

SERIAL SECTIONING OF STEINKERNS

by J. W. STANLEY

SERIAL sections have long been used for the investigation of the internal structures of fossil invertebrates, especially brachiopods. Sectioning techniques, originally applied to material which proved difficult to prepare by excavation of the internal matrix, are now commonly used as a routine procedure. With most unsilicified Lower Palaeozoic material sectioning is quicker and more likely to yield accurate information than other methods of preparation.

During a study of the Silurian brachiopod genus *Sphaerirhynchia* a situation arose in which the interiors of some forms were known only from serial sections of recrystallized specimens, and of others only from latex impressions of a small number of natural completely decalcified specimens. To assist comparison of the two forms it seemed desirable to be able to present the information from both in the same manner. Since it was not possible to prepare satisfactory steinkerns from the recrystallized specimens an attempt was made to serially section replicas of the natural steinkerns.

Technically there is no reason why the following procedure (as from stage 3) should not be applied directly to the specimen. However, a plaster replica would normally be prepared as a preliminary to sectioning in any case so that destruction of the original would be to no advantage in terms of time, labour, or the quality of the resulting sections.

TECHNIQUE

1. A latex impression of the steinkern is prepared in the normal way. Special care is taken to ensure penetration of the latex into crural cavities, &c. (Latex used: M. R. Revultex, by Revertex Ltd., Harlow, Essex.)

2. The latex impression is used as a mould for the casting of a plaster replica of the steinkern. (Plaster: dental quality.)

3. The plaster replica is blackened with a thin complete coating of indian ink, allowed to dry, and then embedded in white dental plaster. It is important to ensure penetration of the white plaster into crural cavities, &c., in the replica. This is assisted by using a plaster mix of thin creamy consistency applied by brush.

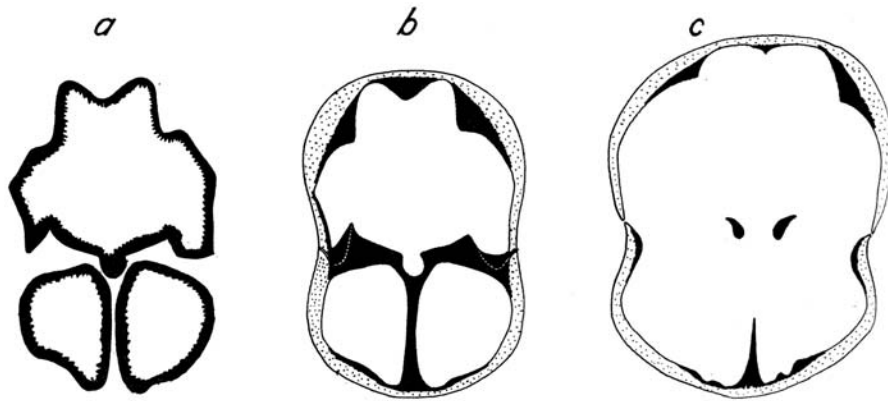
4. The block is sectioned in the normal way using parallel grinding apparatus (e.g. Croft 1950; Jefferies, Adams, and Miller 1962; Hendry, Rowell, and Stanley 1963). For less accurate work, or preliminary investigation in the absence of other equipment, a lap or plate for hand grinding could be used.

The technique has proved successful to a degree governed initially by the quality of the original steinkern and secondly by the care taken in subsequent preparation.

Ground section surfaces (see text-fig. 1*a*) show a black outline of the internal structures and interior shell surface. Section surfaces may easily be photographed as the contrast is high. Structures such as median septum, crura, cruralium, and dental plates

can be clearly seen in section and their shapes compared directly with those revealed in conventional sections.

Reconstruction of the outer shell surface is assisted by examination of the cavity from which the steinkern was obtained. This can only be approximate, although the minimum thickness of shell in certain parts (e.g. at the sides of the ventral and dorsal muscle impressions) may be definitely indicated. Dentition cannot be accurately reconstructed although the amount of variation possible is limited by the shape of the shell material in the appropriate area on the sections.



TEXT-FIG. 1. Section surfaces of a brachiopod steinkern replica, $\times 6$.

a. Section as seen on the block after grinding. The clean edge to the black area represents the junction between the position of the original shell and internal matrix. The blurred edge results from ink soaking into the plaster of the replica.

b. The same section drawn in the conventional manner with shell material in black, or where inferred, in stippled shading. Teeth and sockets reconstructed.

c. A subsequent section showing the accuracy with which fine structures such as crura may be reproduced. Shading as in *b*.

Interesting possibilities emerge for the technique since there is no destruction of the original specimen. Sections of valuable specimens (e.g. rare specimens and types) preserved as steinkerns can be made provided the original will withstand removal of the latex impression.

It is not suggested that sections prepared in this way are superior to photographs of latex impressions of steinkerns which are frequently published; on the contrary, they are subsidiary, enabling a more complete presentation of information and easier comparison with forms whose internal structures are known only from conventional sections.

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J. W. STANLEY
Department of Geology,
The University,
Nottingham

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