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NOTES ON THE PINNIPEDES FROM JAPAN DESCRIBED BY TEMMINCK IN 1844

by

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The zoological collections made in Japan by P. F. von Siebold and Dr. Burger between the years 1823 and 1830 are described by Siebold in his Fauna Japonica (1844). The title page announces the collaboration of C. J. Temminck and H. Schlegel for that part of the work devoted to the vertebrates, but only Temminck's name appears at the head of the section on mammals, which includes that on marine mammals.

The Pinnipede material brought back by Siebold and Burger included remains of some Otariids which Temminck referred to as *Otaria stelleri*, and some Phocids which he named *Phoca nummularis* n.sp. All this material is in the Rijksmuseum van Natuurlijke Historie, Leiden, and I am very grateful to the director, Dr. L. D. Brongersma for allowing me access to it. I also acknowledge with thanks the facilities for measuring skulls offered to me by Dr. J. Dorst and Dr. J. Anthony of the Muséum d'Histoire Naturelle, Paris.

Zalophus californianus japonicus (Peters)

The amount of Otariid material brought back from Japan is clearly indicated by Temminck on p. 11 of Les Mammifères Marins, and his account may be translated and summarized as follows:

"We possess six skulls of Steller's sea lion, two of which belong to mounted skeletons. Four of the skulls of which one is figured nos. 5 and 6, pl. 22 is from an adult male of which we also have the mounted skin. The sex of the other two is not known. The fifth skull figured no. 3 and 4, pl. 22 is from an adult male of which we also have the mounted skin. The sixth skull, pl. 23[1]), figs. 1 and 2 is from an adult male whose complete skeleton is figured on pl. 23."

1) Temminck says pl. 23, but it should read pl. 22.

With reference to Jentink's 1887 Catalogue and the actual skulls in Leiden, the following list of Temminck's Otariid material can be made out:

Jentink (1887) p. 123	Leiden Reg. No.	
b	13443	Skull of adult ♂. Japan. D. W. Burger. Figd. pl. 22 figs. 3 and 4. Belongs to mounted skin.
c	13444	Skull of young animal. Japan. P. F. von Siebold. Figd. pl. 22, figs. 5 and 6.
d	13445	Skull of young ♀. Japan. P. F. von Siebold.
e	13446	Skull of young animal. Japan. D. W. Burger.
f	13447	Skull and skeleton of adult ♂. Japan. P. F. von Siebold. Skull figd. pl. 22. figs. 1 and 2. Skeleton figd. pl. 23.
g	13448	Skull and skeleton of young ♀. Japan. P. F. von Siebold.

This accounts for all the Otariid skeletal material that Temminck mentions. The stuffed animal belonging to skull 13443 is in Leiden (approximate nose-tail length 1935 mm.), and there are also two smaller stuffed animals (nose-tail lengths 1265 mm. and 1235 mm.) from the same expedition.

Temminck, under the mistaken impression that all sea lions of the north Pacific were the same, called the Japanese animal *Otaria stelleri*. Peters (1866, p. 668) included Temminck's animals under "*Otaria lobata* Gray" (= *N. cinerea*), though he was quite convinced that they did not belong there, and had no doubt that they were the same as "*O. gilliespii Macbain*" (*O. gillespii* = *Z. californianus*). In noting the presence of these skulls at Leiden, Peters (p. 668) called them "*Otaria japonica* Schlegel Mspt. (*O. stelleri* Schleg., non Lesson) aus Japan." The contraction 'Mspt.', though not the usual one, would seem to indicate that Schlegel called the Japanese skull *Otaria japonica* in manuscript. As there is no evidence that Schlegel ever published the paper with this name in it, Peters has been given the authorship of *O. japonica*, and as he indicated that *O. japonica* was the same as *O. gillespii*, both these names are included in the synonymy of *Zalophus californianus*.

There is no doubt whatever either from Temminck's figures, or from the actual skulls that all the Otariid material brought back from Japan on this trip is *Zalophus*. Scheffer (1958, p. 62) when referring to these skulls says "Most of the specimens are actually *Zalophus*; one or two (?) are *Eumetopias*, according to Sivertsen (1954, p. 35 and in lit.)". I cannot see that Sivertsen is in any doubt at all as to the identity of these skulls, in his 1954 work at least, as he says (p. 31). "In fact, these skulls from Japan show such a high degree of conformity to the skulls of *Zalophus californianus* that they certainly have to be referred to one and the same

species"; nor could I see any reference to his calling them *Eumetopias,* unless this was done in lit. to Scheffer.

Although *O. stelleri* of Temminck has usually been correctly placed in the synonymy of *Zalophus,* its Japanese locality has sometimes given rise to confusion. Allen (1880) includes it under *Zalophus lobatus* together with *Arctocephalus lobatus* Gray (= *N. cinerea*), and Ellerman & Morrison-Scott (1951) include it under *Neophoca cinerea* and because of it erroneously include Japan in the distribution of *Neophoca.*

TABLE I

Measurements of male *Zalophus* skulls from Japan.

	Leiden 13443		Leiden 13447		BM (NH) 1873.3.12.1	
Suture age	22		33		33	
Condylobasal length	278	%	307	%	323	%
Zygomatic width	159	57.2	174	56.7	186	57.6
Mastoid width	138	49.6	161	52.4	173	53.5
Width ext. aud. meatus	126	45.3	139	45.3	145	44.9
Snout width at canines	55	19.8	66	21.5	75	23.2
Snout width below pre-orb. proc.	78	28.1	87	28.3	90	27.9
Width pre-orb. proc.	84	30.2	94	30.6	92	28.5
Width post-orb. proc.	71	39.9	83	27.0	90	27.9
Interorbital width (ant.)	47	16.9	57	18.6	56	17.3
„ „ (post.)	36	12.9	35	11.4	37	11.5
Gnathion-preorbital proc.	94	33.8	108	35.2	111	34.4
Nasal length	49	17.6	62	20.2	59	18.3
Nasal width ant.	30	10.8	34	11.1	33	10.2
Palate length (to gnathion)	127	45.7	142	46.3	151	46.7
Depth zygomatic below orbit	13	4.7	14	4.6	19	5.9
Length upper molar row	56	20.1	66	21.5	74	22.9
Greatest height crest (approx.)	13	—	39	—	38	—
Length lower jaw	198	71.2	222	72.3	—	—
Width condyle	44	15.8	48	15.6	—	—
Length lower molar row	51	18.3	59	19.2	—	—
Upper molars R	5		5		5	
„ „ L	5		5		5	
Lower molars R	5		5		—	
„ „ L	5		5		—	

When dealing with *Zalophus,* Scheffer (1958, p. 61) makes a separate subspecies of the Japanese animals — *Zalophus californianus japonicus* (Peters), with some doubt as to the validity of '*japonicus*'. Taxonomically it would seem that he is quite justified in using '*japonicus*' as when the name was first used by Peters it was immediately identifiable as *Zalophus.* Zoologically the question is more difficult as so far no differenecs have been recorded between the Californian and Japanese populations of *Zalophus.*

TABLE II

Measurements of male *Zalophus* skulls from California.

	BM(NH) 1953.6.20.1		Paris 1879-270		Paris 1901-646		BM(NH) 1903.10.11.1		Leiden 2132		Paris 1879-271		Paris 1879-269		Leiden 2009		Leiden 2587		Paris no number		Paris 1897-22	
Suture age	21		21		23		24		25		26		26		26		31		32		32	
Condylobasal length	265	%	266	%	282	%	261	%	282	%	281	%	281	%	290	%	290	%	274	%	293	%
Zygomatic width	136	51.3	130	48.9	145	51.4	137	52.5	145	51.4	141	50.2	143	50.9	151	52.1	154	53.1	154	56.2	164	55.9
Mastoid width	123	46.4	116	43.6	135	47.9	118	45.2	131	46.5	128	45.6	132	46.9	144	49.7	145	50.0	150	54.7	145	49.5
Width ext. aud. meatus	111	41.9	102	38.3	119	42.2	106	40.6	111	39.4	106	37.7	113	40.2	120	41.4	121	41.7	120	43.8	128	43.7
Snout width at canines	51	19.2	53	19.9	55	19.5	49	18.8	58	20.6	54	19.2	58	20.6	61	21.0	61	21.0	58	21.2	62	21.5
Snout width below pre-orb. proc.	66	24.9	63	23.7	76	26.9	69	26.4	76	26.9	71	25.3	73	25.9	77	26.6	76	26.2	75	27.4	83	28.3
Width pre-orb. proc.	71	26.8	66	24.8	81	28.7	74	28.4	81	28.7	77	27.4	77	27.4	83	28.6	85	29.3	84	30.7	91	31.1
Width post-orb. proc.	67	25.3	67	25.2	65	23.0	68	26.1	69	24.5	65	23.1	68	24.2	65	22.4	70	24.1	69	25.2	71	24.2
Interorbital width (ant.)	45	16.9	42	15.8	42	14.9	42	16.1	46	16.3	42	14.9	45	16.0	46	15.9	49	16.9	46	19.8	48	16.4
„ „ (post.)	36	13.6	34	12.8	24	8.5	35	13.4	36	12.8	27	9.6	37	10.2	35	12.1	32	11.0	36	13.1	34	11.6
Gnathion-preorbital proc.	95	35.8	88	33.1	99	35.1	94	36.0	96	34.0	98	34.9	102	36.3	98	33.8	98	33.8	—	—	104	35.5
Nasal length	54	20.4	54	20.3	69	21.3	59	22.6	60	21.3	58	20.6	58	20.6	58	20.0	60	20.7	52	18.9	65	22.2
Nasal width ant.	26	9.8	25	9.4	31	10.9	26	9.9	29	10.3	28	9.9	27	9.6	28	9.7	30	10.3	30	10.9	29	9.9
Palate length (to gnathion)	122	46.0	121	45.5	130	46.1	115	44.1	130	46.1	130	46.3	135	48.0	131	45.2	132	45.5	136	49.6	137	46.8
Depth zygomatic below orbit	9	3.4	17	6.4	15	5.3	9	3.4	11	3.9	17	6.0	16	5.7	12	4.1	10	3.4	10	3.6	16	5.5
Length upper molar row	58	21.9	57	21.4	56	19.9	58	22.2	R62	21.9	57	20.3	59	20.9	73 (6m)	25.2	R60	20.7	61	22.3	60	20.5
									L.72	25.5					59 (5m)	20.3	L 76	26.2				
Greatest height crest (approx.)	6	—	2	—	9	—	8	—	11	—	17	—	13	—	16	—	15	—	20	—	35	—
Length lower jaw	182	68.7	179	67.3	198	70.2	181	69.3	193	68.4	193	68.7	196	69.8	200	68.9	197	67.9	200	72.9	186	63.5
Width condyle	36	13.6	34	12.8	39	13.8	35	13.4	38	13.5	39	13.9	41	14.6	40	13.8	44	15.2	40	14.6	49	16.7
Length lower molar row	53	20.0	52	19.5	50	17.7	51	19.5	60	21.3	53	18.9	53	18.9	59	20.3	58	20.0	60	21.9	55	18.8
Upper molars R	5		5		5		5		5		5		5		6		5		5		5	
L	5		5		5		5		6		5		5		6		6		5		5	
Lower molars R	5		5		5		5		5		5		5		5		5		5		5	
L	5		5		5		5		5		5		5		5		5		5		5	

Sivertsen (1954, p. 35) indicated that he had measured the Temminck skulls and compared the measurements with those of Californian skulls. He noted the very large size of the British Museum Japanese skull and said that it was larger than any he had measured from Californian waters. He goes on "As regards all the other skull characters considered, ... the skulls from Japanese waters all fall within or so close to the limit of variation found in skulls of *Zalophus* from California, that no distinction has been possible."

It is not known whether there are any collections of skulls of the native *Zalophus* in Japan; there are four skulls in this museum, one fragmentary, and together with the six skulls of the Temminck collection a total of only ten skulls is available from Japan. The number available for comparison is less than this because only the more mature skulls, between the suture ages of 19 and 36 have been used. Only two male skulls in the Temminck collection (13443, 13447) and one in the British Museum (1873.3.12.1) are thus available from Japan. Measurements of these three skulls have been compared with those of eleven adult male skulls from California (Tables I and II). Two of these skulls are in the British Museum, three in Leiden and six in Paris. Ten adult female skulls from California were also available, and the measurements of these and of the remaining Japanese skulls are listed in Tables IV and V.

TABLE III

Summary of proportions of male *Zalophus* skulls.

	Average		*Range*		*No. of skulls*	
	Japan	Calif.	Japan	Calif.	Japan	Calif.
Zygomatic width	57.2	52.2	56.7-57.6	48.9-56.2	3	11
Mastoid width	51.8	47.8	49.6-53.5	45.2-54.7	3	11
Width ext. aud. meatus	45.2	40.9	44.9-45.3	37.7-43.8	3	11
Snout width at canines	21.5	20.2	19.8-23.2	18.8-21.5	3	11
Snout width below pre-orb. proc.	28.1	26.2	27.9-28.3	23.7-28.3	3	11
Width pre-orb. proc.	29.8	28.4	28.5-30.6	24.8-31.1	3	11
Width post-orb. proc.	31.6	24.3	27.0-39.9	22.4-26.1	3	11
Interorbital width (ant.)	17.6	16.1	16.9-18.6	14.9-16.9	3	11
„ „ (post.)	11.9	11.9	11.4-12.9	8.5-13.6	3	11
Gnathion-preorbital proc.	34.5	34.8	33.8-35.2	33.1-36.3	3	10
Nasal length	18.7	20.8	17.6-20.2	18.9-22.6	3	11
Nasal width ant.	10.7	10.1	10.2-11.1	9.4-10.9	3	11
Palate length (to gnathion)	46.2	46.3	45.7-46.7	44.1-49.6	3	11
Depth zygomatic below orbit	5.1	4.6	4.6- 5.9	3.4- 6.4	3	11
Length upper molar row *)	21.5	21.1	20.1-22.9	19.9-22.3	3	11
Length lower jaw	71.8	68.7	71.2-72.3	63.5-72.9	2	11
Width condyle	15.7	14.2	15.6-15.8	12.8-16.7	2	11
Length lower molar row	18.8	19.7	18.3-19.2	17.7-21.9	2	11

*) Length of upper molar row includes five molars only.

TABLE IV

Measurements of female *Zalophus* skulls from California.

	Paris 1901-647		Leiden 3136		Paris 1944-276		Leiden 3317		Paris 1882-190		BM(NH) 1903.10.11.4		Leiden 1135		BM(NH) 1954.2.9.1		BM(NH) 1903.10.11.6	
Suture age	26		28		29		29		29		30		30		31		31	
Condylobasal length	245	%	252	%	253	%	241	%	242	%	230	%	238	%	226	%	236	%
Zygomatic width	127	51.8	210	45.6	120	51.5	121	50.2	122	50.4	118	51.3	125	52.5	120	53.1	127	53.8
Mastoid width	111	45.3	99	39.3	101	43.3	104	43.2	104	42.9	101	43.9	106	44.5	96	42.5	106	44.9
Width ext. aud. meatus	100	40.8	90	35.7	88	37.8	94	39.0	95	39.3	92	40.0	95	39.9	89	39.4	93	39.4
Snout width at canines	41	16.7	40	15.9	41	17.6	40	16.6	39	16.1	36	15.7	39	16.4	40	17.7	36	15.3
Snout width below pre-orb. proc.	43	17.6	57	22.6	54	23.2	56	23.2	61	25.2	56	24.3	53	22.3	53	23.5	57	24.2
Width pre-orb. proc.	61	24.9	63	25.0	60	25.8	59	24.5	65	26.9	61	26.5	55	23.1	58	25.7	60	25.4
Width post-orb. proc.	—	—	53	21.0	50	21.5	49	20.3	49	20.2	51	22.2	50	21.0	45	19.9	56	23.7
Interorbital width (ant.)	—	—	35	13.9	32	13.7	31	12.9	33	13.6	31	13.5	31	13.0	33	14.6	36	15.3
„ „ (post.)	—	—	30	11.9	29	12.4	27	11.2	26	10.7	26	11.3	27	11.3	27	11.9	31	13.1
Gnathion-preorbital proc.	81	33.1	82	32.5	80	34.3	78	32.4	78	32.2	75	32.6	75	31.5	71	31.4	79	35.5
Nasal length	47	19.2	47	18.7	51	21.9	46	19.1	42	17.4	41	17.8	43	18.1	40	17.7	50	21.2
Nasal width ant.	23	9.4	21	8.3	22	9.4	27	11.2	21	8.7	21	9.1	21	8.8	21	9.3	22	9.3
Palate length (to gnathion)	—	—	112	44.4	105	45.1	108	44.8	114	47.1	111	48.3	104	43.7	106	46.9	101	42.8
Depth zygomatic below orbit	14	5.7	8	3.2	11	4.7	8	3.3	13	5.4	7	3.0	7	2.9	7	3.1	7	2.9
Length upper molar row	55	22.4	53	21.0	63 (6m)	27.0	54	22.4	64 (6m)	26.4	52	22.6	56	23.5	54	23.9	52	22.0
					51 (5m)	21.9			55 (5m)	22.7								
Greatest height crest (approx.)	4	—	3	—	—	—	4	—	—	—	4	—	8	—	1	—	3	—
Length lower jaw	170	69.4	162	64.3	—	—	161	66.8	162	66.9	156	67.8	160	67.2	148	65.5	158	66.9
Width condyle	33	13.5	30	11.9	29	12.4	30	12.4	32	13.2	27	11.7	30	12.6	29	12.8	30	12.7
Length lower molar row	50	20.4	51	20.2	48	20.6	51	21.2	50	20.7	48	20.9	50	21.0	49	21.7	48	20.3
Upper molars R	5		5		6		5		5*		5		5		5		5	
L	5		5		6		5		5*		5		5		5		5	
Lower molars R	5		5		5		5		5		5		5		5		5	
L	5		5		5		5		5		5		5		5		5	

* Teeth spaced as if for 6, but no evidence of m 3.

TABLE V

Measurements of female and young *Zalophus* skulls from Japan.

	Leiden 13444		Leiden 13445 ♀		Leiden 13448 ♀		Leiden 13446	BM (NH) 1884.4.15.1	BM (NH) 1896.5.19.2		BM (NH) 1873.11.5.8	
Suture age	9		11		12		—	—	9		9	
Condylobasal length	192	%	189	%	210	%	—	—	200	%	169	%
Zygomatic width	95	49.5	92	48.7	101	48.1	95est	—	99	49.5	90	53.3
Mastoid width	88	45.8	86	45.5	89	42.4	82est	109	90	45.0	83	49.1
Width ext. aud. meatus	79	41.1	78	41.3	84	40.0	80est	97	83	41.5	78	46.2
Snout width at canines	34	17.7	34	17.9	33	15.7	30	46	33	16.5	30	17.8
Snout width below pre-orb. proc.	49	25.5	49	25.9	50	23.8	48	—	47	23.5	47	27.8
Width pre-orb. proc.	52	27.1	51	26.9	52	24.8	50	—	50	25.0	51	30.2
Width post-orb. proc.	47	24.5	49	25.9	41	19.5	43	—	44	22.0	45	26.6
Interorbital width (ant.)	31	16.1	30	15.9	27	12.9	28	—	27	13.5	28	16.6
„ „ (post.)	40	20.8	41	21.7	36	17.1	37	—	37	18.5	38	22.5
Gnathion-preorbital proc.	59	30.7	62	32.8	67	31.9	56	—	63	31.5	52	30.8
Nasal length	36	18.8	35	18.5	38	18.1	28	—	38	19.0	28	16.6
Nasal width ant.	23	11.9	22	11.6	24	11.4	19	—	19	9.5	21	12.4
Palate length (to gnathion)	83	43.2	80	42.3	90	42.9	76	115	88	44.0	72	42.6
Depth zygomatic below orbit	9	4.7	8	4.2	8	3.8	8	—	7	3.5	8	4.7
Length upper molar row	47	24.5	47	24.9	R 57	27.1	45 (5)	53 (5)	48 (5)	24.0	40 (5)	23.7
					L 51	24.3	51 (6)	56 (6)	56 (6)	28.0	47 (6)	27.8
Greatest height crest (approx.)	—	—	—	—	—	—	—	—	—	—	—	—
Length lower jaw	118	61.5	118	62.4	134	63.8	113	173	125	62.5	107	63.3
Width condyle	20	10.4	21	11.1	24	11.4	21	33	22	11.0	21	12.4
Length lower molar row	45	23.4	47	24.9	47	22.4	45	51	46	23.0	39	23.1
Upper molars R	5		6		6		6	6	6		6	
L	5		5		5		6	6	6		6	
Lower molars R	5		5		5		5	5	5		5	
L	5		5		5		5	5	5		5	

Note: 1884.4.15.1. from Yokohama, Japan. 1896.5.19.2. taken at sea off the coast of Tezo, Japan, Lat. 42° 30′ N, Long. 144° 42′ E. 1874.11.5.8. Japan. Type of *Eumetopias (Phocarctos) elongatus* Gray. Proc. Zool. Soc. Lond. 1873.776.

All measurements in millimetres.

The table summarizing the measurements and proportions of the male skulls (Table III) does, on the limited number of skulls available, confirm Sivertsen's statement that there does not seem to be any difference between the two populations. Most of the Japanese measurements fall within the range of variation of those from California, and the two that do not overlap are separated by less than 1%.

Almost all the average measurements of the Californian skulls are below those of the Japanese skulls but this is probably only due to the small numbers involved.

Zalophus is also present on the Galapagos Islands and it has been described as a separate species *Z. wollebaeki* Sivertsen (1953), with a more detailed comparison of the skull in Sivertsen (1954, p. 36). He compared the Galapagos skulls with Californian skulls and found that for animals of similar suture ages the Galapagos skulls were smaller, and the zygomatic width, mastoid width, width of interorbital constriction and width across preorbital processes were all narrower than in the Californian skulls. For this comparison Sivertsen had available 20 adult male Californian skulls and 23 adult male Galapagos skulls.

The number of cheek teeth is not diagnostic, though there is a tendency for the Californian animals to have the formula $\frac{5-5}{5-5}$, while the Galapagos animals have $\frac{6-6}{5-5}$. Sivertsen (1954, p. 38) notes that while there is some variation "in *Z. wollebaeki* the larger formula (6—6) is most common (75% of the skulls examined) while in *Z. californianus* the smaller formula (5—5) dominates strongly (79%)". In this proportion Sivertsen had presumably included the Japanese skulls with the Californian ones. The ten Japanese skulls show considerable variation—four having the upper cheek teeth 6—6, four 5—5, and two 5—6, while in the lower jaw eight have 5—5 and one 5—6.

Although it cannot be shown here that the Japanese animals are distinct it seems best to adhere to Scheffer's (1958) system of geographical subspecies — *Z. californianus californianus* (Lesson) 1828, *Z. c. japonicus* (Peters) 1866, and *Z. c. wollebaeki* Sivertsen, 1953.

Since Peters (1866) named *O. japonica* when looking at Temminck's collection of skulls from Japan, and did not select a single skull to be the type, it is necessary that a lectotype be chosen from this series. It is proposed that the most adult male specimen in Temminck's collection be the lectotype. This is the skull and skeleton Leiden Reg. No. 13447, figured in Fauna Japonica (1844) pl. 22, figs 1 and 2 (skull) and pl. 23 (skeleton).

Phoca hispida ochotensis (Pallas)

Temminck suggested that the Phocid material brought back from Japan was the same as *Phoca largha* Pallas (= *P. vitulina largha*) but he gave it a new name *Phoca nummularis* n.sp. The name is based on three young animals, the skins of which are stuffed, but the anterior parts of the skulls have been removed. The three stuffed skins and the skull fragments are all in Leiden.

Jentink (1887) p. 121	Leiden Reg. No.	
a	61858	Japan. D. W. Burger 1834. Lower jaw and anterior end of snout cut off behind third post canines (Plate XIV).
b	16859	Japan. D. W. Burger 1834. Lower jaw and anterior end of snout, broken behind third post canine on right and behind last post canine on left (Plate XV).
c	16860	Japan. D. W. Burger 1834. Lower jaw and anterior end of snout with complete tooth row on both sides (Plate XVI).

The three stuffed animals, of approximate nose-tail lengths 913 mm., 800 mm., 786 mm., are collectively labelled "Phoca nummularis, jeune. Voy. de M. Burger 1834. Japon". They are now rather faded to a yellowish-brown colour, but definite ring markings can be seen clearly on the back of the largest one.

From Temminck's description the skull fragments were obviously more complete when he saw them than they are now. He said that his new species was intermediate between *P. groenlandica* and *P. hispida*. It was like the former in its skull, particularly the interorbital region and the teeth, while it was like the latter in its colouration.

Since the time Temminck described the skull fragments of his new species, until the present day, only J. E. Gray seems to have looked at the specimens themselves, and the identification of this seal has been very uncertain.

Although he had seen the actual bones Gray (1864) unfortunately gave no drawings of them. He was obviously struck by the resemblance between *P. nummularis* and *P. hispida* and the differences that he listed led him to believe that *P. nummularis* was close to, but distinct from *P. hispida*. The chief differences from the latter appear to be "the lower jaw being rather shorter and broader, in the grinders being larger, thicker, and rather closer together, in the central lobe of the grinders being considerably larger, thicker, and stronger, and in all lobes of the grinders being more acute".

In 1866 Gray was still of the same opinion, "*Pagomys ? nummularis*" being included in the synonymy of "*Pagomys ? Largha*", this and "*Pagomys foetidus*" being the only two species included under the generic name *Pagomys*.

At the beginning of his great monograph on North American Pinnipeds, Allen (1880) seemed happy that *P. nummularis* = *P. hispida,* but later on, most probably after studying Gray's (1864) description, whose table of measurements he did not understand, he was inclined to put *P. nummularis* in the synonymy of *P. vitulina,* though his final paragraph on the subject indicated that he was not altogether sure. "While I do not deem it improbable, in view of all the facts of the case, that a species distinct from *Phoca vitulina* but of the same general type of structure, though slenderer, may exist in the North Pacific, and which may be referable to Temminck's *P. nummularis,* I feel disposed to leave the question open and for the present provisionally consider *P. nummularis* as a possible, if not a probable synonym of *P. vitulina.*" (p. 579).

In a later paper (Allen, 1902) after having again considered the descriptions of Temminck and Gray, he was still unwilling to commit himself: "Gray's comparative measurements of *Phoca foetida* and *P. nummularis* show that the latter is very much smaller than *P. foetida* and indicate a species much below the size of any species of *Phoca* known to me. The name *Phoca nummularis,* therefore cannot apply to any of the species represented by the material here under consideration. All that we thus far know of *Phoca nummularis* points to a species very similar in coloration to *Phoca foetida,* but smaller and with heavier dentition—features which may characterize a species of seal found in Japan, and still practically unknown, and certainly not known to occur elsewhere."

The two most recent publications that make reference to *P. nummularis* (Ellerman & Morrison-Scott, 1951, Scheffer, 1958) both include it in the synonymy of *Phoca vitulina largha.*

It is quite clear that the uncertainty of identification exists because no one has recently looked at the specimens, and previous workers have had to rely on and interpret the unillustrated accounts of Gray and Temminck. Although only fragments of the facial parts of the skulls of *P. nummularis* remain, the lower jaws are complete. Even at first sight their small size and delicacy of structure make it unlikely that they could be from *P. vitulina.* Plate XVII shows the right sides of the lower jaws of young *P. hispida, P. nummularis* and *P. vitulina,* and the similarity between *P. hispida* and *P. nummularis* really needs no elaboration in words. The general heaviness of the jaw and the more rounded coronoid process in *P. vitulina* contrasts with the slender jaw and narrow coronoid in the other two animals. The dorsal tilting of the anterior end of the lower jaw can be seen in *P. hispida* and *P. nummularis,* but is not nearly so pronounced in *P. vitulina.*

Plate XVIII showing details of teeth of the lower jaw indicates again the

similarity between *P. hispida* and *P. nummularis*. In both *P. vitulina* and *P. hispida* the exact cusping of the teeth has considerable individual variation, but the teeth are always more delicate in *P. hispida* and the accessory cusps more widely separated from the central cusp. Measurements of the antero-posterior length of the post-canines of twenty seven *P. hispida* and twenty seven *P. vitulina* (Table VI) show that, at least in those specimens measured, there is no overlap of the range of measurements between the two animals. The measurements of the teeth of *P. nummularis* are, for every tooth, within the range of *P. hispida* and outside that of *P. vitulina*.

TABLE VI

Antero-posterior lengths of post-canine teeth (in mm.).

	P. hispida			*P. vitulina*			*P. nummularis*		
	total no.	range	average	average	range	total no.	16858	16859	16860
Upper									
1	26	3.5-5.0	4.3	5.4	4.8- 6.7	24	4.2	4.0	4.7
2	26	5.3-7.1	6.3	8.6	7.3-10.5	26	5.4	5.3	6.0
3	26	5.0-7.5	6.4	8.5	8.0-10.2	26	5.9	5.6	6.5
4	26	5.3-7.5	6.2	8.7	7.8- 9.5	27	—	—	5.9
5	26	4.7-6.4	5.6	8.2	7.0- 9.4	27	—	5.4	5.7
Lower									
1	27	3.4-4.7	4.1	5.4	4.6- 6.0	24	4.5	4.2	4.0
2	27	5.4-7.6	6.6	8.1	7.3- 9.3	26	6.4	6.0	6.8
3	27	5.9-8.5	7.3	9.3	8.0-10.7	26	6.9	6.4	7.4
4	27	6.1-8.3	7.0	9.1	7.7-11.0	26	6.3	6.3	6.8
5	27	5.6-8.3	6.6	9.2	7.6-10.3	26	6.0	6.2	6.0

TABLE VII

Measurements of *P. nummularis* fragments (in mm.)

	16858	16859	16860
Lower jaw length	77	74	76
Width condyle	12.5	10.5	10.5
Length lower molar row	28.5	29	30
Width snout at canines	19.5	19	22
Length upper molar row	—	28	30.5

There can then, be no doubt that those specimens that Temminck described as *Phoca nummularis* are really Ringed seals, *P. hispida,* and not Common or Harbour seals *P. vitulina,* an opinion which Gray came to in 1864. The differences which Gray listed were probably due to his having

used only a single *P. hispida* skull for comparison, and the fact that Temminck's skulls are from very young animals.

P. hispida is a circumpolar Arctic animal whose wide distribution is reflected in its many subspecies. As the specimens of *P. nummularis* were collected from Japan it would seem that *P. hispida ochotensis* (Pallas) 1811 is the subspecies involved, and *P. nummularis* should thus be added to its synonymy. This subspecies is present along the shores of the Sea of Okhotsk, the eastern coast of Korea and from Japan about as far south as Yokohama on the Pacific coast. Nishiwaki and Nagasaki (1960) say that this is the most common Japanese species of seal.

Again it is necessary to choose a lectotype and the most complete of the fragmentary skulls is selected — No. 16860.

SUMMARY

The Pinnipede material collected in Japan by Siebold and Burger, and described by Temminck is listed. It is confirmed that the Otariids are *Zalophus californianus japonicus*, and a lectotype is chosen. Comparison of the measurements of the Japanese skulls with those of Californian skulls does not reveal any significant difference between them. The type specimens of *Phoca nummularis* are compared with *P. vitulina* and *P. hispida* and are shown to belong to the latter. The subspecies *P. h. ochotensis* is suggested from the region in which the types were found, and a lectotype is chosen.

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EXPLANATION OF THE PLATES

Plate XIV

Phoca nummularis Temminck. Leiden No. 16858. Ventral and lateral views of lower jaw and snout. Mag. × 1.14.

Plate XV

Phoca nummularis Temminck. Leiden No. 16859. Ventral and lateral views of lower jaw and snout. Mag. × 1.1.

Plate XVI

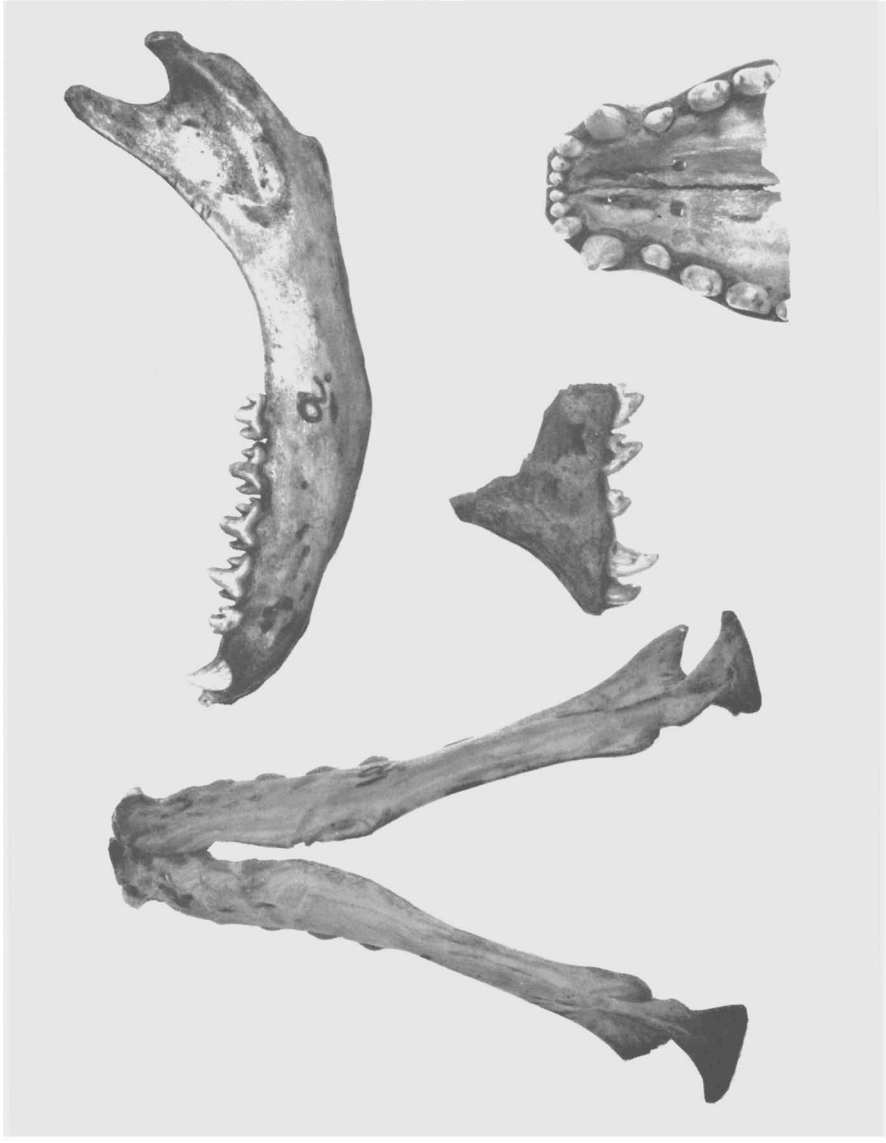
Phoca nummularis Temminck. Lectotype Leiden No. 16860. Ventral and lateral views of lower jaw and snout. Mag. × 1.125.

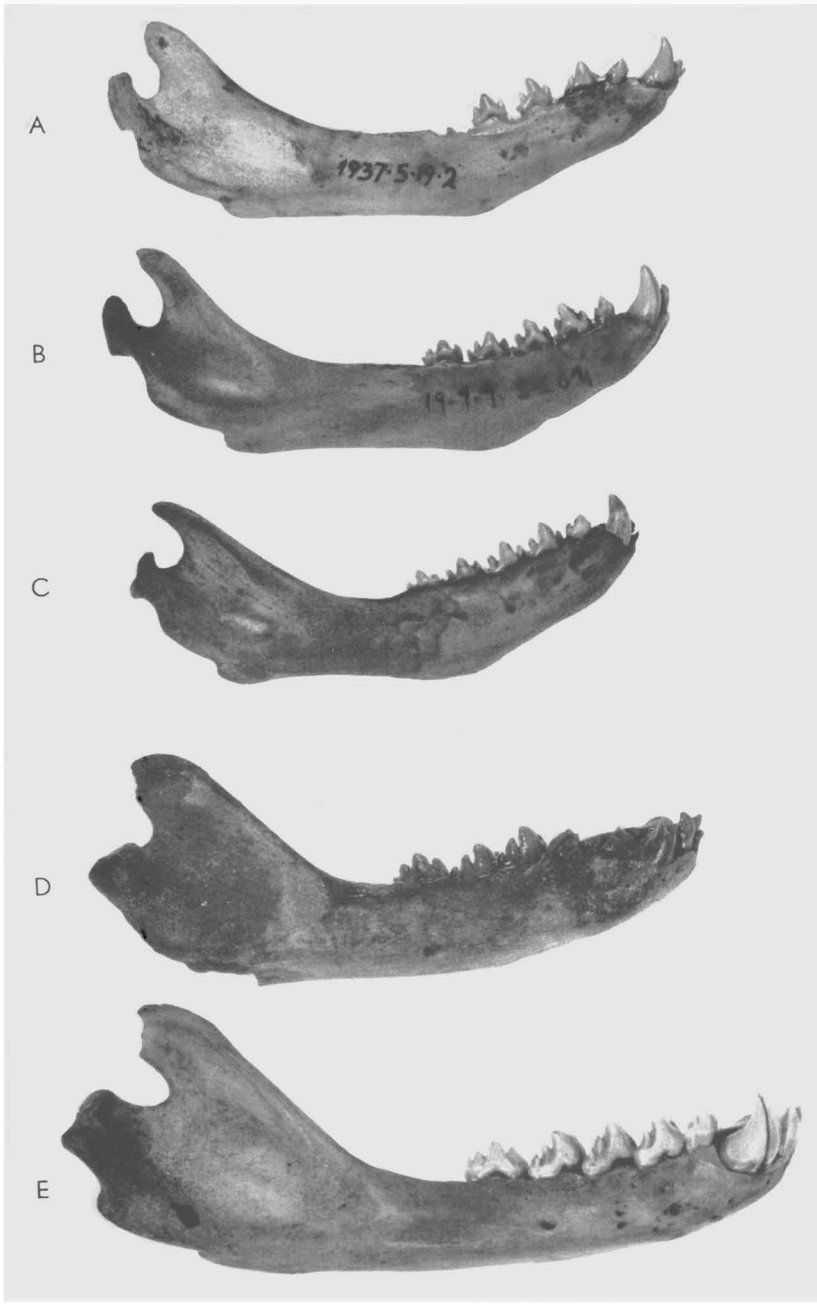
Plate XVII

Right sides of lower jaws of young: A. *P. hispida* 1937.5.19.2; B. *P. hispida* 1919.7.7.3264; C. *P. nummularis* Type. 16860; D. *P. vitulina* 1877.12.10.2; E. *P. vitulina* 1919.7.7.3261. Mag. × 0.78.

Plate XVIII

Details of teeth of young: A. *P. vitulina* 1919.7.7.3261; B. *P. vitulina* 1909.11.24.2; C. *P. nummularis* Type 16860; D. *P. hispida* 1919.7.7.3264; E. *P. hispida* 1937.5.19.2. Mag. × 1.5.




A
1937·5·19·2
B
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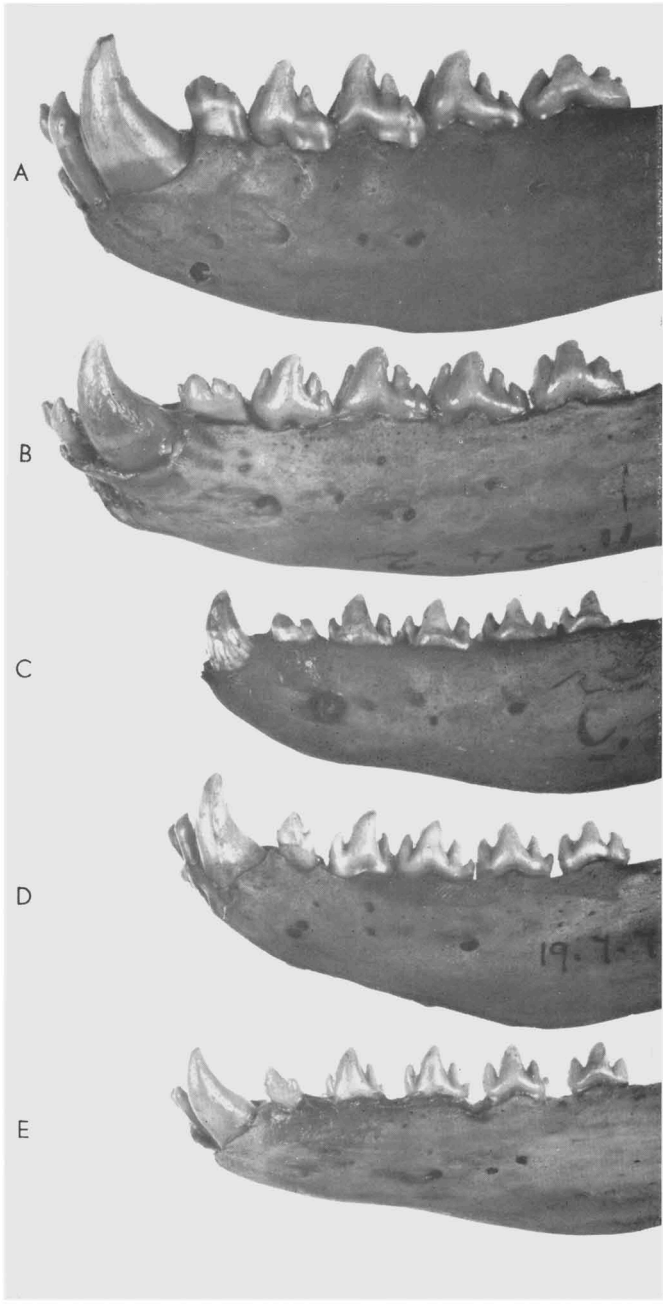
D
E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