

LARVAE AND JUVENILES OF AURORA ROCKFISH, *Sebastes aurora*,
FROM OFF CALIFORNIA AND BAJA CALIFORNIA

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INTRODUCTION

Adults of *Sebastes aurora* are uniformly pink-red in coloration, moderate in size (up to 40 cm) and have been reported from Amphridite Pt., Vancouver Island, to San Diego, California, in depths of 180-768 m (Miller and Lea 1972; Eschmeyer et al. 1983). They are a minor component of trawl catches from deep soft-bottom habitats (W.H. Lenarz, NMFS, Tiburon Lab., pers. comm.). - Published fishery and life history information of this species is lacking.

Sebastes aurora is the eighth eastern Pacific *Sebastes* species for which complete life history stages are known. Others are *S. cortezii*, *S. dallii*, *S. jordani*, *S. levis*, *S. macdonaldi*, *S. melanostomus* and *S. paucispinis* (Moser et al. 1977; Moser and Ahlstrom 1978; Moser and Butler 1981). Five other species have been reared to the stage of notochord flexion--*S. rufus* and *S. constellatus* (Moser and Butler, In press); *S. caurinus* and *S. auriculatus* (Stahl-Johnson, this volume); *S. melanops* (G.W. Boehlert, NMFS, Honolulu Lab., pers. comm.). Postflexion stages have been described for seven species--*S. crameri*, *S. helvomagulatus* and *S. pinniger* (Richardson and Laroche 1979); *S. flavidus* and *S. melanops* (Laroche and Richardson 1980); *S. entomelas* and *S. zacentrus* (Laroche and Richardson 1981). Information on pre-extrusion, newborn or first-feeding larvae is available for 28 other species (Moser et al. 1977; Kendall 1982; Washington et al. 1984), leaving 22 eastern North Pacific species for which life history stages have not been described. The use of ichthyoplankton surveys in estimating spawning biomass and recruitment of *Sebastes* species is impaired by the large species complement and the inadequate knowledge of their early life histories. This paper employs specimens from ichthyoplankton and trawl collections and the technique of tracing larval series backward from identifiable juveniles. The companion paper (Stahl-Johnson, this volume) describes larval stages of two nearshore species reared from larvae extruded from identified females. Extensive use of these techniques is necessary to fill in the gaps in our knowledge of *Sebastes* life histories.

MATERIALS AND METHODS

Material for early life history description was based on the 415 larvae and early pelagic juvenile specimens (3.0-21.5 mm in length) collected on California Cooperative Oceanic Fisheries Investigations (CalCOFI) plankton surveys from 1949 to 1981. Eleven pelagic juveniles (14.4-34.4 mm SL) were obtained from midwater trawl collections of the Natural History Museum of Los Angeles County (LACM Cat. Nos. 9369-17, 9674-16, 9677-11, 9943-17, 30202-7, 30203-3, 30270-9, 30526-13, 36303-1, and 36313-1). Two benthic juveniles (38.3 and 38.9 mm SL) were obtained from bottom trawl samples of Scripps Institution of Oceanography (SIO Cat. Nos. 70-350 and 84-47). Descriptive methods and terminology follow Moser et al. (1977) and Moser and Ahlstrom (1978).

Fresh specimens for aging were obtained from the stomach contents of albacore (*Thunnus alalunga*) taken in August 1977 about 129 km south-southwest of San Diego, California. The otoliths were prepared and analyzed according to the methods of Brothers et al. (1976).

DESCRIPTION OF DEVELOPMENT

GENERAL DEVELOPMENT

Larvae of *S. aurora* are released principally during the winter and spring and are about 4.0 mm long at birth (Fig. 1). Notochord flexion occurs in a size interval of about 6.5-8.6 mm and transformation to the pelagic juvenile stage occurs at about 13 mm SL (Table 1). Our largest pelagic juvenile was 34.4 mm SL; the smallest benthic juvenile was 38.3 mm SL (Fig. 2).

MORPHOLOGY

Larvae have a distinctive shape; the head and mouth are large and the produced snout has a concave dorsal profile. The snout-anus distance is relatively greater than in other species studied (Table 2). Pelagic juveniles have a relatively large head and mouth; however, the dorsal snout profile is slightly convex.

Sebastes aurora develops a nearly complete complement of head spines; the sequence of their appearance is listed in Table 3. The parietal spines are relatively small, weakly serrated and lie flat against the head. The 2nd and 3rd anterior preopercular spines, and the 1st and 4th upper infraorbitals are lost during the pelagic juvenile stage; the pterotic, lower posttemporal and cleithral spines are lost in the benthic juvenile stage.

FIN DEVELOPMENT/MERISTICS

The principal caudal fin rays are the first rays to begin ossification, at about 5.3 mm. The full complement of 8 + 7 rays is present at 8.0 mm at which size the procurrent caudal rays begin ossifying (Table 4). Ossification of the pectoral fin rays begins at about 5.6 mm and the full complement is ossifying at about 8.3 mm. The pectoral fin attains a moderate size compared with that in other *Sebastes* species (Table 2). Ossifying dorsal and anal fin rays are present during notochord flexion and the full complements are present in early postflexion larvae. The gill rakers on the lower limb of each arch appear at about 5.6 mm and the full complement on both limbs (24-28) is ossifying at the end of the larval period. Only one other species of eastern Pacific *Sebastes*, *S. rastrelliger*, has a lower count. The

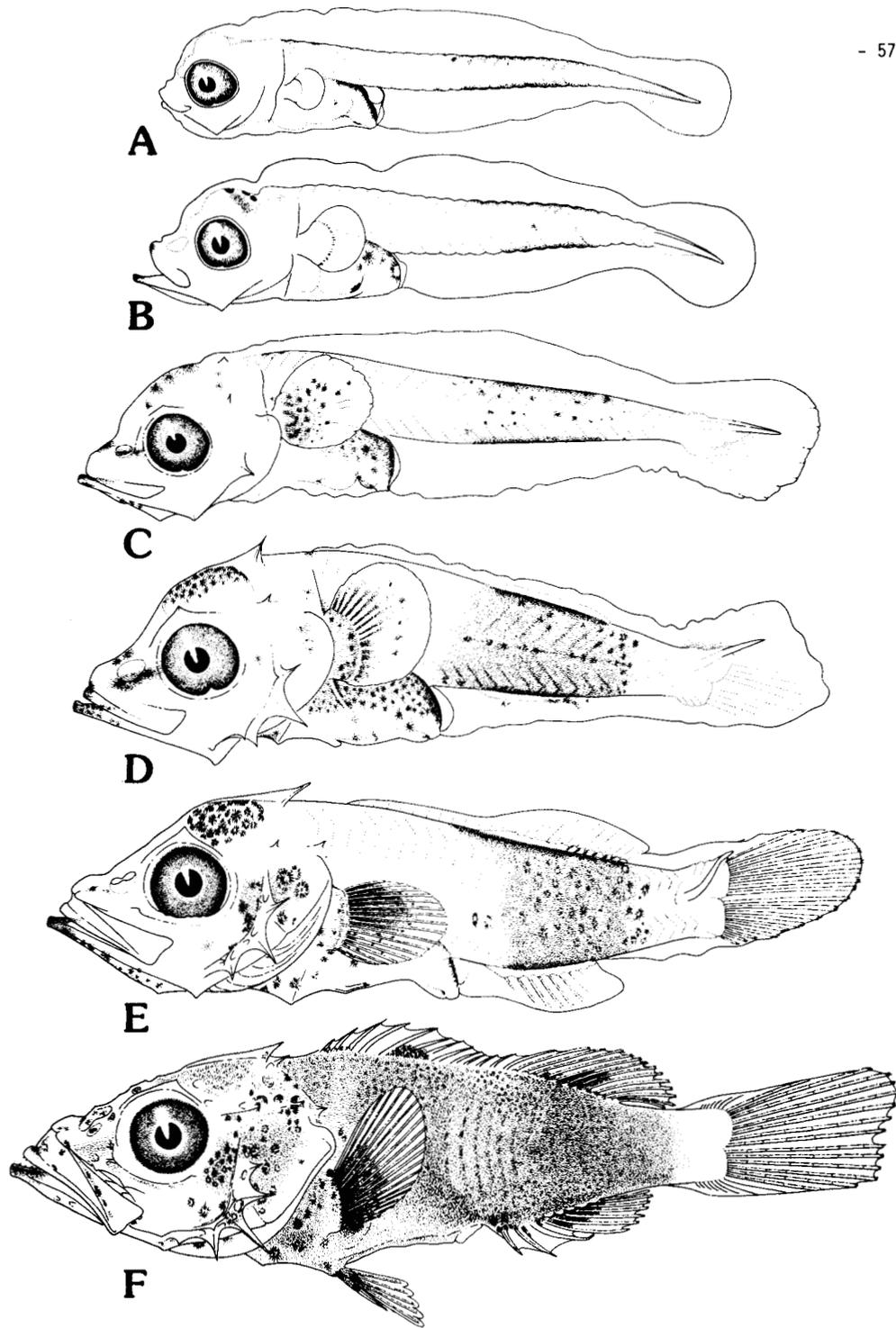


Figure 1. Developmental series of *S. aurora*. (A) 4.4 mm larva, Scripps 2-6-B, Sta. 3-1-A; (B) 4.8 mm larva, CalCOFI 4900 (H6) 802; (C) 6.5 mm larva, Scripps 2-6-B, Sta. 3-1-A; (D) 6.7 mm larva, CalCOFI 5005 Sta. 130.40; (E) 8.3 mm larva, CalCOFI 7507 Sta. 90.70; (F) 13.5 mm pelagic juvenile, LACM 30270-9.

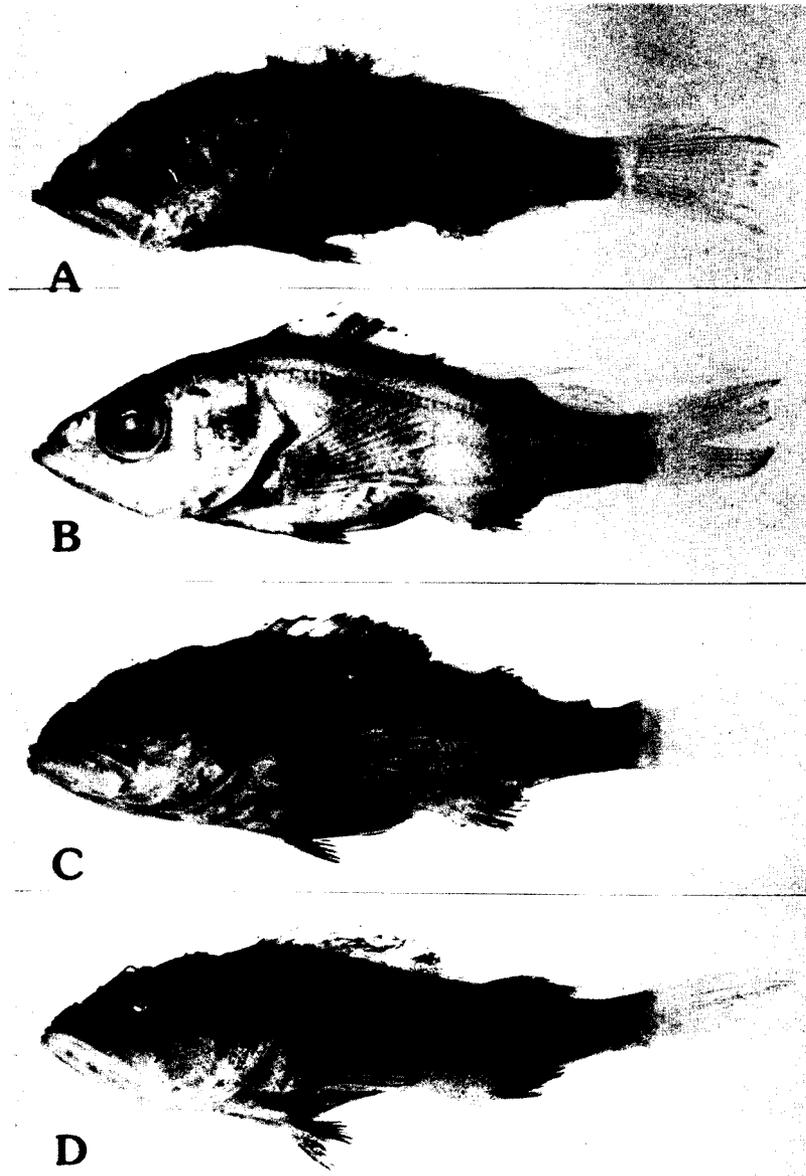


Figure 2. Developmental series of *S. aurora*. (A) 19.6 mm pelagic juvenile, LACM 30202-7; (B) 28.3 mm pelagic juvenile, LACM 36313-1; (C) 34.4 mm pelagic juvenile, LACM 36303-1; (D) 38.9 mm benthic juvenile, SIO 70-350.

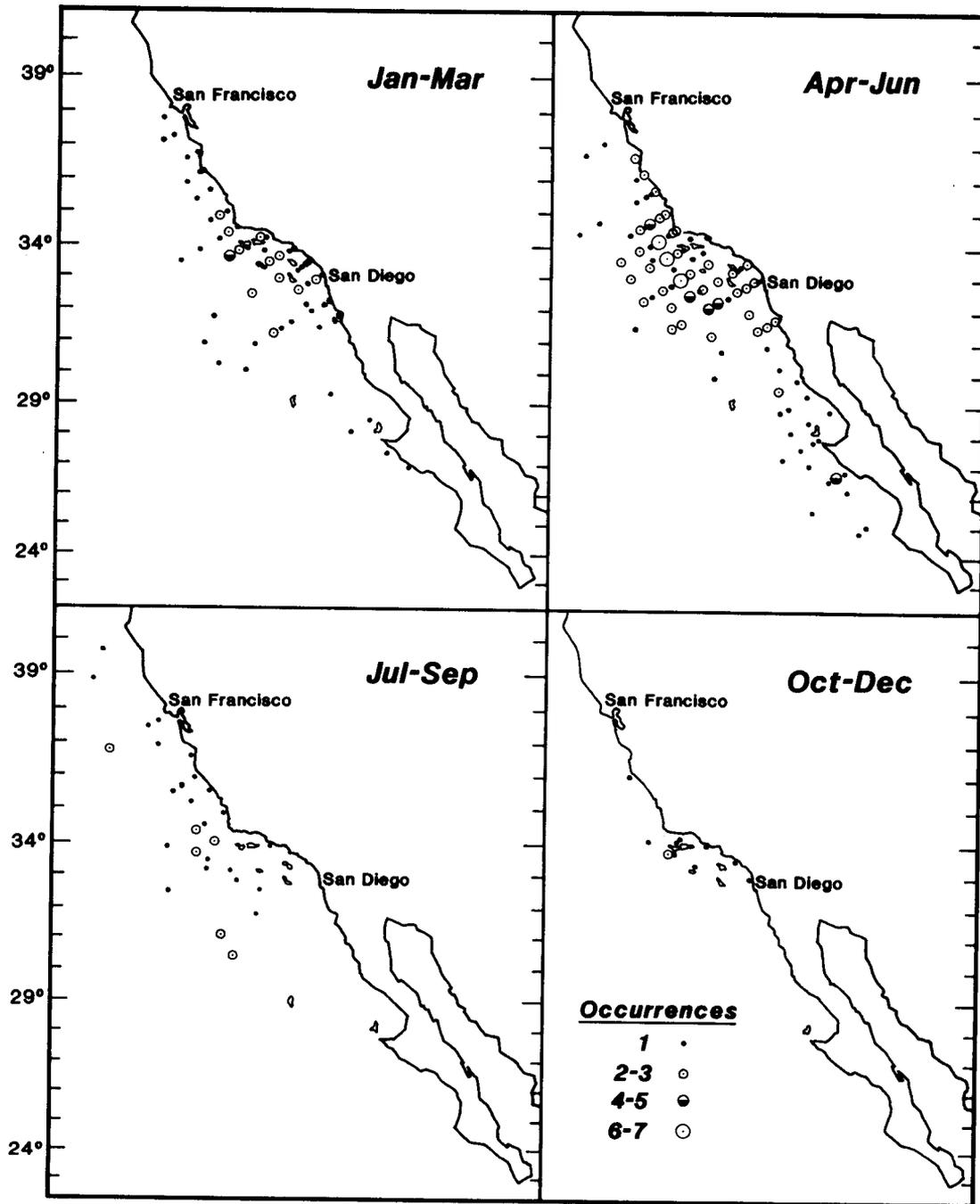


Figure 3. Numbers of occurrences of larvae of *S. aurora* in standard CalCOFI tows taken during 1959-1981 and pooled by season.

full complement of 27-30 lateral line scales, the lowest count among eastern Pacific *Sebastes*, is present about mid-way through the pelagic juvenile stage. The combination of these two counts is diagnostic for the species.

PIGMENTATION

Larvae of *S. aurora* have an unusual pigment pattern. Newborn larvae have a melanistic sheath above the gut and a distinctive band extending from the 4th or 5th postanal myomere to the 14th or 15th. Most of the melanophores are concentrated near the dorsal and ventral midlines but some occur laterally and many are deeply embedded in the myomeres (Fig. 1). Melanophores can be counted in only a few specimens in which the pigment cells are contracted. A 3.8 mm larva had about 45 melanophores above the horizontal septum and 35 below. In four specimens between 4.5 mm and 6.1 mm the counts range from about 63-100 above the septum and 44-73 below. The band enlarges and becomes more prominent in later larval stages and appears as a dusky bar in pelagic and benthic juveniles (Fig. 2). The head becomes heavily pigmented in preflexion larvae as pigment develops above the brain, on the nape, upper jaw, lower jaw, gular region, isthmus, otic region, cleithral region and snout. The deeply embedded pigment in the snout is a diagnostic feature. During the preflexion stage, groups of melanophores appear posterior to the eye on the preopercle and opercle. The pectoral fin becomes heavily pigmented during the preflexion period; the fin base develops solid pigmentation on both medial and lateral surfaces and the blade is pigmented except in the distal region. During notochord flexion pigment begins to develop on the proximal regions of the pelvic fins and the anal fin. Transition to the pelagic juvenile stage involves an expansion of the tail bar posteriorly and anteriorly and the appearance of pigment over the entire head and body. A second dusky bar appears at midbody below the 5th-11th spinous dorsal rays and a small pigment saddle forms below the 1st-3rd spinous rays. Three blotches form on the membrane of the spinous dorsal at rays 1-3, 5-7, and 9-11. A large blotch develops on the proximal region of the soft dorsal. In large pelagic juveniles the distal margin of the spinous dorsal fin develops a series of black markings.

DISTRIBUTION AND GROWTH

Adults of *S. aurora* have been reported from central Baja California to southern British Columbia. Distribution of the larvae collected on CalCOFI surveys indicates that the southern limits of the distribution are south of Punta Eugenia, Baja California (Fig. 3). Larvae of *S. aurora* occurred in 292 of 14,124 CalCOFI samples taken at 136 stations from 1949 to 1981 in a region extending from Cape Mendocino, California, to off Thetis Bank, Baja California. Seasonal

fluctuations in abundance were evident with occurrences most numerous in April-June (166 occurrences in 4762 tows, 3.5%) followed by January-March (79 occurrences in 4083 tows, 1.9%), July-September (36 occurrences in 2928 tows, 1.2%), and October-December (11 occurrences in 2351 tows, 0.5%). Individuals ranged in size from 2.8-21.5 mm; 92% were 8.5 mm or less. Larval size was independent of season and distance offshore.

Examination of the otoliths of specimens taken from albacore stomachs showed an estimated age of 68 days for a 17.6 mm SL pelagic juvenile, 76 days for one 25.3 mm SL and 80 days for one 26.8 mm SL (Fig. 4). This is similar to age estimations for pelagic juveniles of *S. melanostomus*, a species with a similar early life history (Moser and Ahlstrom 1978). Adults of both species occupy deep slope habitats and have distinctively banded pelagic juveniles which attain a length of 35-40 mm SL and an age of 3-4 months before settling. The pigment pattern of strong dark bands alternating with almost transparent body regions is also found in pelagic juveniles of the subgenus *Sebastomus* and the genus *Sebastolobus* and may function to conceal the juveniles during their extended midwater life (Moser and Ahlstrom 1978).

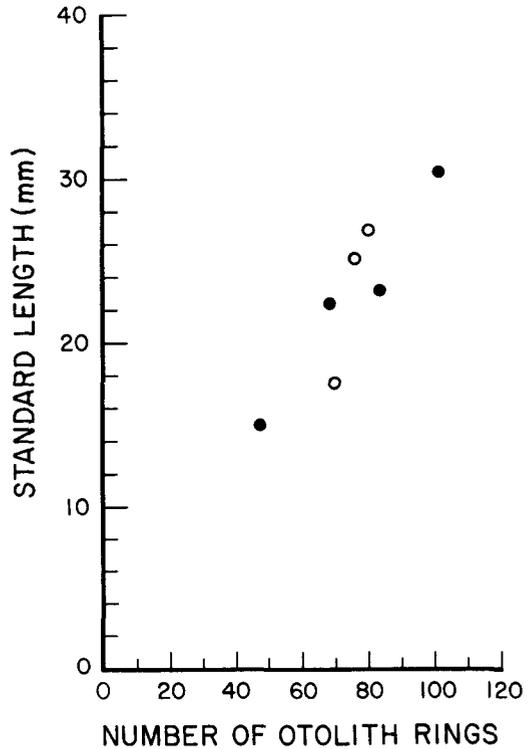


Figure 4. Estimated ages of pelagic juveniles of *S. aurora* and *S. melanostomus* based on counts of daily growth rings of sagittae.

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Table 1. Measurements (mm) of larvae and juveniles of *Sebastes aurora*. Specimens between dashed lines are in the notochord flexion stage and specimens between solid lines are pelagic juveniles.

Station	Body length	Snout-anus length	Head length	Snout length	Eye diameter	Body depth	Pectoral fin length	Pectoral fin base depth	Pelvic fin length	Snout-anal fin distance
5404 117.37.5	3.8	1.5	0.80	0.22	0.31	0.64	0.25	0.22		
5206 90.33	4.0	1.5	0.84	0.22	0.30	0.60	0.21	0.24		
5305 77.60	4.2	1.7	0.94	0.22	0.32	0.73	0.24	0.26		
Scripps 36B-31A	4.4	1.8	1.0	0.24	0.38	0.76	0.28	0.27		
7805 87.60	4.6	2.0	1.2	0.34	0.43	0.88	0.34	0.34		
4908 802	4.8	2.1	1.2	0.40	0.41	0.94	0.38	0.34		
6504 83.51Reg	5.0	2.1	1.2	0.34	0.40	0.90	0.35	0.32		
5104 130.3 .34	5.2	2.2	1.4	0.44	0.49	1.2	0.43	0.36		
7203 100.80	5.5	2.4	1.6	0.45	0.49	1.1	0.46	0.40		
8104 83.3 .42	5.7	2.7	1.5	0.45	0.46	1.1	0.47	0.40		
7807 77.60	5.9	2.8	1.8	0.58	0.58	1.3	0.58	0.56		
5404 127.37	6.1	2.9	1.8	0.66	0.53	1.4	0.54	0.50	0.02	3.3
5305 113.45	6.3	3.1	1.8	0.61	0.60	1.7	0.59	0.52	0.03	3.6
Scripps 36B-21A	6.5	3.0	1.9	0.59	0.59	1.4	0.54	0.53	0.03	3.6

5005-130.40	6.7	3.5	2.2	0.80	0.71	1.8	0.72	0.53	0.07	3.8
5206 80.60	6.9	3.3	2.2	0.78	0.62	1.7	0.60	0.60	0.06	4.1
5604 83.70	7.0	3.6	2.3	0.81	0.76	1.8	0.70	0.66	0.08	4.2
5206 93.50	7.4	4.0	2.5	0.89	0.75	1.8	0.80	0.75	0.12	4.5
5306 85.60	7.6	4.2	2.5	0.91	0.79	2.1	0.84	0.84	0.13	4.5
5704 100.60	7.7	4.6	3.1	1.1	0.80	2.2	1.0	0.80	0.18	5.0
5303 80.60	7.9	4.7	2.8	1.1	0.86	2.2	0.91	0.86	0.18	5.0
5605 93.70	8.0	4.7	3.0	1.1	0.85	2.2	1.0	0.83	0.24	5.0
7507 90.70	8.3	5.0	3.1	1.1	1.0	2.4	1.0	0.95	0.18	5.3
5706 73.90	8.6	5.0	3.2	1.2	0.90	2.2	1.0	0.86	0.30	5.4

7712 90.26	8.8	4.9	2.9	1.0	0.95	2.3	1.0	0.91	0.22	5.4
5304 127.40	9.4	5.3	3.2	1.2	0.92	2.7	1.1	1.0	0.34	5.6
7807 63.60	9.8	6.1	3.8	1.4	1.1	2.9	1.3	1.1	0.50	6.1
8107 70.90	10.3	6.5	4.1	1.4	1.2	3.2	1.4	1.1	0.68	6.5
LACM 9674-16	10.5	6.9	4.2	1.5	1.2	3.4	1.8	1.0	0.90	6.9
8107 76.7.70	11.3	6.9	4.3	1.6	1.3	3.8	1.8	1.2	1.0	6.9
7808 93.60	11.9	7.7	4.7	1.6	1.3	3.6	2.1	1.2	1.0	7.7
H49 123.50	12.4	7.9	4.8	1.7	1.4	4.0	1.9	1.2	1.4	7.9

LACM 302-70-9	13.5	8.8	5.5	2.0	1.4	4.3	2.6	1.2	1.5	8.8
8101 76.7.50	13.7	8.3	5.4	1.9	1.6	4.3	2.4	1.2	1.7	8.3
LACM 30202-7	14.2	8.8	5.4	1.8	1.6	4.6	2.9	1.3	1.6	8.8
7510 83.60	14.7	9.5	5.8	1.8	1.8	4.6	3.1	1.5	2.1	9.5
LACM 9677-11	15.7	9.8	6.2	2.2	1.8	4.8	3.2	1.3	2.2	9.8
LACM 9497-11	17.9	11.3	6.8	2.2	1.8	5.2	4.1	1.7	2.7	11.3
LACM 30202-7	18.6	11.3	7.1	2.5	2.0	5.6	4.1	1.6	2.9	11.5
5103 93.40	21.5	14.4	7.8	2.5	2.2	7.0	4.8	1.9	3.4	14.4
LACM 30203-3	23.1	15.2	9.6	---	2.5	6.8	5.5	1.8	4.0	15.9
LACM 9943-17	27.3	16.9	10.0	2.8	2.9	9.2	6.7	2.5	4.8	17.7
LACM 36313-1	28.3	17.9	10.0	3.2	2.8	9.2	6.9	2.5	4.6	18.6
LACM 36303-1	34.4	22.0	12.8	4.2	3.3	11.2	8.6	2.9	5.9	23.3

SIO 84-47*	38.3	23.7	13.2	3.4	4.1	11.3	10.1	3.2	6.9	25.5
SIO 70-350*	38.9	23.0	13.8	3.2	4.2	11.8	8.6	3.2	6.2	25.5

*Benthic juvenile.

Table 2. Comparative morphometry of six species of *Sebastes*. Data from Moser et al. 1977, Moser and Butler 1981, and this study.

Species	Snout to anus distance		Head length	Snout length	Eye diameter	Body depth	Pectoral fin length	Pectoral fin base depth	Pelvic fin length
	Body length	Body length	Head length	Head length	Head length	Body length	Body length	Body length	Body length
<i>S. aurora</i>	A	43.6 ± 3.46(38-49)	25.9 ± 3.38(21-30)	29.5 ± 3.86(23-37)	33.7 ± 2.87(29-39)	19.9 ± 3.20(15-27)	7.6 ± 1.34(5-10)	7.0 ± 0.96(6- 9)	<1
	B	56.3 4.69(48-62)	35.2 2.66(32-40)	36.2 1.40(35-39)	30.0 2.36(26-33)	27.0 1.70(25-29)	11.4 1.26(9-13)	9.9 0.99(8-11)	1.9 ± 0.74(1- 3)
	C	61.6 3.81(56-66)	37.8 2.71(33-40)	35.6 1.60(34-38)	29.5 1.51(28-33)	30.5 2.39(26-34)	14.5 2.45(11-18)	10.5 0.53(10-11)	7.0 2.78(3-11)
	D	63.4 1.98(61-67)	38.2 1.96(35-41)	32.9 2.30(28-36)	28.0 1.91(25-31)	31.2 1.60(29-34)	21.9 2.35(18-25)	8.8 0.58(8-10)	14.8 2.38(11-18)
<i>S. dallii</i>	A	42.4 ± 0.52(42-43)	22.6 ± 1.06(21-24)	25.6 ± 3.02(19-29)	38.0 ± 1.85(35-41)	17.6 ± 1.85(15-20)	5.6 ± 0.52(5- 6)	5.9 ± 1.36(3- 7)	—
	B	45.7 2.07(43-48)	26.5 1.38(25-29)	28.7 1.86(27-32)	37.8 1.33(36-40)	20.7 2.07(18-23)	8.0 0.63(7- 9)	8.3 0.82(7- 9)	1.26 ± 0.73(0.3-2)
	C	50.8 3.27(48-56)	30.6 1.95(28-33)	30.4 0.89(29-31)	36.8 1.92(34-39)	23.8 2.68(22-28)	11.0 2.45(9-14)	10.2 0.84(9-11)	4.0 2.83(2- 9)
	D	57.0 1.41(56-58)	29.5 0.71(29-30)	33.0 0.00(33)	33.5 0.71(33-34)	25.0 0.00(25)	23.5 0.71(23-24)	8.0 0.00(8)	15.5 0.71(15-16)
<i>S. jordani</i>	A	36.5 0.84(36-38)	22.3 1.51(21-25)	26.8 3.43(23-31)	37.7 0.82(36-38)	17.0 1.26(16-19)	6.7 0.52(6- 7)	6.5 0.55(6- 7)	—
	B	42.4 1.67(41-45)	28.4 2.19(26-30)	35.5 1.29(34-37)	32.2 2.50(29-35)	21.0 1.00(20-22)	8.4 1.14(7-10)	7.8 0.45(7- 8)	1.4 0.55(1- 2)
	C	51.0 2.86(46-54)	32.3 1.44(31-36)	34.4 1.98(31-39)	29.3 2.10(27-34)	23.8 1.19(22-26)	16.8 3.25(11-20)	7.9 1.00(7-10)	9.0 3.62(3-13)
	D	53.3 1.03(52-55)	31.2 1.94(28-33)	34.0 2.83(30-38)	26.5 1.52(24-28)	22.2 0.84(21-23)	20.5 1.05(19-22)	7.0 0.00(7)	13.5 1.22(12-15)
<i>S. levis</i>	A	39.6 2.30(37-44)	24.7 1.60(23-28)	30.7 2.63(27-35)	33.1 2.67(29-36)	21.7 1.11(20-23)	17.4 5.29(11-24)	10.9 1.57(8-13)	—
	B	48.9 3.44(45-56)	30.5 1.85(28-33)	34.8 0.87(34-36)	32.5 1.77(30-35)	28.5 3.51(24-35)	34.9 6.96(24-46)	12.9 0.64(12-14)	6.1 3.27(2-12)
	C	59.2 2.87(57-63)	35.0 2.00(34-38)	30.2 2.22(28-33)	30.5 1.73(28-32)	34.0 1.41(33-36)	45.0 3.74(41-50)	11.2 0.96(10-12)	21.0 4.76(16-26)
	D	63.0 0.82(62-64)	33.8 0.96(33-35)	30.5 2.38(28-33)	27.0 3.37(25-32)	35.0 1.41(34-37)	40.8 7.09(32-47)	10.2 0.96(9-11)	24.2 2.87(22-28)
<i>S. macdonaldi</i>	A	42.4 3.53(36-47)	27.6 2.25(24-31)	30.6 4.16(25-36)	34.6 2.34(31-37)	23.1 3.99(13-27)	8.4 1.21(6-10)	—	1.8 0.84(1- 3)
	B	51.8 3.56(48-56)	35.6 1.52(34-38)	34.0 4.00(30-38)	32.0 1.41(31-34)	31.6 2.07(30-35)	13.0 1.22(12-15)	—	5.8 2.39(3- 9)
	C	60.3 3.06(55-64)	37.5 1.84(34-41)	32.9 3.00(29-37)	33.0 1.33(31-35)	34.4 1.17(33-36)	19.3 3.65(15-26)	—	14.3 3.77(10-21)
	D	64.2 2.44(61-68)	35.1 2.37(32-38)	27.9 2.09(25-32)	30.7 2.74(26-34)	31.4 1.59(30-34)	30.4 1.74(28-34)	—	21.9 1.36(21-25)
<i>S. paucispinis</i>	A	41.0 2.74(37-44)	26.8 2.28(24-29)	27.4 3.21(24-32)	32.8 3.77(29-37)	19.6 1.67(17-21)	16.4 4.56(11-21)	9.0 0.71(8-10)	5.3 4.93(2-11)
	B	44.8 3.70(40-49)	29.6 1.95(27-32)	30.6 1.82(29-33)	30.2 1.64(29-33)	23.0 1.41(21-24)	27.2 2.49(25-31)	9.0 0.71(8-10)	13.6 9.28(9-26)
	C	57.3 3.82(51-61)	37.1 1.07(36-39)	32.2 0.98(31-33)	31.3 1.70(28-33)	29.6 0.98(28-31)	35.7 1.25(34-37)	7.6 0.53(7- 8)	35.1 2.79(31-39)
	D	62.3 2.73(60-66)	36.2 1.72(33-38)	30.5 2.95(26-33)	27.8 1.72(26-30)	27.3 0.52(27-28)	28.2 3.40(25-34)	6.0 0.89(5- 7)	25.2 2.71(22-30)

¹A = preflexion larvae; B = larvae undergoing notochord flexion; C = postflexion larvae; D = pelagic juveniles

Table 3. Sequence of Development of Head Spines of *Sebastes aurora*.

Spine	Order of appearance	Size (mm) (body length) at appearance	Size (mm) (body length) when lost
pterotic	1	5.0	---
2nd anterior preopercular	2	5.3	18.6
3rd posterior preopercular	2	5.3	---
4th anterior preopercular	3	5.6	18.6
2nd posterior preopercular	3	5.6	---
parietal	3	5.6	---
postocular	3	5.6	---
4th posterior preopercular	4	6.1	---
5th posterior preopercular	5	8.0	---
lower posttemporal	5	8.0	---
1st upper infraorbital	5	8.0	27.3
1st lower infraorbital	5	8.0	---
upper opercular	5	8.0	---
nuchal	6	8.9	---
1st posterior preopercular	7	10.5	---
2nd lower infraorbital	7	10.5	---
superclithrum	7	10.5	---
preocular	7	10.5	---
4th upper infraorbital	8	12.7	27.3
nasal	8	12.7	---
upper posttemporal	9	15.2	---
interopercular	9	15.2	---
lower opercular	10	18.6	---
supraocular	10	18.6	---
tympanic	10	18.6	---
coronal	10	18.6	---
cleithral	11	34.4	---

Table 4. Meristics of Cleared and Stained Specimens of Sebastes aurora.

Length (mm)	Principal caudal fin rays		Procurrent caudal fin rays		Branchio- stegal rays		Pectoral fin rays		Gill rakers (right arch)		Anal fin rays	Dorsal fin rays	Pelvic fin rays		Vertebrae
	superior	inferior	superior	inferior	left	right	left	right	upper limb	lower limb			left	right	
5.3	1	1	--	--	1	1	--	--	--	--	--	--	--	--	1
5.6	3	3	--	--	4	4	2	2	--	5	--	--	--	--	2
6.1	4	4	--	--	4	4	5	5	--	5	--	--	--	--	4
6.2	5	5	--	--	5	4	6	6	--	6	--	--	--	--	7
6.6	6	6	--	--	6	6	7	7	--	7	--	--	--	--	14
7.2	7	7	--	--	7	7	12	12	--	7	--	--	--	--	22
7.5	7	7	--	--	6	6	9	9	--	7	--	--	--	--	21
8.0	8	7	1	2	7	7	14	14	2	12	I,4	I, 9	I,2	I,2	24
8.3	"	"	4	4	"	"	16	17	3	14	III,5	XII,12	I,4	I,4	26
8.9	"	"	3	3	"	"	16	16	3	12	III,5	XII,13	I,4	I,4	25
9.4	"	"	4	4	"	"	17	17	3	12	III,6	XIII,13	I,4	I,4	26
10.5	"	"	7	7	"	"	17	17	5	15	III,6	XIII,13	I,5	I,5	"
11.3	"	"	7	7	"	"	18	18	4	14	III,7	XIII,13	"	"	"
12.7	"	"	8	8	"	"	18	18	5	14	III,6	XIII,13	"	"	"
13.7	"	"	9	9	"	"	17	18	7	17	"	XIII,12	"	"	"
14.2*	"	"	10	10	"	"	17	17	7	17	"	XIII,13	"	"	"
15.2*	"	"	10	10	"	"	17	17	6	16	"	XIII,13	"	"	"
18.6*	"	"	10	11	"	"	17	17	8	18	"	XIII,13	"	"	"
21.5*	"	"	10	10	"	"	18	18	8	18	"	XIII,13	"	"	"
27.3*	"	"	10	10	"	"	18	18	7	17	"	XIII,13	"	"	"
28.3*	"	"	10	10	"	"	17	17	8	17	"	XIII,13	"	"	"
34.4*	"	"	10	10	"	"	18	18	9	18	"	XIII,12	"	"	"
38.9**	"	"	10	9	"	"	18	18	7	18	"	XIII,13	"	"	"

*Pelagic juvenile.
**Demersal juvenile.