

The occurrence of Baird crab, *Chionoecetes bairdi* RATHBUN, in the waters off western Kamchatka

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Abstract

Locality records are given on the occurrence of Baird crabs in the waters off western Kamchatka from lat. 52°30'N northward to lat. 54°20'N. Morphometric measurements are provided and relative growth of chela is examined and compared with Baird crabs in the Bering Sea.

The Baird crab, *Chionoecetes bairdi*, commonly known as Tanner crab, has been found from Alaskan waters, the Bering Sea and southward to the coast of Oregon (RATHBUN 1925, SLIPP 1952, SLIZKIN 1974, HOSIE and GAUMER 1974). The occurrence of this species was also reported on the east and west coasts of Hokkaido (IGARASHI 1970), although it has not been found in the Okhotsk Sea from Krill Islands, western Kamchatka to Sakhalin, or in the Sea of Japan.

Seventy three specimens of Baird crab have been identified from survey collections made off the coast of western Kamchatka and represent the first record for this area. Locality records and morphometric measurements for these specimens are presented here. In addition, differences in relative growth of chela between Kamchatka and Bering Sea Baird crab are discussed.

Collection and treatment of crabs

Baird crabs were collected from 1969 to 1975 during annual surveys, conducted by the Fisheries Agency of Japan, designed primarily for king crab stock analysis (Fig. 1). Trawl and pot gear was employed during the survey.

In 1969 and 1970, 21 male Baird crabs were identified from trawl catches made by the crab research vessel HOKUHO MARU (85 ㉟) at 4 stations off western Kamchatka from lat. 53°00'N to 54°20'N.

In 1973 and again in 1975 the crab research vessel WAKATAKE MARU (495 ㉟), using trawl and crab pot gear, surveyed at 21 stations between lat. 52°30'N and lat. 57°00'N.

A total 73 Baird crabs were identified together with 1075 *Opilio* crabs, *Chionoecetes opilio*, during these research operations. The collection of Baird crab includes only 3 females, all of which were mature.

The specimens were preserved in 10% formalin or iced with sea water and used for

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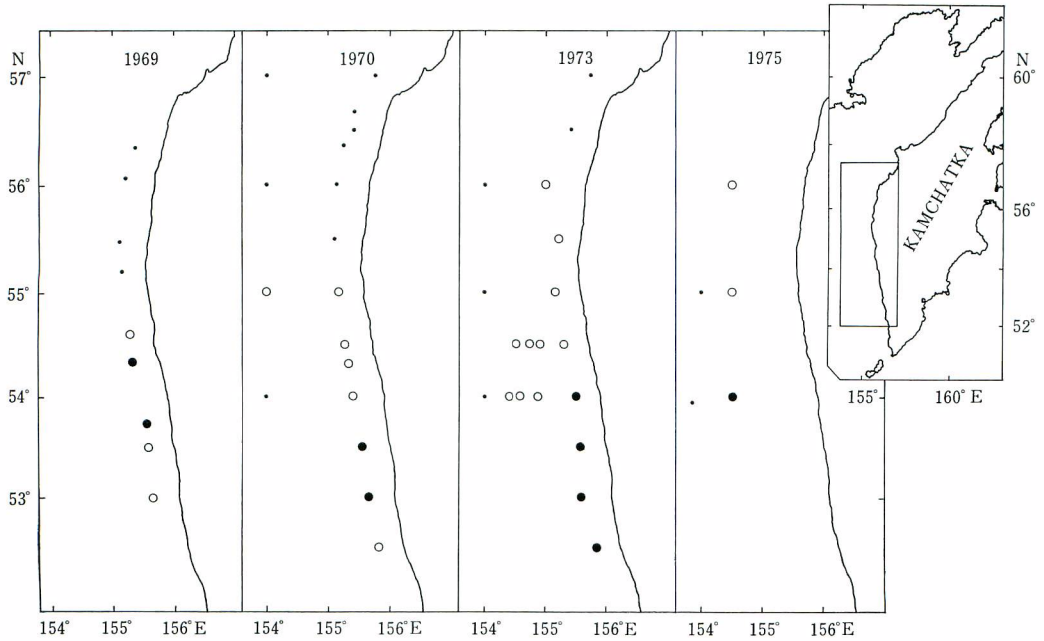


Fig. 1. Survey stations occupied by the RV HOKUHO MARU (1969, 1970) and the RV WAKATAKE MARU (1973, 1975).

- Station with catch of Baird crab and Opilio crab
- Station with catch of Opilio crab
- Station with no catch of the both species

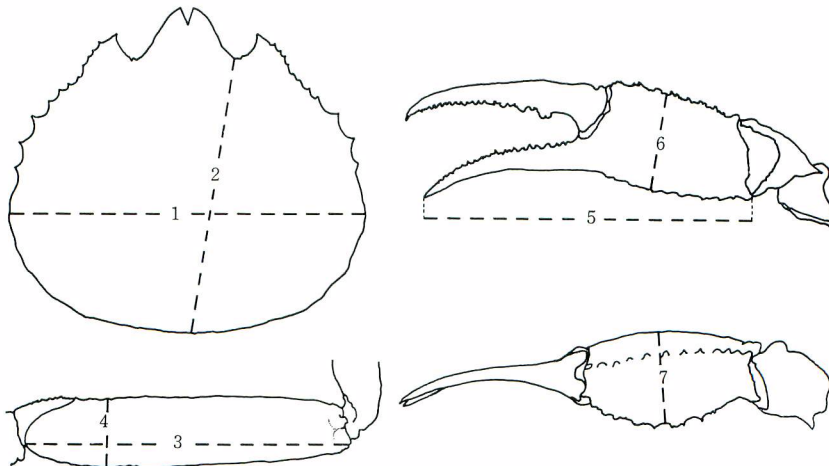


Fig. 2. Baird crab dimensions measured: 1. carapace width; 2. carapace length; 3. merus length; 4. merus width; 5. chela length; 6. chela width; 7. chela depth, maximum distance from the dorsal surface to the ventral surface of chela.

biological examinations in the laboratory (Plate I). Morphometric measurements were made by using vernier calipers to determine carapace length and width, merus length of the first to fifth legs, merus width of the second and third legs, and chela length, width and depth (Fig. 2).

Locality records of the crabs

Baird crabs were found at 7 stations located from lat. 52°30'N to lat. 54°20'N. They occurred most frequently at the southernmost station and were less abundant at the northern stations (Table 1), perhaps indicating the nature of the distribution of Baird crab in western Kamchatka.

The bathymetric range of distribution of Baird crab in this area could not be determined. However, it appears to be more limited than *Opilio* crab which occurs from shallow water zone to depth of 500 m, as indicated in Fig. 1.

Table 1. Catch record of *Chionoecetes bairdi* in the waters off west coast of Kamchatka.

Station	Date	Position		Depth (m)	Gear	Catch in number	
		Lat.(N)	Long.(E)			Male	Female
1969							
1	May 17	53°44'	155°33'	58	Trawl	2	0
2	May 18	54°20'	155°20'	60	Trawl	1	0
1970							
3-1	May 19	53°00'	155°40'	57	Trawl	8	0
4-1	May 19	53°30'	155°33'	62	Trawl	10	0
1973							
5-1	May 7	52°30'	155°52'	50	Trawl	1	1
5-2	May 7	52°32'	155°52'	50	Trawl	3	0
5-3	May 7	52°33'	155°52'	50	Trawl	3	1
5-4	May 8	52°30'	155°52'	50	Pot	20	1
3-2	May 8	53°00'	155°36'	50	Pot	8	0
4-2	May 9	53°30'	155°35'	52	Pot	10	0
6	May 9	54°00'	155°28'	51	Pot	3	0
1975							
7	May 16	54°00'	154°30'	190	Pot	1	0

Chela allometry

The size at maturity in male Baird crab can be determined from chela allometry. For the Alaskan Baird crab, chela width plotted against carapace width shows a distinct break at approximately 110 mm carapace width and indicating the average size at maturity (BROWN and POWELL 1972).

To examine the size at maturity in Kamchatka Baird crabs collected during this study, chela depth, *Y*, was plotted against carapace width, *X*, (Fig. 3, Table 2 and Appendix Table).

A disproportionate increase in chela depth is suggested at carapace widths between 75 mm and 105 mm and probably indicates the size at maturity for Kamchatka male Baird crabs. The relative growth of chela depth is expressed by the linear relationship for males considered mature, as follows:

$$Y=0.2371X-7.84$$

For males considered immature, the relative growth of chela is also tentatively presented, because of the lack of data for crabs under 60 mm in carapace width. It is shown by the linear regression:

$$Y=0.1507X-3.36$$

In Fig. 3, comparable relative growth data of chela depth was also presented for the Bering Sea Baird crab. Discontinuity in the data occurs at 100 mm to 110 mm carapace width indicating the size at maturity (Table 2).

The relationships are as follows:

$$Y=0.2657X-12.36, \quad \text{over 105 mm in carapase width}$$

$$Y=0.1485X-3.08, \quad \text{between 65 mm and 110 mm in carapace width}$$

Table 2. Relationship between carapace width and chela depth* for Kamchatka and Bering Sea Baird crab (male).

Kamchatka				Bering Sea			
Carapace width	Chela ¹⁾ depth	Carapace width	Chera ²⁾ depth	Carapace width	Chela ¹⁾ depth	Carapace width	Chela ²⁾ depth
66.5	6.9			66.1	6.8		
				74.1	7.7		
76.4	8.0			77.6	8.2		
81.6	8.7	82.9	12.1	83.3	8.9		
		87.8	13.8				
		93.9	13.4	91.7	10.2		
98.7	11.6	98.3	15.3	98.0	11.0		
103.5	12.3	102.3	15.7	104.2	12.5		
		107.9	17.8	109.6	12.9	107.6	16.8
		113.2	19.5			113.3	17.7
		118.5	20.0			118.3	16.1
		123.4	22.0				
		128.5	22.3			126.3	21.8
		134.4	22.2			132.5	22.5
		135.8	27.5			139.5	25.3
		140.1	24.2			142.5	26.4
						148.1	26.5
						151.6	29.7
						157.6	30.8
						162.7	32.7
						168.3	32.5
						172.9	29.7

* Carapace width (mm) and chela depth (mm) is presented by the means for each 5 mm of carapace width.

1) Males considered immature. 2) Males considered mature.

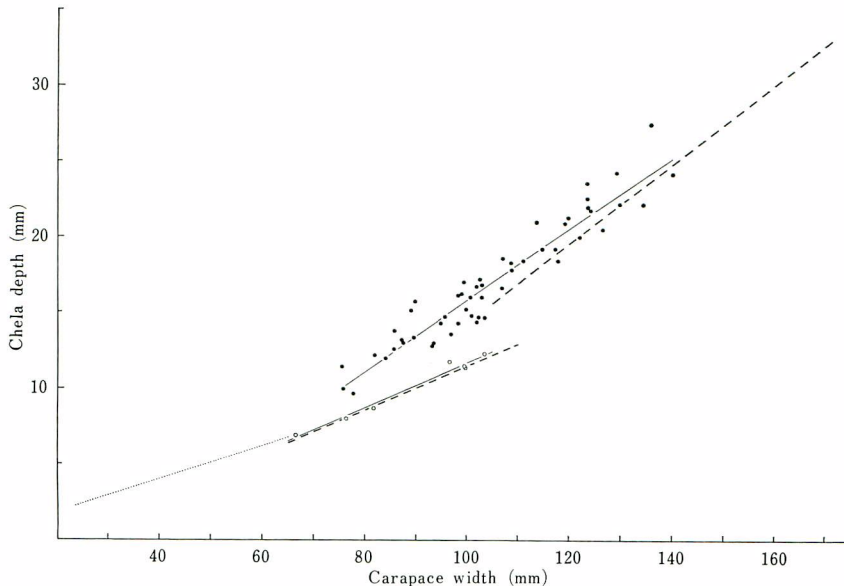


Fig. 3. Relationship of carapace width and chela depth for Kamchatka crab (solid line) and for Bering Sea crab (broken line). Another linear relationship is expected for Bering Sea crabs under approximately 65 mm in carapace width (fine dot line).

- Male considered mature
- Male considered immature

Regarding the relative growth of chela, a distinction may be made between Kamchatka and Bering Sea Baird crab. The onset of maturation probably occurs at a smaller size in Kamchatka than in the Bering Sea. The proportion of chela depth to carapace width is generally larger in Kamchatka crab than in Bering Sea crab, for males considered mature at widths between 75 mm and 140 mm. These results suggest that growth may be different between these populations.

Other morphometric measurements for Kamchatka Baird crabs are provided for comparison between different localities in the Appendix Table.

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カムチャッカ西岸沖合におけるズワイガニ
Chionoectes bairdi RATHBUN の出現

藤田 轟・川崎正和・竹下貢二

西カムチャッカ水域において、ズワイガニ属の一種 *C. bairdi* の出現を認め、本種の分布範囲に関する新しい知見として報告した。

1969, 1970, 1973 および 1975 年の調査により採集された雄 70 尾, 雌 3 尾について採集地点の記載を行うとともに、体各部の測定値を形態学的基础資料として報告した。また性成熟に関する鋏脚の相対生長について、ペーリング海産の *C. bairdi* との比較検討を行い、西カムチャッカ産のものは、比較的小型で性成熟に達すると推定した。

Appendix Table Morphometric measurements (mm) for the Baird crab in the waters off west coast of Kamchatka.*

1)	1969	May	17	53°44'N—155°33'E	58 m depth	trawl
2)	1969	May	18	54°20'N—155°20'E	60 m depth	trawl
3)	1970	May	19	53°30'N—155°33'E	62 m depth	trawl
4)	1970	May	19	53°00'N—155°40'E	57 m depth	trawl
5)	1973	May	7	52°30'N—155°52'E	50 m depth	trawl
6)	1973	May	7	52°32'N—155°52'E	50 m depth	trawl
7)	1973	May	7	52°33'N—155°52'E	50 m depth	trawl
8)	1973	May	8	52°30'N—155°52'E	50 m depth	pot
9)	1973	May	8	53°00'N—155°36'E	50 m depth	pot
10)	1973	May	9	53°30'N—155°35'E	52 m depth	pot
11)	1973	May	9	54°00'N—155°28'E	51 m depth	pot
12)	1975	May	16	54°00'N—154°30'E	200 m depth	pot

Collection** number	Carapace		Merus***							Chela		
	width	length	length					width		length	width	depth
			I	II	III	IV	V	II	III			
1)	107.0	82.5	49.4	92.5	93.2	82.6	50.6	21.0	20.5	—	23.6	18.6
	106.5	81.0	—	91.8	95.3	—	48.7	20.5	20.7	—	—	—
2)	99.6	77.2	38.3	77.9	90.2	69.6	37.2	18.0	17.8	—	14.4	11.5
	128.5	100.0	—	117.7	120.6	104.6	59.1	—	24.4	—	—	—
3)	100.8	78.5	46.4	86.6	—	—	45.4	17.9	—	—	19.6	16.0
	87.2	68.4	39.9	72.4	75.0	67.1	39.2	—	15.8	—	16.8	13.2
	114.8	86.2	54.8	100.0	102.3	90.3	—	—	21.1	—	23.8	19.2

Appendix Table (Continued)

Collection** number	Carapace		Merus***					Chela				
	width	length	length					width		length	width	depth
			I	II	III	IV	V	II	III			
	83.1	64.3	—	—	74.3	66.4	38.6	—	15.5	—	—	—
	80.5	64.5	—	—	—	—	36.1	—	—	—	—	—
	140.1	108.8	65.0	119.8	120.8	96.7	59.1	—	25.4	—	29.5	24.2
	123.6	94.0	62.0	104.0	109.0	96.5	53.1	—	22.9	—	27.3	22.0
	129.8	95.3	62.2	101.0	104.5	96.0	56.1	—	23.7	—	27.6	22.2
	107.8	84.7	46.4	84.0	89.0	79.5	47.3	—	19.8	—	19.8	16.4
4)	115.8	87.5	—	—	98.7	—	—	—	21.1	—	—	—
	99.0	77.6	—	—	91.3	—	—	—	18.0	—	19.8	16.2
	117.4	89.5	—	—	—	—	—	—	—	—	22.1	17.4
	129.2	100.0	—	—	103.1	—	—	—	23.4	—	29.7	24.3
	100.0	78.0	—	—	—	—	—	—	—	—	—	—
	135.0	103.9	—	—	112.7	—	—	—	25.4	—	33.3	27.5
	117.8	88.5	—	—	—	—	—	—	—	—	24.4	19.9
	111.1	86.5	—	—	98.0	—	—	—	20.9	—	23.4	18.4
5)	76.4	59.8	26.8	58.9	62.0	56.0	32.7	13.5	13.3	41.7	10.7	8.0
f	92.4	69.1	27.2	57.9	61.6	54.5	33.4	17.0	16.5	43.8	10.8	8.4
6)	126.6	95.8	63.5	111.8	111.2	98.3	55.3	24.5	23.9	—	25.0	20.5
	99.5	78.4	47.1	87.4	89.8	80.6	47.1	19.8	19.1	64.8	20.9	17.0
	77.8	62.1	29.5	59.5	59.3	55.4	33.0	14.4	13.7	43.4	11.3	9.7
7)	81.6	64.3	28.9	64.5	67.4	61.0	35.5	14.2	13.6	44.4	10.9	8.7
	66.5	51.6	22.9	50.5	53.4	48.4	28.7	11.2	11.0	34.4	8.4	6.9
f	103.5	78.8	38.8	81.9	82.5	73.3	—	18.2	17.0	58.5	15.8	12.3
8)	93.9	70.8	28.7	59.6	58.7	56.6	34.5	17.6	16.0	43.1	10.4	8.1
	102.0	79.4	44.3	72.4	85.0	—	42.8	19.6	20.8	56.1	17.5	14.4
	102.6	81.0	46.6	85.8	87.1	77.9	46.6	19.4	18.9	64.3	20.9	17.2
	119.8	92.3	56.0	97.9	99.2	88.3	49.9	22.5	22.0	78.3	25.3	21.3
	98.4	75.0	43.0	81.1	83.4	73.8	43.1	18.4	17.9	59.8	17.1	14.3
	106.9	82.4	49.0	84.2	92.8	82.3	46.7	19.6	21.2	66.6	21.0	16.6
	108.7	86.6	50.3	93.3	93.9	84.3	48.3	21.0	20.2	70.3	21.5	18.3
	102.0	80.0	47.4	85.4	87.4	77.9	45.0	18.2	17.8	66.4	19.5	16.7
	81.8	64.2	36.2	68.9	69.7	60.0	37.0	15.5	15.0	50.0	15.0	12.2
	89.8	72.3	46.8	79.0	80.4	72.0	43.0	18.1	17.0	63.6	18.4	15.7
	93.5	70.9	40.2	77.7	79.1	64.8	41.0	17.4	16.7	55.3	16.0	13.0
	108.8	84.1	51.5	92.2	92.2	82.2	46.2	20.4	19.5	69.3	20.9	17.8
	99.8	76.3	37.7	79.0	82.3	74.5	43.0	17.3	16.7	52.5	14.0	11.4
	103.1	78.3	47.0	85.2	85.5	75.3	43.6	18.6	18.2	61.3	19.4	16.8
	89.0	69.9	46.0	82.8	82.9	73.1	43.9	18.5	17.8	59.3	18.0	15.1
	104.3	80.7	46.1	89.1	90.8	80.5	46.8	19.7	18.9	—	—	—
	134.4	100.4	65.4	117.9	120.8	106.5	58.1	24.1	23.9	91.3	27.4	22.2
	123.5	97.4	60.7	108.6	110.6	—	52.0	23.9	23.2	82.4	27.0	22.6
	103.0	77.5	49.0	—	94.8	83.7	47.9	—	18.7	66.0	19.8	16.0

Appendix Table (Continued)

Collection** number	Carapace		Merus***						Chela			
	width	length	length					width		length	width	depth
			I	II	III	IV	V	II	III			
	96.6	76.0	25.4	73.8	75.3	67.0	38.5	17.0	16.2	50.8	14.2	11.8
	85.8	65.7	39.0	74.0	75.8	66.4	38.6	16.0	15.3	53.5	16.4	13.8
	f 100.1	78.7	28.7	61.0	63.4	57.0	33.7	19.1	18.2	45.7	11.9	9.4
9)	93.2	73.6	39.5	75.1	77.2	68.4	40.3	17.7	14.4	—	16.1	12.8
	75.8	58.4	31.7	63.4	65.7	58.5	35.1	15.0	14.2	—	12.5	10.0
	117.3	91.6	57.0	104.1	106.7	84.9	50.0	23.9	23.0	76.9	23.8	19.2
	99.8	77.9	43.3	—	86.5	77.6	40.9	—	18.2	60.9	18.4	15.2
	89.6	69.2	39.2	71.9	76.6	68.4	39.4	16.4	16.0	54.6	16.3	13.5
	95.7	73.7	43.6	72.8	82.2	73.0	41.6	17.7	17.7	57.3	19.0	14.7
	101.0	77.5	46.6	83.5	85.5	76.5	44.7	18.1	17.8	61.8	18.6	14.8
	106.2	83.3	40.6	81.3	83.6	73.8	41.8	19.9	19.3	61.0	16.1	13.1
10)	75.5	59.3	33.6	62.1	63.5	57.1	33.6	13.7	13.7	—	14.2	11.4
	87.5	66.1	37.7	65.7	74.6	67.3	38.9	14.9	15.5	—	15.8	13.0
	113.6	86.8	55.5	96.8	97.3	85.9	48.6	21.3	20.5	76.9	23.8	21.0
	103.5	78.0	45.9	88.2	90.3	79.8	45.4	20.2	19.1	61.6	18.9	14.7
	84.0	65.2	36.7	70.6	73.0	65.2	37.7	15.7	15.4	51.3	14.0	12.0
	97.0	75.5	42.5	85.8	87.8	78.3	44.7	18.3	17.5	59.7	17.4	13.6
	102.3	79.1	43.7	—	89.1	78.8	43.6	—	17.6	61.0	18.0	14.7
	98.4	76.9	45.2	87.6	89.8	79.3	44.4	19.6	18.7	62.0	19.3	16.1
	94.9	73.9	41.3	81.4	83.2	68.6	44.7	18.0	17.3	57.5	16.9	14.3
	85.7	66.0	37.7	71.4	73.0	65.0	37.6	15.7	15.1	52.2	15.4	12.6
11)	124.2	95.1	61.6	110.0	109.2	96.6	55.3	22.8	21.3	—	27.3	21.8
	119.2	93.8	58.8	105.1	107.4	94.7	55.4	23.2	22.9	—	26.1	20.9
	123.5	96.7	65.0	114.0	114.7	100.4	56.1	24.0	22.7	—	28.9	23.6
12)	122.1	97.6	59.0	105.1	105.4	92.0	53.0	22.3	21.4	80.4	24.8	20.0

* Specimens include three females that are indicated by letter f.

** Locality position of collection number is catalogued above the table.

*** Measurements for the first leg (I)—the fifth leg (V).

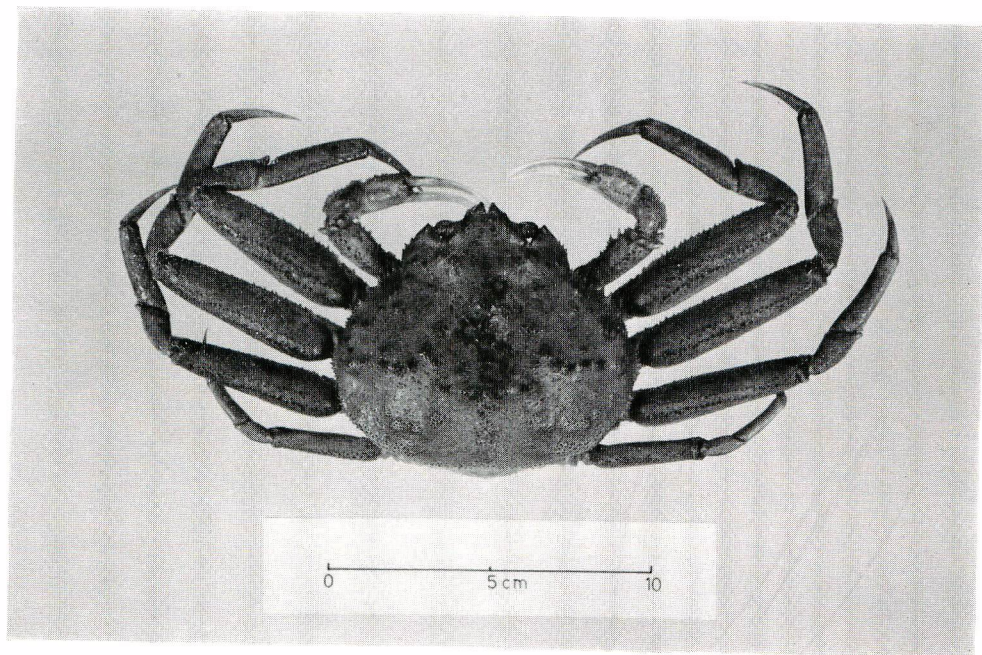
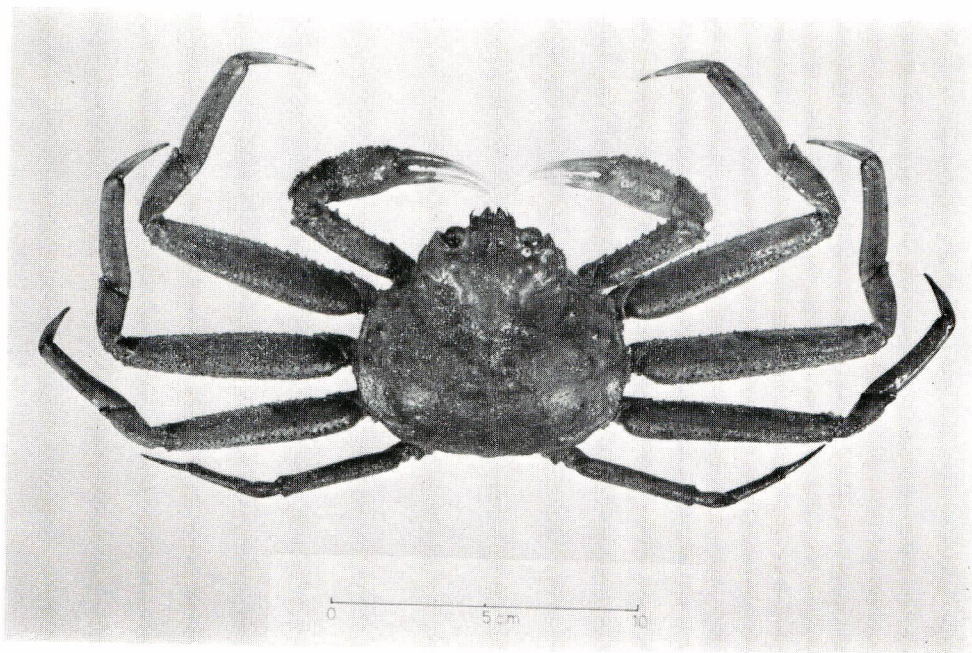


Plate I. Dorsal view of *C. bairdi*: male (upper) 89.6 mm in carapace width captured on May 8, 1973 at 53°00'N, 155°36'E; and female (lower) 92.4 mm in carapace width captured on May 7, 1973 at 52°30'N, 155°52'E.