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Brief Technical Note

This section of the journal is intended for the publication of brief notes containing primarily practical information. Brief scientific articles will continue to be published in the section Short Communications

A PHOTOGRAPHIC-PLANIMETRIC METHOD FOR MEASURING BIVALVES

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ABSTRACT

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A simple photographic method is described for the accurate measurement of length and breadth in bivalves. The use of an electronic planimeter to measure planar area is also described.

INTRODUCTION

Various measurements and morphometric combinations have been utilized in estimating growth in bivalves (Gunter, 1938; Newcombe, 1950; Butler, 1953; Walne, 1964). During a recent investigation into the mariculture potential of the Bait cockle (*Katelysia corrugata* Lamarck 1818) in a seawater evaporation pond, a simple photographic technique was developed for morphometric measurements, including planar area. Planar area, as distinct from shell surface area, has a possible usage in the quantitative determination of growth and shell shape, and the effects of local conditions on these parameters (Nomura, 1926; Galtsoff, 1964).

METHOD

A total of 98 cockles were numbered, arranged in a plastic tray with a black background and supported in horizontal positions by pieces of modelling clay. A 4.0 × 4.0-cm white square acted as a dimensional reference scale. The tray was photographed from a point perpendicular to the centre using a hand-held Asahi Pentax KM camera fitted with a 50-mm lens and Kodak Plus-X black and

white film. From enlargements (36.5 × 30.5 cm) the antero-posterior length of individual cockles was measured to the nearest 0.5 mm using a ruler. The images of the numbered shells were cut from the photographic sheet and the planar area measured to the nearest 0.01 cm^2 using a Paton Electronic Planimeter. Actual dimensions were obtained by multiplying by a correction factor calculated from the reference square. For comparative purposes length was recorded manually using dial calipers, accurate to 0.05 mm.

Mean length and standard deviation of a population of *K. corrugata* obtained by direct and indirect measurement is shown in Table I. The plot of planar area against antero-posterior length is shown in Fig. 1. The curvilinear regression was fitted according to the formula $y = 0.005\ x^2$, where x and y represent the variables length and area, respectively. Nomura (1926), using the equation $y = ax^b$, considered b as an invariable specific exponent and a as a variable local constant.

TABLE I

Mean length and standard deviation of a population of *K. corrugata* measured by two different techniques (n = 98)

Technique	Length (mm)	
	$\bar{x}$	s
Manual	36.79	5.60
Photographic	36.6	5.6

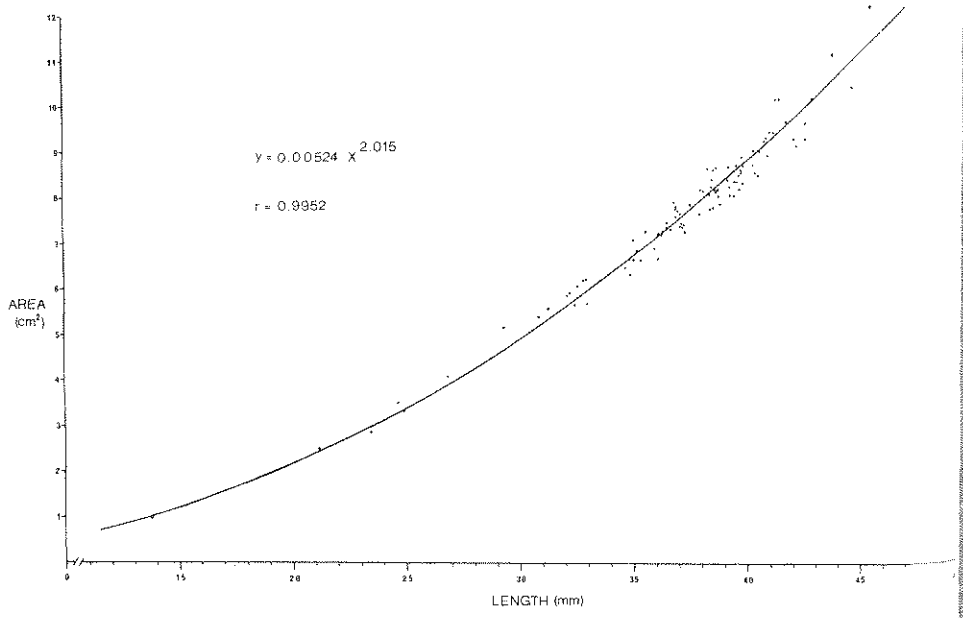

Fig. 1. Relation between antero-posterior length (mm) and planar area (cm^2) in *K. corrugata*

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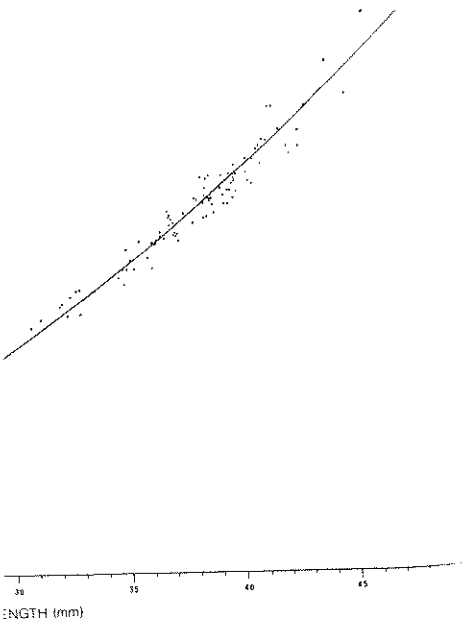

n (mm) and planar area (cm^2) in *K. corrugata*

The coefficient of variation involved in cutting out the shell images was 1.3%, calculated by accurately weighing 10 identical discs of known area cut from photographic paper. The coefficient of variation in planimeter readings was 0.4%, calculated by means of a metal plate of known accurate area. To determine repeatable accuracy, a group of five cockles, ranging in length from 15 to 35 mm, was measured 10 times using dial calipers. The group was then photographed 10 times at variable distances, exposure and shutter speed settings. Individual lengths were measured from each of the 10 enlargements using a ruler.

Mean and standard deviation of the 10 manual and photographic length measurements (mm) for the five cockles are shown in Table II.

TABLE II

Mean lengths of five *K. corrugata* calculated from 10 separate manual and photographic measurements

Cockle	Mean and s.d. of 10 length measurements (mm)	
	Manual	Photographic
a	15.75*	15.5 ± 0.5
b	20.05*	19.8 ± 0.3
c	24.75*	24.8 ± 0.3
d	29.76 ± 0.02	29.5 ± 0.3
e	34.08 ± 0.03	34.4 ± 0.3

*No variation in 10 measurements.

CONCLUSION

The photographic technique is currently being used to measure growth in oysters. It has the advantage in that:

(1) it is simple and accurate to use,

(2) handling time is reduced, hence the effect of stress on the animals is minimized,

(3) a permanent photographic record is available for filing and reference,

(4) length and breadth can be measured more conveniently, and

(5) an additional and more useful parameter, area, is readily available for morphometric study.

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