SUMMARY

Measurements have been made on the relationship between body mass and carapace length in four species of chelonian. The results, in the form of allometric equations, show that in general carapace length is proportional to body mass

RESULTS

Figure 1 shows the data for all four species plotted on logarithmic coordinates. The allometric equations that have been derived from these data are of the form \( y = ax^b \). This is where \( y \) = carapace length in mm, \( a \) = the intercept and \( b \) an exponent of the mass \( x \) in g.

This gave for *Emys orbicularis*,

\[ y = 10.84 \times \text{mass}^{0.41 \pm 0.06} \quad r = 0.99, \quad n = 7, \]

*Chrysemys scripta*,

\[ y = 15.25 \times \text{mass}^{0.36 \pm 0.01} \quad r = 0.99, \quad n = 26, \]

*Testudo graeca*,

\[ y = 21.43 \times \text{mass}^{0.30 \pm 0.03} \quad r = 0.97, \quad n = 28, \]

*Testudo hermanni*,

\[ y = 11.87 \times \text{mass}^{0.38 \pm 0.11} \quad r = 0.94, \quad n = 9. \]

The line predicted by the constants in this equation in relation to all four data sets on logarithmic coordinates is shown in Fig. 1.

DISCUSSION

The study of allometric growth curves provides a useful basis for establishing the relationship between body mass and carapace length in chelonians. The availability of the data sets from the ASRA stock records has enabled the calculation of allometric equations which define the growth relationships of four commonly kept species of chelonian. By use of these
equations it is possible to determine whether a given individual has a typical body mass-carapace length relationship for its species. Although the equations are based on only small samples, it can be seen from the graph and the high correlation coefficients that the equations provide a reliable description of the data that has been analysed. If it can be assumed that this is typical data for the captive chelonians dealt with in this paper and that there is no radical change in growth strategy, then the equations should also be reliable for size ranges not included in the samples.

The equations can also be used to compare the growth relationships between species or populations. Here when two exponents are compared the lower value indicates a relatively greater increase in body mass in relation to increases in carapace length; an exponent of 0.33 indicates geometric similarity. In this respect it is interesting to compare the data for captive animals with those for wild tortoises, since differences in diet, food availability, and perhaps seasonal changes in climate, may produce fluctuations in body mass. Data are available for wild *T. hermanni* from Yugoslavia and Greece. Meek & Inskeep (1981) working with a Yugoslavian population found an exponent of 0.35 in their animals which when allowing for the confidence limits suggests that they do not differ too greatly from the captive tortoises. Stubbs, Hailey, Tyler & Pulford (1981) have published data for Greek populations but have not quantified the relationship. However, from their graph it is estimated that,

$$y = 16.00 \times \text{mass}^{0.35}$$

This equation is closer to the one for other wild *T. hermanni* than that for captive animals.

Exponents of 0.35 and 0.38 have been found for wild *Mauremys caspica* in North Africa (Meek, in preparation); these agree well with the exponent for captive *Chrysemys scripta* but are lower than that found for captive *Emys orbicularis*.

**ACKNOWLEDGEMENTS**

I thank Professor R. McNeill Alexander and A. S. Jayes for reading the manuscript.

**REFERENCES**


