NOMOGRAM DERIVING BASAL METABOLISM FROM HEIGHT-WEIGHT COORDINATES.

BY CURTIS BRUEN.

(New York City.)

(Received for publication, November 8, 1929.)

The normal basal metabolism per day is estimated by the method of Du Bois as the surface area of the body, calculated from the equation, \( A = 0.007184 W^{0.425} H^{0.725} \) in which \( A \) represents area in sq. m., \( W \) weight in kilos, and \( H \) height in cm. (1) multiplied by the standard value of calories per sq. m. of body surface per hour for the sex and age group (2) (Table I), multiplied by 24.

The polyphase alignment chart of Boothby and Sandiford (3) makes this calculation in two stages. A straight edge laid between the proper points on the scales of height and weight intersects the scale of surface area. Readjusted to lie between this point and the proper point on the scale of sex and age group, it indicates the answer on the scale of calories. To this end two points must be spotted, a straight edge placed, an intersection marked, a fourth point spotted, the straight edge rotated, a value read. The manipulations are many and exacting.

All that is necessary to obtain the result in one step is to spot two coordinates, sight their intersection, and read off its value. The height-weight formula chart of surface area (1) can be modified to represent calories per unit of time for a uniform metabolic rate (4). By using logarithmic in place of numerical values and a separate scale for one of the variables in the formula for each metabolic rate, the calories per unit of time can be represented coincidently for all metabolic rates. \( x \) and \( y \) axes are marked off as equidivisional scales of logarithms. A scale of height in inches, \( h \), is plotted on the \( y \) axis according to the value each number receives when developed according to the expression, \( 0.725 \log 2.54 \ h \). A scale of weight in pounds, \( w \), is plotted on the
CHART 1. Basal metabolism per day (Du Bois).
x axis for each rate of calories per sq. m. per hour, c, according to the value each number receives when developed according to the expression, 0.425 log 0.4536 w + log 0.007184 + log c + log 24. Graphs are drawn for a series of equations, log C = x + y, in which C represents calories per 24 hours, and x and y the logarithms of the respective axes.

Chart 1 estimates the basal metabolism per day from sex, age, height, and weight. Go to the upper tier of weight scales for females, the lower for males, identify the scale for the required age group, spot the weight in pounds on it, trace an imaginary line perpendicularly into the field of the chart, spot the height in feet and inches on the nearest scale, trace an imaginary line horizontally to its intersection with the vertical line previously traced, read the number of calories from the nearest graph, or approximate more closely by interpolation.

### TABLE I.

*Calories per Sq. M. of Body Surface per Hour (Height-Weight Formula).*

<table>
<thead>
<tr>
<th>Age yrs.</th>
<th>Males calories</th>
<th>Females calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>14-16</td>
<td>46.0</td>
<td>43.0</td>
</tr>
<tr>
<td>16-18</td>
<td>43.0</td>
<td>40.0</td>
</tr>
<tr>
<td>18-20</td>
<td>41.0</td>
<td>38.0</td>
</tr>
<tr>
<td>20-30</td>
<td>39.5</td>
<td>37.0</td>
</tr>
<tr>
<td>30-40</td>
<td>39.5</td>
<td>36.5</td>
</tr>
<tr>
<td>40-50</td>
<td>38.5</td>
<td>36.0</td>
</tr>
<tr>
<td>50-60</td>
<td>37.5</td>
<td>35.0</td>
</tr>
<tr>
<td>60-70</td>
<td>36.5</td>
<td>34.0</td>
</tr>
<tr>
<td>70-80</td>
<td>35.5</td>
<td>33.0</td>
</tr>
</tbody>
</table>

### BIBLIOGRAPHY.

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Curtis Bruen


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