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A TECHNIQUE FOR THE MEASUREMENT OF PROBE DEPTH

by Andy Evans

INTRODUCTION

The depth-distribution of intertidal invertebrates is a factor of major importance in the accessibility of prey items to waders (e.g. Myers *et al.*. 1980). Indeed, sexual dimorphism in bill-length within a species may be great enough to permit females access to food items unavailable to males (Clark 1983, Townshend 1981). It is, therefore, often desirable to know to what depth foraging waders are probing. This can be determined in two ways: a) the proportion of the bill used during probing can be estimated by direct observation. This is now a fairly standard technique, but only leads to an approximation; or b) probe depth can be measured directly by taking casts of probe holes preserved in the substrate. The second method has been used in the past (Burton 1974, Mallory 1981), but I can find no attempt to document the accuracy of the technique.

Here I describe a method of measuring the depth of probe holes of Redshanks *Tringa totanus* and Dunlins *Calidris alpina* with a high degree of accuracy.

MATERIALS AND METHODS

The material used to make the casts was Silastic 9161 RTV silicon rubber, obtainable as a kit including catalyst N9162 from: Dow Corning Ltd., Barry, Glamorgan, U.K. When mixed with catalyst (20 parts rubber solution: 1 part catalyst by volume), the compound sets in saline water at 0° C in about 45 minutes. By increasing the proportion of catalyst (up to 10:1 by volume) a setting time of 20 minutes can be obtained.

A measured quantity of the rubber (10 cm^3 proved convenient) was gently stirred and the appropriate volume of catalyst added. The mixture was thoroughly stirred for between 30 and 90 seconds, then transferred to a syringe fitted with a needle and injected into the probe hole.

Initial experiments on a sample of estuarine mud in the laboratory returned consistently short casts. This could have been due either to the collapse of the holes, or a failure of the compound to reach the bottom of the holes, due perhaps either to an air lock or surface tension effects.

To test between these possibilities a second trial was performed using plasticine as the substrate to eliminate any possibility of hole collapse. Again, short casts were obtained. However, I discovered, however, that if a small syringe needle was inserted into the hole

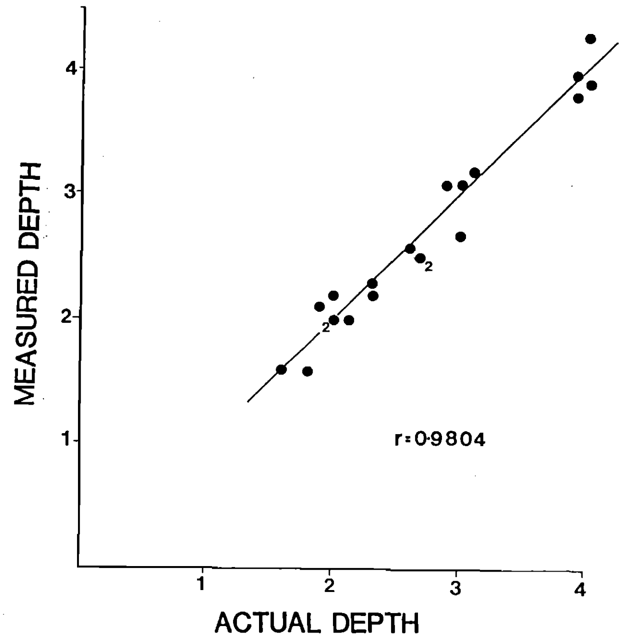

Figure 1. Depth measured by casts in relation to their actual depth.

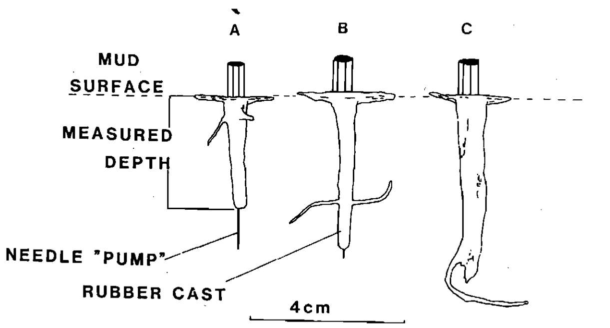

Figure 2. Drawings made from actual casts. A and B are from Dunlins in the laboratory tests, C is from a Redshank in the field.

before injection, and very carefully moved to and fro laterally after injecting the compound, the rubber solution was pumped to the bottom of the hole and perfect casts were obtained. The needle "pump" was left in position while the compound set. This made easier withdrawal of the cast from the mud.

A 'blind experiment' was then performed in the laboratory on a fresh sample of estuarine mud. Probe holes were bored to known depths by an assistant using the closed bill of a dead Dunlin. I then attempted to measure these depths by the casting technique described (using the needle "pump").

RESULTS

Figure 1 shows that the casting technique allowed precise measurement of probe holes (up to 4 cm deep) in estuarine mud. Drawings made from casts taken both in the laboratory and in the field illustrate that the technique can even show up the interception of invertebrate burrows by probes (Figure 2).

DISCUSSION

Although the technique proved reliable and easy to use, it should be retested on each substrate used, since collapse of probe holes must occur on some softer sediments. In the field the compound proved dense enough to expel all water from flooded holes and give good casts. The method might be usefully employed to measure probe depths in the field after a foraging bird has left an area on which it was feeding (even if only to assess the accuracy of the direct observation method of estimating probe depths). Additionally the technique could be used to make precise measurements of foraging patterns of captive birds.

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ABSTRACTS OF DOCTORAL AND MASTERS THESES

PARENTAL BEHAVIOUR AND ROLE DIFFERENTIATION IN THE BLACK OYSTERCATCHER *Haematopus bachmani*

by Margaret Anita Purdy

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science, University of Victoria, Canada, November 1985

ABSTRACT

An understanding of patterns of evolution and adaptive radiation of parental behaviour within a group such as shorebirds (sandpipers, plovers and their kin) requires adequate documentation of the characteristics and existing patterns of variation in parental behaviour, both within and among species. To this end, monogamously breeding Black Oystercatchers *Haematopus bachmani* were studied on Cleland Island, British Columbia from April-September, 1982 and 1983. The emphasis of the study was a comparison of the behaviour of males and females during six stages of the breeding season. Data were collected during day-long (16-h) sampling periods on thirteen pairs, simultaneously recording the behaviour of both pair members.

Prior to egg-laying, females spent approximately 6 per cent more time foraging than did males. During this period, males were more aggressive, spending almost twice as much time in piping behaviours with conspecifics. Males were also more alert than females, as indicated by comparison of the amount of time they spent in alert standing behaviours (females 23%, males 30%), and by the shorter bouts of foraging, preening, and sitting, which