and biological factors. *D. albida* and *G. filamentosus* are not only economically important as food fishes but also draw attention as two potentially desirable species for brackish water fish farming ventures. Virtually no information is available regarding growth rates of these two species and hence the present attempt

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has been made to understand the length-weight relationship and relative condition factor.

Materials and Methods

A total of 426 *D. albida* and 615 *G. filamentosus* were collected from Vembanad lake and examined for calculating the length-weight relationship. Fishes were measured and weighed in fresh condition. Standard length was measured from tip of snout to hypural plate and the weight was recorded in gram to the nearest 0.1 mg. As mentioned by previous workers, the length-weight relationship of each fish can be expressed by the formula $w = al^b$ where w = weight, l = standard length and 'a' and 'b' are constants.

Log a and the regression co-efficient (b) were estimated by the usual method of least squares. The linear equation was fitted separately for males, females and indeterminants in *D. albida* and *G. filamentosus*. Student's 't' test (Zar, 1974) was employed for comparing the regression co-efficients between males and females, males and indeterminants and females and indeterminants of both the species. The relative condition factor ($Kn = w/\bar{w}$) is the ratio of observed weight (w) of a fish at a given length to the expected weight ($\bar{w}$) of a fish of the same length as calculated from the length weight regression (Le Cren, 1951), has been calculated separately for males and

females of *D. albida* and *G. filamentosus* for the year 1980.

Results and Discussion

(a) Length-weight relationship

Statistical details regarding length-weight relationship of *D. albida* is summarised in Table 1. The logarithmic relationship between length and weight of males, females and indeterminants of *D. albida* are represented in Figs. 1-3. The logarithmic regression equations obtained are as follows:

For males: $\log w = -1.5055 + 2.8618 \log l$;
For females: $\log w = -0.9260 + 2.4089 \log l$;
For indeterminants: $\log w = -1.7188 + 3.0616 \log l$.

Table 2 shows the details of the statistical analysis of length - weight relationship of *G. filamentosus*. Figs. 4-6 represent the logarithmic relationship between length and weight of males, females and indeterminants of *G. filamentosus*. The logarithmic regression equations obtained are as follows:

For males: $\log w = -1.32244 + 2.8740 \log l$;
For females: $\log w = -1.2874 + 2.8381 \log l$;
For indeterminants: $\log w = -0.8167 + 2.2558 \log l$.

The regression equations of males, females and indeterminants of the above two species were compared pair-wise using 't' test. In

Table 1. Statistical details showing number (N), regression coefficient (b), y intercept (log a), standard error of b (Sb), correlation coefficient (r) for *D. albida*

	N	b	log a	Sb	r
Male	162	2.8618	-1.5055	0.0454	0.9804
Female	167	2.4089	-0.9260	0.0510	0.9624
Indeterminant	97	3.0616	-1.7188	0.0507	0.9872

Table 2. Statistical details showing number (N), regression coefficient (b), y intercept (log a), standard error of b (Sb), correlation coefficient (r) for *G. filamentosus*

	N	b	log a	Sb	r
Male	164	2.8740	-1.3244	0.0568	0.9701
Female	278	2.8381	-1.2875	0.0412	0.9711
Indeterminant	164	2.2558	-1.8167	0.0586	0.9597

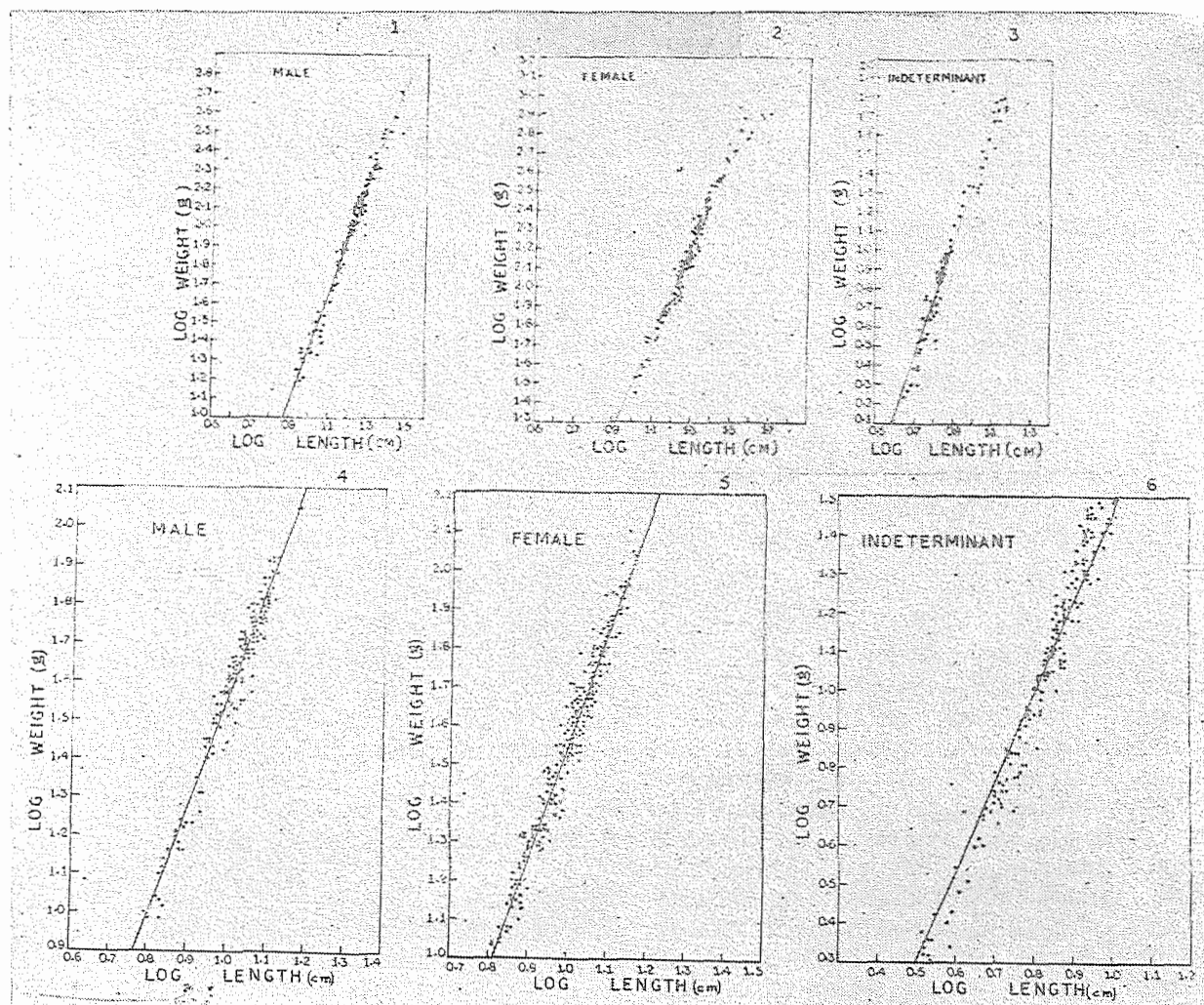


Fig. 1—6. Length-weight relationship of *D. albidus* (Fig. 1—3) and *G. filamentosus* (Fig. 4—6)

D. albidus (Table 3) in the regression coefficients between males and females, males and indeterminants and females and indeterminants, significant difference could be noted. Table 4 represents the comparison of regression coefficients between males and females, males and indeterminants and females and indeterminants of *G. filamentosus*. It is found that the regression coefficient between males and females is insignificant at 5% level. Significant differences were obtained between males and indeterminants. In *D. albidus* the regression coefficient of female is found as lowest when compared to males and indeterminants. Relatively high b value is noticed in indeterminants. From the relationship it may be presumed that indeterminants gained more weight with increase in length compared to males and females.

In *G. filamentosus* higher b values are obtained in males and females compared to indeterminants. The body weight in relation to length increases more rapidly in males and females than that of indeterminants.

The theoretical value of b (regression coefficient) in length-weight relationship is reported as 3 when the body form of fish remains constant at different lengths, i.e. the growth is isometric (Allen, 1938). Slope value less than 3.0 indicates that fish become more slender as they increase in length, and slope greater than 3.0 indicate the reverse, i.e. growth is allometric (Grover & Juliano, 1976). But the value of b usually lies between 2.5 and 4.0 (Hile, 1936; Martin, 1949). In the present investigation also, in *D. albidus* and *G. filamentosus* the value of b ranged between 2.5–4.0 except in the

indeterminant groups of *G. filamentosus* where it is less than 2.5.

(b) Relative condition factor (Kn)

D. albida (Fig. 7.1): In males, comparatively high Kn values were observed during June to September with a slight decline in July. From October onwards a gradual fall in the values were noted till January followed by an increase during February–March. Again another slight inflection was noticed during April–May. The fluctuation of Kn values of females also denoted more or less similar trend with highest values during August–October period. During November–December, a steep decline was noticed, showing the lowest values in February. From March onwards the Kn values were found to be increasing reaching another peak in April followed by sudden fall during May. The Kn values showed a very gradual increase

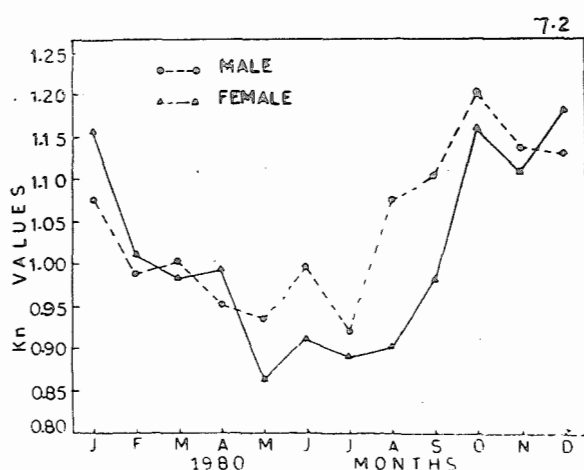
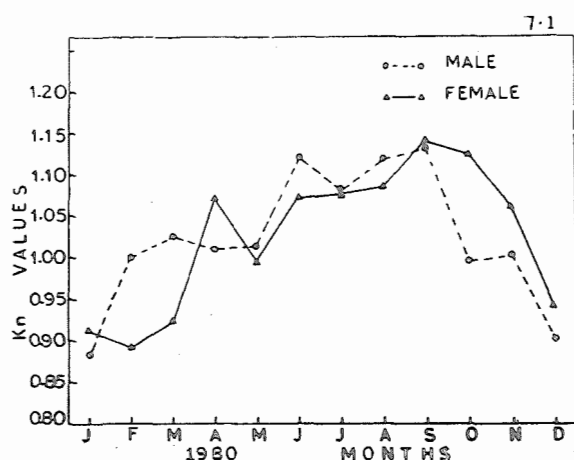


Fig. 7. Relative condition factor of *D. albida* (7—1) and *G. filamentosus* (7—2)

during June to August and attained the peak values in September.

G. filamentosus (Fig. 7.2): The Kn values of males and females followed similar trend. From August onwards the values were found to be increasing and attaining the peak in October. A steep decline was seen in November and higher values were observed during December–January periods. A steep inflection was again noticed in February and comparatively less values were recorded upto July except a minor peak in June. From August onwards the increase in the Kn values were very steep reaching the peak in October.

Table 3. Comparison of regression coefficients in the length-weight relationship of *D. albida*

Comparison	t	d.f	P
Male and female	6.6330	325	< 0.001
Male and indeter- minant	2.9360	255	0.002 < p < 0.01
Female and indeter- minant	9.0779	260	< 0.001

In *D. albida* the occurrence of higher percentage of fully matured ovaries and testis were reported from July to November and very high gonadosomatic indices were observed during September–October (Kurup, 1982). Similarly, spent fishes were encountered from September to January with highest percentage in October–November. The high Kn values recorded in males and females during June to September and August to October respectively may be due to the pre-spawning maturation. The steep decrease of Kn values from October–November period synchronises with the appearance of spent fishes. In females, the percentage of gorged and full stomachs were high during March–April (Kurup, 1982) and hence it may be presumed as the probable reason for the high Kn values recorded in the month of April. But the reason for the rise of Kn values during February–March in males cannot be attributed to any of the above factors. Similarly, in *G. filamentosus* the occurrence of ripe ovary and testis were encountered in the lake during August–April

and high gonadosomatic indices during August–December period. The high Kn values recorded during October–January period may be due to the intense gonadal activity. The probable reason for the steep inflection of Kn values from February onwards may be due to strain of spawning. The feeding intensity of this species was also reported as high during April–July (Kurup, 1982) whereas the Kn values showed an inverse relationship. The reason for the high Kn values recorded during June can be attributed due to none of the above factors.

Table 4. Comparison of regression coefficients in the length-weight relationship of *G. filamentosus*

Comparison	t	d.f	P
Male and female	0.5114	447	N.S.
Male and indeterminate	7.5760	324	< 0.001
Female and indeterminate	8.1327	447	< 0.001

N. S. – Not significant at 5% level

The Kn values depended on physiological factors like maturity, spawning, environmental factors like availability of food (Brown, 1957) and also has been attributed to a variety of other reasons (Hickling, 1945; Qasim, 1957). In *D. albida* the reasons for the fluctuation of Kn values can be due to both spawning activity as well as feeding intensity as Rao (1983) observed in *Saurida tumbil* whereas in *G. filamentosus* the fluctuation of Kn values mainly synchronises only with spawning cycle as reported in carangids (Venkataramani, 1979). But in *D. albida* and *G. filamentosus* the high values observed in some of the months neither coincide with spawning activity nor feeding intensity, similar to the findings of Thomas (1969) in goat fishes. Hence it may be presumed that Kn values were not only influenced by sexual cycle and feeding intensity but also due to some other unknown factors.

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