

METHODS OF MEASURING THE INTERNAL
VOLUME OF SHELLS

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METHODS OF MEASURING THE INTERNAL VOLUME OF SHELLS

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The internal volume of a pelecypod valve may be measured by: (A) dipping the valve into a container of water and then pouring the water in the shell into a graduated cylinder; (B) filling the inverted valve with water measured from a burette; or by a method (C) described in this note.

In method C the valve is placed concave downward on the bottom of a vessel which is then filled with water. The shell is held on the bottom with one hand. A funnel and graduated cylinder are placed in the vessel and allowed to fill with water (text-fig. 1). The stem of the funnel is placed inside the graduated cylinder and the funnel with cylinder is inverted over the shell (text-fig. 2). The shell is held concave downward on the bottom with the fingers of one hand during step 2. The shell is then inverted permitting the entrapped air under the shell to escape and displace water in the graduated cylinder. The volume of air may be read directly from the scale on the graduated cylinder (text-fig. 3).

The three methods were compared on shells of the pelecypod *Dinocardium robustum*. Internal volume measurements made using methods A and C were about the same (Table 1). Methods A and C resulted in higher volume measurements than

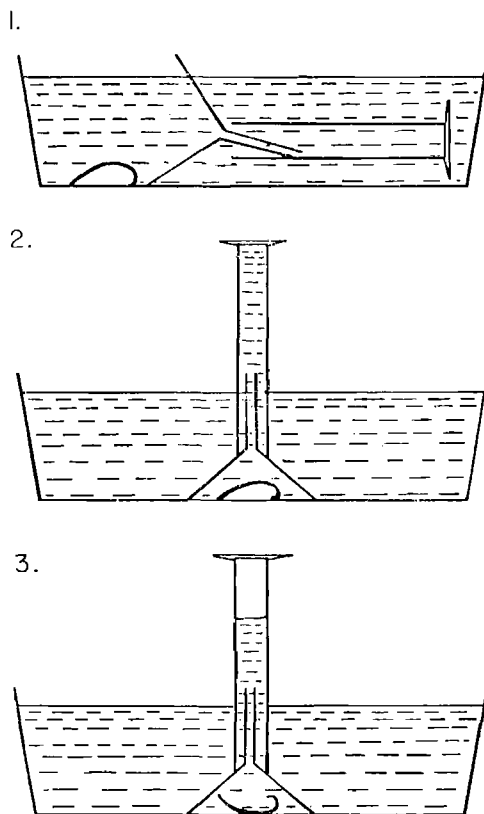


TABLE 1—COMPARISON OF INTERNAL VOLUME MEASUREMENTS OF *Dinocardium robustum* VALUES OBTAINED BY DIFFERENT MEASURING TECHNIQUES

Specimen Number	Type Valve	Internal Volume Measurements		
		Method A (Avg. of 5 trials, cc.)	Method B (Avg. of 2 trials, cc.)	Method C (Avg. of 5 trials, cc.)
2	Right	49.0	—	50.0
4	Right	49.1	—	47.2
4	Left	47.2	40.8	45.6
5	Left	50.6	45.0	—
6	Right	105.0	—	102.0
6	Left	—	79.7	82.0
7	Right	8.0	—	7.5
10	Left	119.0	108.2	118.0

TEXT-FIG. 1—The shell is placed on bottom of vessel which is then filled with water. A funnel and graduated cylinder are placed in the vessel and allowed to fill with water. The shell is held in place with one hand (not shown).

TEXT-FIG. 2—The funnel stem is placed inside a graduated cylinder and both are inverted over the shell. The shell is held in place with the fingers of one hand (not shown).

TEXT-FIG. 3—The shell is overturned under the funnel. The air that escapes from under the shell displaces water in the graduated cylinder. The volume of displaced water is read directly from the scale of the graduated cylinder.

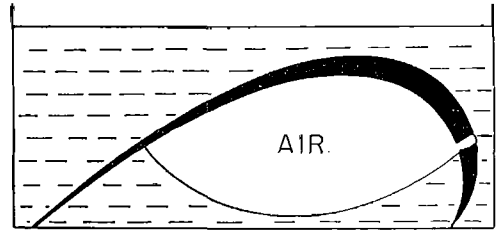
did method B (Table 1). It has not been determined which method better approximates the true volume. Method A has the advantage of simplicity and rapidity. Method B probably gives least reproduc-

TABLE 2—COMPARISON OF THE COEFFICIENT OF RELATIVE VARIATION OF INTERNAL VOLUME MEASUREMENTS OF *Dinocardium Robustum* VALVES MADE WITH METHODS A AND C

Method of Measuring	Specimen Number	Type Valve	Number of Measurements	Observed Range (cc.)	Arithmetic Average (cc.)	Standard Deviation (cc.)	Coefficient of Relative Variation
C	4	Right	5	45.2-48.5	47.2	1.16	2.45%
A	4	Right	5	47.6-50.0	49.1	0.99	2.00%
C	4	Left	5	42.0-49.5	45.6	2.69	5.90%
A	4	Left	5	45.5-49.0	47.2	1.29	2.73%

bility by different operators because judgement is involved in deciding when the shell is to be considered filled with water. Method C has almost the same degree of reproducibility as method A (Table 2). The accuracy of method C may be increased by adjusting the water level in the large vessel so that it is the same as the water level in the graduated cylinder when readings are made.

Method C was devised specifically to determine the volume of air entrapped beneath pelecypod valves containing holes drilled by snails when the valves are in a concave downward position and covered with water (text-fig. 4). The amount of air entrapped beneath the valves depends on



TEXT-FIG. 4—Cross-section of pelecypod shell with snail-drilled-hole showing entrapped air.

the diameter and position of the snail-drilled-hole so that it is not possible to make this measurement using either method A or B.