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SOME MORPHOMETRIC DATA ON SHARK EMBRYOS

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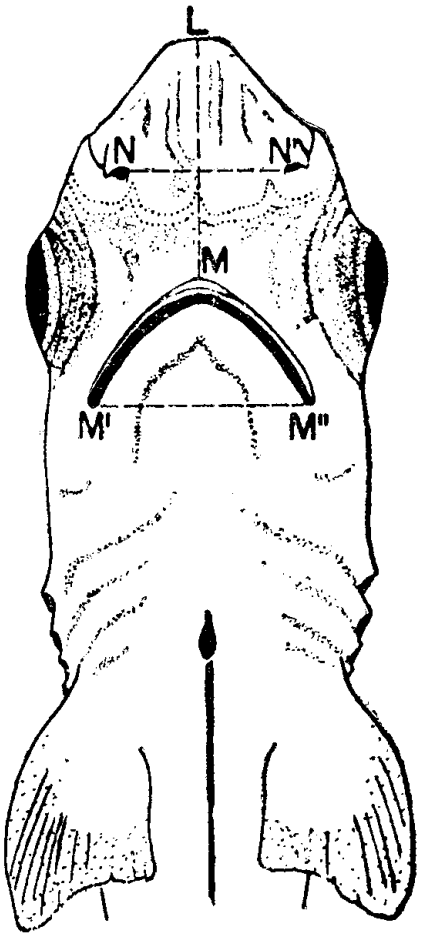


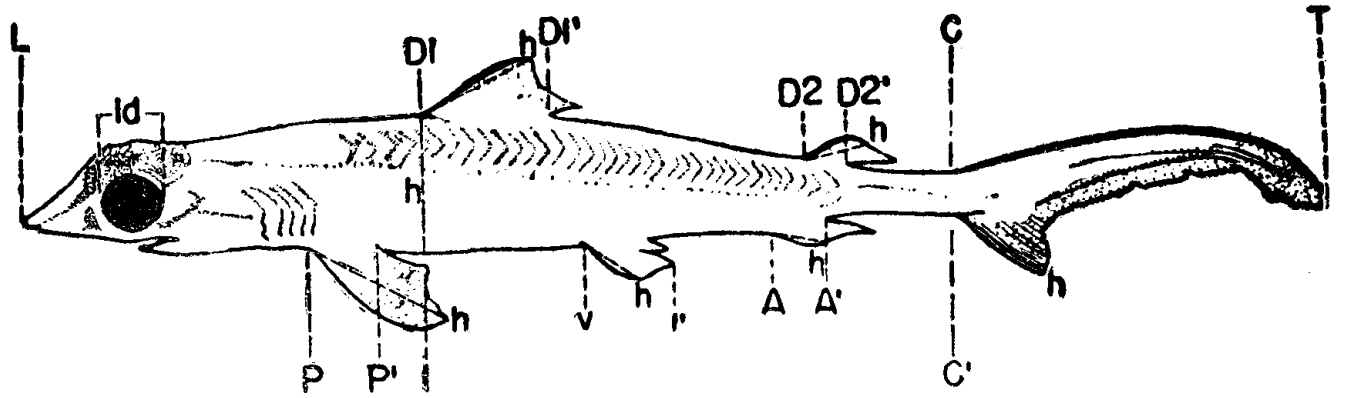
In this paper we present some morphometric data on shark embryos found in pregnant females caught in front of Mucuripe Beach (Fortaleza, State of Ceará, Brazil).

Sixteen embryos were obtained from a female of *Carcharinus porosus* (Ranzani, 1840), caught in September 2, 1966, and their identification was based on Bigelow & Schroeder (1948).

All embryos of *Carcharinus porosus* were morphometrically analysed (figure 1, table I), according to Bigelow & Schroeder (1948); they say that these embryos have not yet been described. The embryos ranged from 152 to 220 mm total length.

The two smallest specimens of *Carcharinus porosus* morphometrically analysed in literature (Bigelow & Schroeder, 1948), with a 485 mm and 500 mm total length, were obtained in Colón (Panamá, Atlantic coast). Eighteen proportional dimensions (in per cent of total length) were considered: snout

Figure 1 — Embryo of *Carcharinus porosus* (Ranzani, 1840) : LT = total length, LM = snout to mouth, M'M" = mouth breadth, Id = eye diameter, NN' = distance between nostrils, D1h = height of dorsal 1, D1D1' = base of dorsal 1, D2h = height of dorsal 2, D2D2' = base of dorsal 2, Ah = height of anal, AA' = base of anal, CT = upper margin of caudal, C'h = lower margin of caudal, Ph = anterior margin of pectoral, P'i = inner margin of pectoral, ih = distal margin of pectoral, Vh = anterior margin of pelvic, hi' = distal margin of pelvic, LD1 — snout to dorsal 1, LD2 = snout to dorsal 2, LA = snout to anal, LP = snout to pectoral, LV = snout to pelvic, D1'D2 = interspace between dorsal 1 and 2, D2'C = interspace between dorsal 2 and caudal, A'C' = interspace between anal and caudal, h = greatest depth.



length in front of outer nostrils — 4.5 and 4.3 ; snout length in front of mouth — 8.9 and 8.7 ; mouth breadth — 8.2 and 7.9 ; mouth height — 5.4 and 5.3 ; distance between inner ends of nostrils — 5.8 and 5.8 ; opening length of lst gill slit — 2.5 and 2.6 ; length of base of dorsal 2 — 3.4 and 3.4 ; length of base of anal — 4.6 and 4.6 ; inner margin of pectoral — 5.9 and 6.0 ; distance from snout to dorsal 1 — 33.0 and 32.2 ; distance from snout to dorsal 2 — 64.3 and 62.6 ; distance from snout to upper caudal — 73.7 and 73.4 ; distance from snout to pectoral — 23.5 and 23.8 ; distance from snout to pelvic — 47.0 and 48.6 ; interspace between dorsal 1 and dorsal 2 — 20.7 and 20.6 ; interspace between dorsal 2 and caudal — 7.8 and 7.0 ; interspace between anal and caudal — 7.6 and 6.8 ; distance from origin of pelvic to origin of anal — 13.4 and 13.8 .

Sixteen embryos were obtained from a female of *Sphyrna mokarran* (Rüppell, 1835) , caugth in November 19 , 1962 ; their identification was based on Clark & Schmidt (1965) .

Twelwe of the embryos of *Sphyrna mokarran* were morphometrically analysed (figure 2 , table II) , according to Clark & Schmidt (1965) . They ranged from 364 to 408 mm total length.

The smallest embryo of *Sphyrna mokarran* morphometrically analysed in literature (Bigelow & Schroeder, 1948) , with a 673 mm total length, was obtained in Englewood (Florida, U. S. A.). Eleven proportional dimensions (in per cent of total length) were considered: distance between nostrils — 16.9 ,

TABLE I

Morphometric data on sixteen embryos of *Carcharinus porosus* (Ranzani, 1840) . Values expressed as per cent of total length, unless otherwise indicated.

Morphometric data	*Carcharinus porosus* (Ranzani, 1340)	
	Range	Average
total length (mm)	152 — 220	183.0
trunk at origin of pectoral:		
a) breadth	8.8 — 11.2	10.2
b) height	8.1 — 10.3	9.3
snout length in front of:		
a) outer nostrils	3.7 — 5.3	4.4
b) mouth	8.2 — 9.5	8.9
eye: horizontal diameter (iris diameter)	2.7 — 3.5	3.0
mouth:		
a) breadth	5.9 — 9.3	7.7
b) height	4.6 — 6.1	5.2
nostrils: distance between inner ends	5.0 — 6.2	5.7
gill opening lengths:		
a) 1st gill slit	1.3 — 2.2	1.6
b) 2nd gill slit	1.8 — 2.6	2.1
c) 3rd gill slit	1.8 — 2.6	2.2
d) 4th gill slit	1.8 — 2.5	2.2
e) 5th gill slit	1.3 — 1.8	1.6
dorsal 1 , vertical height	10.0 — 12.9	11.1
dorsal 1 , length of base	6.9 — 10.1	8.4
dorsal 2 , vertical height	3.1 — 5.6	4.4
dorsal 2 , length of base	2.7 — 3.9	3.1
anal, vertical height	3.6 — 5.6	4.8
anal, length of base	3.7 — 5.0	4.4
caudal, upper margin	26.8 — 29.5	27.9
caudal, lower anterior margin	8.1 — 10.4	9.2
pectoral, outer margin	6.8 — 12.7	11.2
pectoral, inner margin	4.3 — 6.2	5.2
pectoral, distal margin	6.2 — 9.0	7.5
distance from snout to:		
a) dorsal 1	28.5 — 32.7	30.7
b) dorsal 2	58.0 — 63.1	60.6
c) upper caudal	70.0 — 76.3	72.1
d) pectoral	20.7 — 25.0	23.1
e) pelvic	40.2 — 48.7	44.4
f) anal	53.9 — 59.6	57.1
interspace between:		
a) dorsal 1 and 2	19.0 — 23.2	20.8
b) dorsal 2 and caudal	6.6 — 9.4	7.9
c) anal and caudal	6.5 — 9.5	8.0
distance from origin to origin of:		
a) pectoral and pelvic	17.5 — 25.0	21.2
b) pelvic and anal	11.2 — 16.1	12.9
number of vertebrae	134 — 163	158.5

base of dorsal 1 — 10.1, base of dorsal 2 — 5.6, base of anal — 6.7, lower margin of caudal — 10.4, inner margin of pectoral — 4.4, snout to dorsal 2 — 57.3, snout to anal — 55.9, snout to pelvic — 43.7, interspace between dorsal 2 and caudal — 7.1, interspace between anal and caudal — 6.8.

For a young of *Sphyrna mokarran* with 810 mm total length, from the Central Gulf Coast of Florida (Clark & Schmidt, 1965), nine proportional dimensions (in per cent of total length) were considered: standard length — 67.0, distance between nostrils — 16.2, base of anal — 5.9, lower margin of caudal — 10.5, distal margin of pectoral — 10.4, anterior margin of pelvic — 6.9, distal margin of pelvic — 6.8, snout to dorsal 2 — 55.5, interspace between anal and caudal — 6.9.

The large range of vertebral numbers of the embryos analysed (table II) envolves the vertebral numbers of two specimens of *Sphyrna mokarran* from the Pacific — 205 and 206, — quoted by Springer & Garrick (1964).

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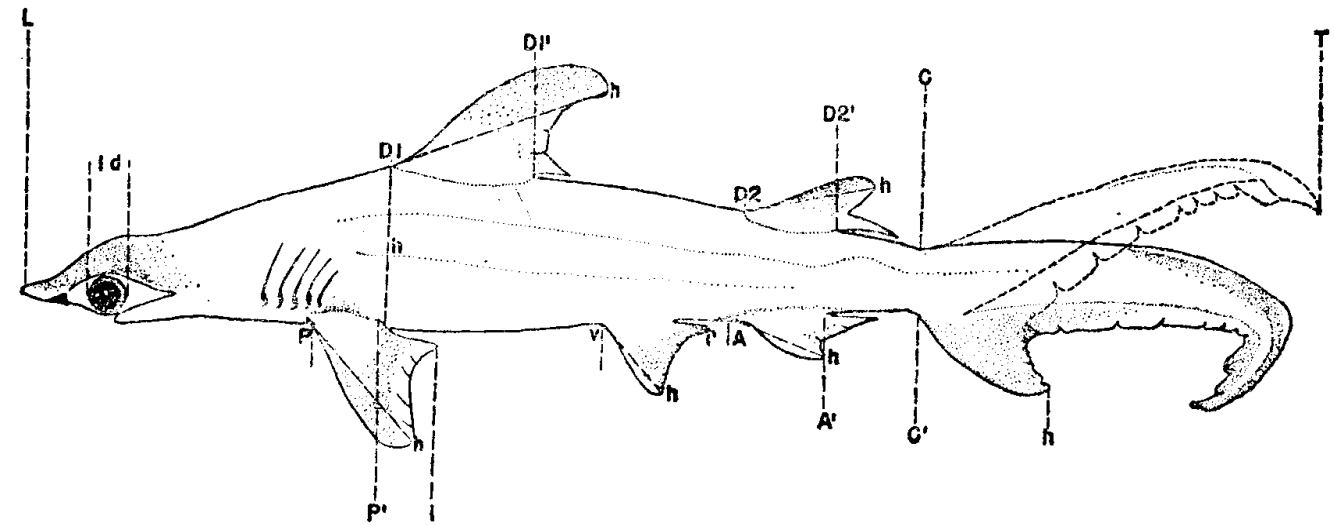

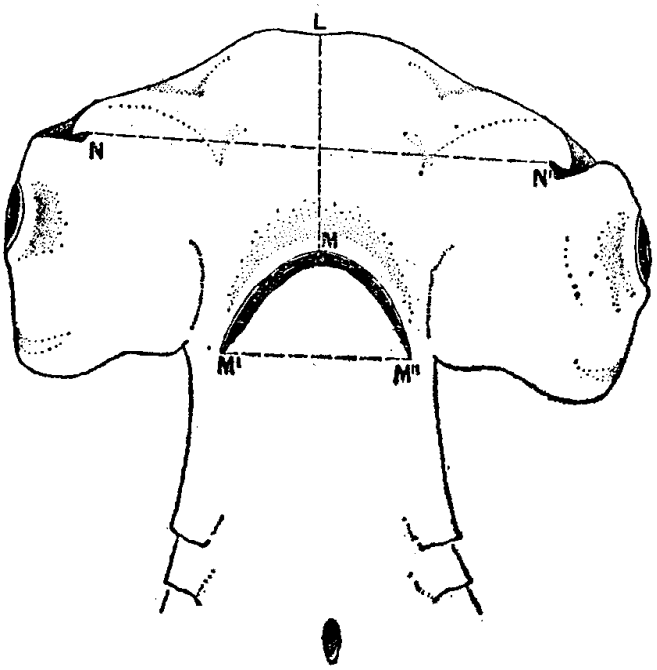

Figure 2 — Embryo of *Sphyrna mokarran* (Rüppell, 1835) : LT = total length, LC = standard length, LM = snout to mouth, M'M" = mouth breadth, Id = eye diameter, NN' = distance between nostrils, D1h = height of dorsal 1, D1D1' = base of dorsal 1, D2h = height of dorsal 2, D2D2' = base of dorsal 2, Ah = height of anal, AA' = base of anal, CT = upper margin of caudal, C'h = lower margin of caudal, Ph = anterior margin of pectoral, P'i = inner margin of pectoral, ih = distal margin of pectoral, Vh = anterior margin of pelvic, hi' = distal margin of pelvic, LD1 = snout to dorsal 1, LD2 = snout to dorsal 2, LA = snout to anal, LP = snout to pectoral, LV = snout to pelvic, D1'D2 = interspace between dorsal 1 and 2, D2'C = interspace between dorsal 2 and caudal, A'C' = interspace between anal and caudal, h = greatest depth.

TABLE II

Morphometric data on twelve embryos of *Sphyrna mokarran* (Rüppell, 1835). Values expressed as per cent of total length, unless otherwise indicated.

Morphometric data	*Sphyrna mokarran* (Rüppell, 1835)	
	Range	Average
total length (mm)	364 — 408	389.9
standard length	66.3 — 69.2	67.8
snout length in front of:		
a) mouth	7.4 — 8.0	7.7
eye: horizontal diameter (iris diameter)	2.5 — 3.9	2.8
mouth:		
a) breadth	6.4 — 7.5	7.0
nostrils: distance between inner ends	15.3 — 17.8	16.7
dorsal 1, vertical height	15.5 — 17.2	16.5
dorsal 1, length of base	9.1 — 11.2	10.0
dorsal 2, vertical height	6.5 — 7.8	7.2
dorsal 2, length of base	5.2 — 5.9	5.5
anal, vertical height	5.1 — 6.2	5.7
anal, length of base	5.4 — 6.8	6.2
caudal, upper margin	31.1 — 34.3	32.3
caudal, lower anterior margin	9.6 — 10.9	10.3
pectoral, outer margin	11.1 — 12.0	11.5
pectoral, inner margin	4.1 — 5.3	4.4
pectoral, distal margin	9.5 — 11.0	10.1
distance from snout to:		
a) dorsal 1	27.8 — 29.0	28.3
b) dorsal 2	54.7 — 57.6	56.0
c) pectoral	21.5 — 23.4	22.2
d) pelvic	42.7 — 45.5	44.0
e) anal	53.6 — 56.6	55.8
pelvic, outer margin	6.4 — 7.2	6.8
pelvic, distal margin	5.9 — 7.1	6.4
interspace between:		
a) dorsal 1 and 2	17.5 — 19.5	18.4
b) dorsal 2 and caudal	7.0 — 7.6	7.2
c) anal and caudal	5.5 — 7.4	6.4
greatest depth	10.6 — 11.9	11.2
number of vertebrae	196 — 215	207.5