It is significant that of the 50 "adults" reared in laboratory cultures only two were from aerated dishes. All the other specimens in such dishes died or grew only slightly. Whether the deleterious effect of aeration was due to mechanical disturbance by the jet, or poor bacterial (food) growth is not known. Obviously the oxygen requirements of the clams are not great since sufficient oxygen can diffuse from the surface of the culture dish. This also is not surprising in view of foul conditions found late in the growing season in the bottom of the pond, or under ice during years when the pond has standing water all winter. (Kenk, 1947).

SUMMARY

1. Most of the growth of *Sphaerium (Musculium) partumeium* (Say) can be accomplished in 7-10 weeks.
2. Young can be produced before the 14th week of growth.
3. Size of clams grown in the field is greater than that of laboratory specimens in this case (possibly because of a richer food supply).
4. L/H ratios of field animals were different from those of laboratory animals.
5. Oxygen is not a limiting factor in the growth of these animals.

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NOTE ON LIMA (ACESTA) ANGOLENSIS

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Fifteen specimens of *Lima (Acesta) angolensis* Adam and Knudsen were trawled by the U. S. Bureau of Commercial Fisheries vessel *Geronimo* on 9 September, 1963, while participating in the *Equalant II* program. All specimens were taken alive in a depth of 951 meters at *Geronimo* Station 249, 04°40′S and 11°00′E, about 55 miles west of Pointe Noire, Congo Republic (Brazzaville). Neither the bottom type nor any hydrographic data were

recorded. The original description of *angolensis* (Adam and Knudsen, 1955) was based on the holotype, which was collected by the Belgian Oceanographic Expedition (1948-1949) at Station 88, 10°45'S, 13°07'E, about 40 miles west of Ponta do Môrro, Angola, in 400-500 meters. The *Geronimo* specimens constitute the second known occurrence of the species, increase the bathymetric range 450 meters, extend the geographic range about 360 miles northward, and add significant information on its biology.

Adam and Knudsen (1955) pointed out that *angolensis* is closely related to *Lima (Acesta) excavata* (Fabricius), an eastern north Atlantic species which ranges from Norway to the Azores in depths of 150-1450 fathoms (Thiele, 1918; Vokes, 1963a). In comparing *excavata* with *angolensis*, Adam and Knudsen noted the differences of the shape of the auricles, the size of the lunule, the strength of the ridges which define the lunule, and the development of the rudimentary lateral teeth. This latter trait was described:

"Le plateau cardinal de la valve droite présente à chaque extrémité un nodule; dans la valve gauche il y a aux endroits correspondants de chaque côté deux nodules allongés et parallèles. Ces nodules sont tous très peu apparents."

Dall (1902) documented the occurrence of lateral teeth in *Lima (Acesta) goliath* Sowerby and *Lima (Acesta) patagonica* Dall, and he mentioned that *excavata* lacked lateral teeth. A comparison of *excavata* from Hardanger Fjord, Norway, with *angolensis* shows that distal marginal irregularities, which could be considered obsolete lateral dental elements, occur in both species, rendering this character diagnostically unsuitable.

Other morphological characters, including conchological measurements, afford further specific parameters which may define the species. Table 1 gives some measurements of *angolensis* and *excavata*. The mean height/length ratio of *angolensis* is less than that of *excavata* but the overlap is considerable. More important are the ratios, breadth/height and breadth/length; both of them indicate that *excavata* has a greater lateral expansion. In these ratios, the amount of overlap is small. As pointed out by Vokes (1963b), the posterior auricle of *angolensis* is shorter than that of *excavata*, giving the outline of the shell a more broadly rounded posterior dorsal margin. Further, in *angolensis* the

	Height	Length	Breadth	Height/length	Breadth/height	Breadth/length
angolensis						
holotype	153	122	49	1.30	0.32	0.40
1	164	127	59	1.30	0.40	0.50
2	162	123	62	1.31	0.40	0.50
3	159	120	66	1.32	0.41	0.60
4	159	119	50	1.33	0.31	0.42
5	156	137	58	1.13	0.40	0.42
6	154	117	59	1.31	0.40	0.50
7	152	116	59	1.31	0.40	0.50
8	148	113	57	1.30	0.40	0.50
9	142	111	57	1.30	0.40	0.51
10	139	114	51	1.21	0.40	0.48
11	133	103	49	1.30	0.40	0.50
12	130	104	44	1.30	0.33	0.42
13	123	103	48	1.20	0.40	0.50
14	105	81	31	1.30	0.30	0.40
mean				1.28	0.38	0.47
excavata						
1	135	101	62	1.33	0.50	0.61
2	122	92	60	1.32	0.50	0.70
3	121	89	48	1.40	0.40	0.53
4	115	86	46	1.33	0.40	0.53
5	106	81	42	1.30	0.40	0.51
6	105	82	52	1.30	0.50	0.63
7	104	80	46	1.30	0.44	0.60
8	103	76	39	1.40	0.40	0.51
9	91	65	35	1.40	0.40	0.53
10	80	71	39	1.30	0.43	0.54
11	88	64	35	1.40	0.40	0.54
mean				1.34	0.43	0.56

Table I. Measurements in millimeters of *Lima (Acesta) angolensis* and *L. (A.) excavata*. Holotype data from original description; specimens of *angolensis* from *Geronimo* Station 249; those of *excavata* from Hardanger Fjord, Norway, in the collection of the U. S. National Museum.

anteroventral ridges which define the periphery of the lunule are stronger and more angular than the less definitive ridges in *excavata*. An internal view of the shell shows that the margin of the lunule of *angolensis* is more concave and lacks the strong proximal lunular notch of *excavata*. The radial sculpture is stronger and more widely spaced in *excavata*, perhaps a reflection of its heavier and thicker shell. The sculpture of *angolensis* is less well developed and finer, and the shell itself is thin and rather fragile.

Some epizoic commensal organisms were observed in association with *angolensis*. Two living specimens of a species of the prosobranch gastropod *Capulus*, here tentatively referred to as *C. ungaricus* (Linnaeus), were found attached to *angolensis* in

the region of the margin of the lunule. The site of attachment on one specimen is about 30 millimeters in diameter and is impressed in the shell, forming a scar. Four of the limas exhibited these deformations of the shell, three on the right valves and one on the left. The left valve of the holotype of *angolensis* also possesses a similar disfiguration near the lunular margin. In one of the *Geronimo* specimens, an elongate hole was bored through the shell by *Capulus*. The snail lives with its apex directed away from the edge of the shell of its host, a condition similar to that exhibited by *Capulus ungaricus* on *Chlamys opercularis* (Linnaeus) in Europe (Sharman, 1956).

At least 6 of the specimens of *angolensis* have small, circular depressions which measure from one to three millimeters in diameter, distributed on the surface of the valves. These depressions are occupied by a species of the foraminiferan genus *Rosalina*. A complete penetration of the limid's shell may be effected in these depressions, and the mantle of the mollusk may secrete a conical deposit on the internal surface of the valve in a reaction against the irritation caused by the *Rosalina*. Other foraminiferan species of the genera *Cibicides* and *Placopsilina* may be attached to the shell externally.

The soft parts of all the specimens were preserved. None of them possessed a byssus; however, these limas may possibly attach byssally in the immature stage. The posterior pedal-byssal retractor muscle is small and inserts in the muscular portion of a special axial branchial apparatus which irregularly attaches to the shell posteroventral to the strong adductor muscle.

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MOLLUSKS NEW TO SOUTH CAROLINA

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Certain species collected in beach drift along the shores of South Carolina, and other material brought to us by cooperating shrimp fishermen in the past, led us to suspect that many of the mollusks from the Caribbean province inhabit these waters but have never been reported in the literature due to the lack of concentrated collecting. Therefore, we decided to do extensive shore collecting and offshore dredging when possible, in an effort to define properly the fauna. This work has resulted in many range extensions to South Carolina, some of which are here reported.

Many of our range extensions are major ones, commonly extending known ranges northward from southeast Florida, over four hundred miles. These records from South Carolina are particularly important because this state lies between Cape Hatteras and southern Florida, areas where the molluscan fauna has been much more extensively defined. One has only to check the "specimens examined" sections of *Johnsonia* to realize the lack of specific locations for species between these areas. Most of the North Carolina records are from the old *Albatross* dredgings, and those from southern Florida are largely from the McGinty dredgings. Until our recent work, little dredging has been done off the South Carolina coast since the *Albatross* made a few deep water stations in 1885.

We are fortunate to have dredgings from 18 stations offshore to supplement our shore collecting. Our first series of dredgings consisted of a transect of 12 stations off McClellanville, S. C. made in July 1963 aboard the shrimp boat, *Miss Kim,* at depths

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