The author is grateful to Shri Moosa Raza, I.A.S., Fisheries Commissioner, Govt. of Gujarat, for facilities provided and for permission to publish this note. Thanks are also due to Shri J. A. Pandya, Research Officer and Shri M. Bhaskaran, Assistant Research Officer of this station for encouragement.


A NOMOGRAPH FOR THE VARIOUS CHARACTERS OF THE SCIAENID FISH *PENNAHIA ANEUS* (BLOCH).

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**ABSTRACT**

Nomograph of four characters such as standard length, otolith length, scale length and weight are drawn in relation to total length, based on 580 specimens of the sciaenid fish *Penahia aneus*.

Nomographs are used in Engineering and Agricultural science to find out the interrelation between more than two characters and to determine the unknown value from the two known values of the interrelated characters. (Swett 1928; Allcock and Jones 1932; Mavis 1939). Nomographs were employed by Carlander and Smith (1944) in fishery biology for the study of growth rate in fishes. In the present study the use of nomograph is extended to find the relation between different characters of the fish.

Total length, standard length, scale length (scales taken from pectoral axilla), otolith (sagittal) length and the weight of 580 specimens of the sciaenid fish *Penahia aneus* of the size range 80 to 200 mm were used for the investigation. Total length was taken as a dependent variable and the other characters as independent variables. Length-weight relation was converted to logarithmic scale so as to fit to an equation of linear form.

The linear equation \( Y = a + bx \), where \( Y \) is the dependent variable, \( X \), the independent variable and \( a \) and \( b \) are the constants to be determined by the method of least square, is used.
By using the data the following equations were obtained:

\[ Y_1 = -7.6647 + 0.08546 \times \] \hspace{1cm} (1)
\[ \log \: Y_2 = -4.2800 + 3.1887 \log \: X \] \hspace{1cm} (2)
\[ Y_3 = -0.2911 + 0.0248 \times \] \hspace{1cm} (3)
\[ Y_4 = 1.1012 + 0.0359 \times \] \hspace{1cm} (4)

Where \( Y_1, \log \: Y_2, \: Y_3 \) and \( Y_4 \) are the standard length, weight, scale length, and otolith length respectively and \( X \) the total length. From the equation (1), (2), (3) and (4) the equations (5), (6), (7) and (8) were obtained by solving for \( X \).

\[ X = 1.1701 \: Y_1 + 8.9685 \] \hspace{1cm} (5)
\[ \log \: X = (0.3136) \log \: Y_2 + 1.3422 \] \hspace{1cm} (6)
\[ X = 40.3226 \: Y_3 + 11.6936 \] \hspace{1cm} (7)
\[ X = 27.8552 \: Y_4 - 30.6407 \] \hspace{1cm} (8)

Table 1. *Relationship between total length and standard length (mm)*

<table>
<thead>
<tr>
<th>( X )</th>
<th>67</th>
<th>79</th>
<th>91</th>
<th>102</th>
<th>114</th>
<th>126</th>
<th>137</th>
<th>149</th>
<th>161</th>
<th>173</th>
<th>184</th>
<th>196</th>
<th>208</th>
<th>220</th>
</tr>
</thead>
<tbody>
<tr>
<td>( Y_1 )</td>
<td>50</td>
<td>60</td>
<td>70</td>
<td>80</td>
<td>90</td>
<td>100</td>
<td>110</td>
<td>120</td>
<td>130</td>
<td>140</td>
<td>150</td>
<td>160</td>
<td>170</td>
<td>180</td>
</tr>
</tbody>
</table>

\( X = \) Total length; \( Y_1 = \) Standard length

Table 2. *Relationship of total length and weight (mm)*

| \( X \) | 93  | 116 | 131 | 144 | 154 | 163 | 171 | 179 | 185 | 192 | 198 | 203 | 208 | 213 |
| \( Y_2 \) | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 |

\( X = \) Total length; \( Y_2 = \) weight from the formula (6)

the above table is got by finding the log and anti log.

Table 3. *Relationship between total length and scale length (mm)*

| \( X \) | 52  | 92  | 132 | 173 | 213 |
| \( Y_3 \) | 1   | 2   | 3   | 4   | 5   |

\( X = \) Total length; \( Y_3 = \) Scale length

Table 4. *Relationship of total length and otolith length (mm)*

| \( X \) | 81  | 108 | 136 | 164 | 192 | 220 |
| \( Y_4 \) | 4   | 5   | 6   | 7   | 8   | 9   |

\( X = \) Total length; \( Y_4 = \) Otolith length
Table 1, 2, 3, 4 are obtained by using the above formulae (5), (6), (7) & (8) respectively and the nomograph is drawn from them (Fig. below. From the nomograph, if any corresponding value of two characters are fixed from the Tables, the intermediate values as well as other unknown values of any character can be determined.

For example, total length 132 mm is taken and the corresponding scale length is 3 mm. From the line connecting these two points, values for other characters can be found out. This method is evidently useful for calculating the unknown values if any of the corresponding values of two characters are known.

I am thankful to Dr. K. Viswanath, Reader, Department of Mathematics, Madurai University for his help.

Carlander, K. D. and Smith, L. L. Jr. 1944. Copeia, 1944 (3): 157-162, 2 Fig.