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A new Pliocene fur seal (Carnivora : Otariidae) from the Senhata Formation on the Boso Peninsula, Japan

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Abstract A basicranium and left and right dentaries of a single individual from the earliest Pliocene Senhata Formation in Kyonan-machi, Boso Peninsula, central Japan is designated as the holotype of the primitive fur seal *Thalassoleon inouei*, new species. *Thalassoleon inouei* has an auditory bulla lacking conspicuous ornamentation of the ventrally projected medial edge of the ectotympanic, a large paroccipital process of the exoccipital, a long and narrow ventral strut between the palatine and braincase, horizontal ramus of the dentary massive and deep with prominent genial tuberosity, P_2-P_4 crowns having small but distinct accessory cuspules on their lingual cingula, a tendency toward coalescence of the P_2 roots, and has lost the M_2. *Thalassoleon inouei* records the first occurrence of the genus from the western North Pacific coast and provides evidence of a geochronologically early dispersal of the otariine pinnipeds in the circum-North Pacific.

Key words : *Thalassoleon inouei* sp. nov., fur seal, Otariidae, Carnivora, North Pacific, Japan, Pliocene.

Introduction

A primitive fur seal genus *Thalassoleon* Repenning and Tedford, 1977, has been known so far from the late Late Miocene to Early Pliocene of the eastern North Pacific Ocean. In their original description of the genus, Repenning and Tedford (1977) recognized two species : well known *Thalassoleon mexicanus* Repenning and Tedford, 1977, based on some skulls with mandibles and postcranial bones from the late Late Miocene Almejas Formation of Mexico ; and less well known *T. macnallyae* Repenning and Tedford, 1977, based on a few cranial fragments, a mandibular fragment and some postcranial bones from the latest Miocene or Early Pliocene Purisima Formation (originally published as the Drakes Bay Formation : L. G. Barnes, personal commun., 1991) of California. They also suggested that this fossil genus might be ancestral to both lineages of living fur seals and living sea lions. More recent studies (e.g., de Muizon, 1978 ; Berta and Deméré, 1986) have suggested that *T. macnallyae* at least is recognized as the beginning of the lineage leading to the modern fur seal genus *Callorhinus*.

In the present paper, I describe a new species of the genus *Thalassoleon* Repenning and Tedford, 1977, from the earliest Pliocene Senhata Formation on the Boso Peninsula, central Japan. It is the first record of the genus from the western North Pacific and reveals an earlier existence of otariine pinnipeds than previously known in the western North Pacific realm.

Abbreviations

Abbreviations used in this paper are as follows :

CBMPV : Natural History Museum and Institute, Chiba, Department of Earth Sciences ; Vertebrate Paleontology Collection.
IGCU : Instituto de Geología, Ciudad Universitaria, Universidad Nacional Autonoma de Mexico.
LACM : Natural History Museum of Los Angeles County, California.
NSM-PV : National Science Museum, Tokyo, Department of Geology ; Vertebrate Paleontology Collection.
UCMP : University of California, Museum of Paleontology, Berkeley, California.
USNM : National Museum of Natural History, Smithsonian Institution, Washington, D. C.

Materials and methods

The specimen described herein was found in a sandstone block as the remnant of a crushed skull with broken dentaries, both of which were originally complete. The facial portion of the skull and

the roof of the braincase were broken away. The exposed dorsal surface of the basicranium was also severely damaged and only its ventral surface was prserved as a thin layer in a piece of matrix. Considering the disintegrated condition, a plaster jacket was applied to the exposed broken surface of the basicranium prior to removal of the matrix from the ventral surface of the bone.

Specimens were coated with a sublimate of ammonium chloride for photography.

An accurate cast of the holotype of *Thalassoleon mexicanus* (NSM-PV 15411) was used for comparison instead of the original specimen (IGCU 902). Osteological data for other extinct and extant otariids were obtained from museum specimens (LACM and USNM collections and others) and references cited.

The anatomical terminology used in this paper follows that of Mitchell and Tedford (1973), Repenning and Tedford (1977), Evans and Christensen (1979), and Barnes (1979, 1989). Measurements of the specimen in Tables 1 and 2 are as defined by Sivertsen (1954), Barnes (1972), and Mitchell and Tedford (1973). The diagnosis of the genus listed by Repenning and Tedford (1977 : 60) is emended on the basis of characters shown by the new species. The classification of the otariid pinnipeds adopted here is that of Barnes (1989), in which the subfamily Otariinae includes fur seals and sea lions.

The CBM locality numbers that are defined by the Natural History Museum and Institute of Chiba (1990) indicate a 100 m square area and does not represent the exact point from which vertebrate remains were found. I use it for convenience to point out a localized area.

Systematics

Class Mammalia Linnaeus, 1758

Order Carnivora Bowdich, 1821

Family Otariidae Gill, 1866

Subfamily Otariinae (Gill, 1866)

Genus *Thalassoleon* Repenning and Tedford, 1977

Type species. Thalassoleon mexicanus Repenning and Tedford, 1977.

Included species. Thalassoleon mexicanus Repenning and Tedford, 1977 ; *T. macnallyae* Repenning and Tedford, 1977 ; and *T. inouei*, new species (although Berta and Demeré (1986) commented that *T. macnallyae* should not be recognized as a species of this genus).

Diagnosis of genus. A genus of the subfamily Otariinae distinguished from other genera by

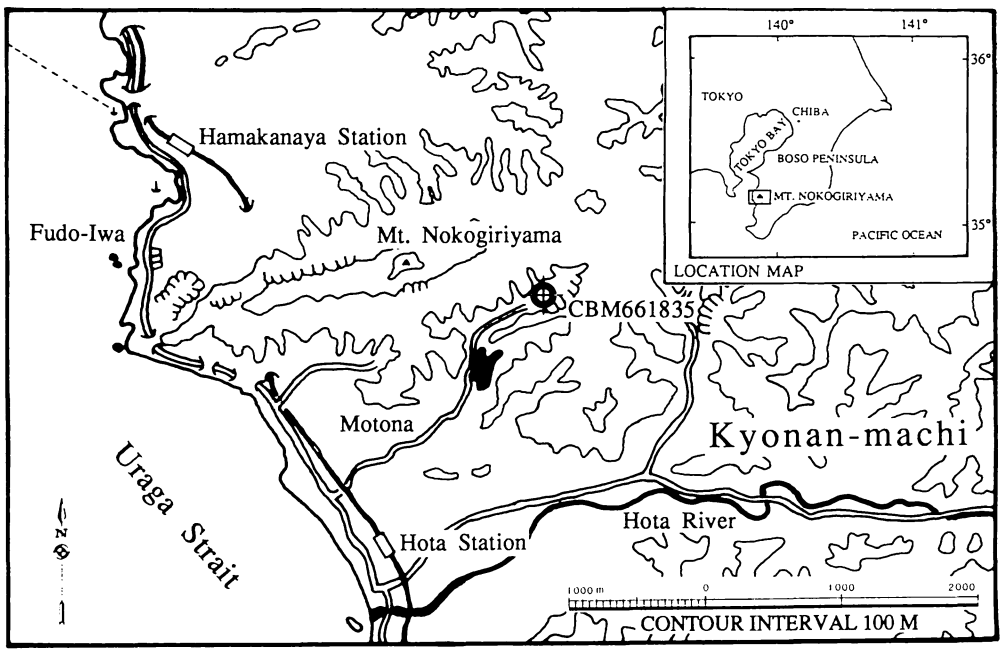

Fig. 1. Locality map, Motona area.

having a cranium with short rostrum and widely flaring nasals, facial angle of about 150°, M^2 present, M_2 lost, double rooted cheek teeth (except P^1 and P_1), diastema between M^1 and M^2, cheek tooth crowns forming a simple pointed cusp with almost no accessory cusps on lingual cingulum, posteriorly expanded basisphenoid and basioccipital, relatively large paroccipital process that is connected to the cubic mastoid process by a thin, plate-like paroccipital-mastoid crest, coronoid process of the dentary very broad, shallow pterygoid process of the dentary with very little shelf-like medial protrusion. Dental formula : 3 • 1 • 4 • 2/2 • 1 • 4 • 1.

Known distribution. Range in age from the late Late Miocene to the Early Pliocene, Pacific coast of Baja California (Mexico), California (U.S.A.), and Boso Peninsula (Japan).

Thalassoleon inouei, New species

(Figs. 2-7 ; Tables 1-2)

Diagnosis of species. A species of *Thalassoleon* distinguished from *T. mexicanus* by having much larger skull with long, narrow, sharply edged pterygoid strut, ventrally more projected medial edge of ectotympanic, much larger paroccipital process of exoccipital, a larger mandible in which the horizontal ramus is more massive and deep with prominent genial tuberosity, digastric prominence very week and smooth, and by having P_4 and M_1 on the dorsal margin of the ramus rather than on the medial side of the margin ; distinguished from *T. macnallyae* by having much larger skull with auditory bulla lacking conspicuous medial ornamentation of ectotympanic, more prominent postglenoid process, much larger paroccipital process of exoccipital, and by having much larger lower cheek teeth ; distinguished from both *T. mexicanus* and *T. macnallyae* by having P_2-P_4 crowns with small but distinct accessory cuspules on lingual cingula and a tendency toward coalescence of the P_2 roots.

Holotype. CBMPV 087, basicranial region of the skull, left dentary with canine and P_2-M_1, and right dentary with canine and P_2-P_4 ; collected by Kokichi Inoue, 15 March 1987.

Type locality. CBM locality 661835 (Loc. 4 of O'hara and Ito, 1980 ; Loc. 5 of Tomida, 1990). Sandstone quarry of Matsukura Industry Co., Ltd. at Motona, Kyonan-machi, located about 3.5 km southeast from the Hamakanaya Port of the Tokyo Bay Ferry, and about 2.4 km northeast from the Hota station of the JR Uchibo Line, Awa-gun, Chiba Prefecture (Fig. 1), 35°09′20″ north latitude and 139°51′20″ east longitude.

Formation and age. The specimen was found in a partially weathered, greenish gray, coarse-grained sandstone block. This block apparently came from the middle part of the Senhata Formation that is exposed in the quarry. Based mainly on planktonic foraminifera in coeval, underlying, and overlying units, several workers (e.g., Oda, 1977 ; O'hara and Ito, 1980 ; Ibaraki and Tsuchi, 1980 ; Tomida, 1983) consider the Senhata Formation to be latest Miocene or earliest Pliocene. More recent correlations have suggested that the Senhata Formation corresponds to the CN 10b of the nannoplankton biostratigraphy (Kanie *et al.*, 1989 ; Kanie *et al.*, 1991), indicative of Early Pliocene age. Therefore the most probable age for the Senhata Formation is the earliest Pliocene at the present time.

Associated fauna. Some proboscidean and many cetacean remains are known from the Senhata Formation (Takahashi, 1954), exposed in the sea cliffs along the coast (CBM localities 660597, 661507) near Fudo-Iwa not far from the quarry, although they have yet been undescribed. Recently, Uyeno *et al.* (1990) reported 50 teeth and 10 vertebrae of a single individual belonging to a large lamnid shark, *Isurus hastalis* (Agassiz, 1843), from the same formation and mentioned a rich fauna of sharks in the formation. Indeed, more than ten species of sharks are now known from the Senhata Formation, however, these also are unreported.

Etymology. The species is named in honor of Mr. Kokichi Inoue of Abiko City, Chiba Pref., who collected the holotype specimen. He has made many important paleontological discoveries at the type locality.

Description. Completely fused basicranial bones with almost no indication of the sutures, the robust mandible with relatively large canine, and the heavily worn dentition suggest that the specimen represents an adult male individual. The basicranium of the specimen is crushed transversely. Its left side has been skewed anteriorly relative to the right, and the posterior half of the basicranium has been removed dorsally and obli-

Table 1. Measurements (in mm) of the holotype basicranium of *Thalassoleon inouei*, new species, CBMPV 087; asterisks indicate estimated measurements, brackets indicate measurements of distorted portions, numbers in parentheses indicate correspondence with the same dimension used by Sivertsen (1954).

Postpalatal length (palatal notch to basion)	121
Basion to anterior edge of glenoid fossa (21)	[53]
Auditory width (19)	[107]*
Mastoid width (20)	[117]
Paroccipital width	[69]*
Greatest width across occipital condyles	[55]
Greatest width of foramen magnum	[17]*
Greatest height of foramen magnum	[25]*

quely anteriorly. Because of this distortion, the left sides of the basisphenoid, basioccipital and auditory region are much more damaged than the right.

Exoccipitals-The occipital condyles are relatively large, closely spaced, and project posteriorly from the occipital shield. The articular surfaces of the condyles are exceedingly convex, and separated ventrally by a deep intercondylar notch. The medial margins of the condyles are nearly parallel and are outlined with a sharp edge. There are large condyloid foramina in the condyles. Although the left condyloid foramen is almost broken away, the right condyloid foramen is approximately 3.3 mm wide and 6.4 mm high. The exoccipitals, although the right one is broken off, flare anteriorly and ventrolaterally toward the mastoid process. The lambdoidal crest, as far as preserved, is relatively thin and also flares ventrolaterally along with the dorsal margin of the exoccipital. The paroccipital process of the exoccipital is relatively large and directed posteroventrally. This process is connected to the cubic mastoid process by a thin, plate-like paroccipital-mastoid crest that is somewhat sigmoidal in outline.

Basioccipital-The basioccipital is trapezoidal in form and broad posteriorly. The medial portion of the basioccipital bears a pair of rounded, prominent, hemispherical fossae, and their anterolateral edges are low muscular tubercles for the rectus and longus capitis muscles. These fossae, in pairs, are separated by a narrow, very prominent pharyngeal tubercle in the center of the basioccipital, that continues to the intercondylar notch. The posterior lacerate foramen is relatively large and expanded anteroposteriorly. On the left side, its anteroposterior dimension is 13.1 mm and its transverse demension is approximately 7.7 mm. The hypoglossal foramen is small (approximately 3.4 mm and 1.8 mm in maximum and minimum diameters respectively) and located close to the posteromedial side of the posterior lacerate foramen.

Sphenoids-The presphenoid and parts of the basisphenoid that expands posteriorly are still in matrix and partly broken off. The posterior opening of the alisphenoid canal is large and cylindrical and situated at the anteromedial edge of the glenoid fossa. The opening of the foramen ovale, that is distorted by the medially removed glenoid fossa of the squamosal, does not face directly toward the alisphenoid canal.

Pterygoid-The pterygoid strut is long, narrow and nearly straight, and has a sharply edged ventral margin extending from the palate to the medial side of the glenoid fossa. A thin ventral ridge is continuous with the slender, ventroposteriorly projecting pterygoid hamulaus. Between the pterygoid hamulus and the alisphenoid canal, the lateral surface of the pterygoid is slightly excavated into a shallow groove.

Squamosal-Most of the squamosal is broken off. The glenoid fossa of the squamosal that is placed relatively high above the level of the horizontal palate, is deep, straight, and approximately 19 mm in dorsoventral diameter. The postglenoid process strongly projects anteroventrally and is largest at a more medial portion with an anteriorly expanded tympanic bone in front of the auditory bulla. The cubic mostoid process is enlarged ventrolaterally and its surface is rugose and excavated.

Fig. 2. *Thalassoleon inouei*, new species, holotype basicranium, CBMPV 087, from CBM locality 661835, stereophotographs, ventral view.

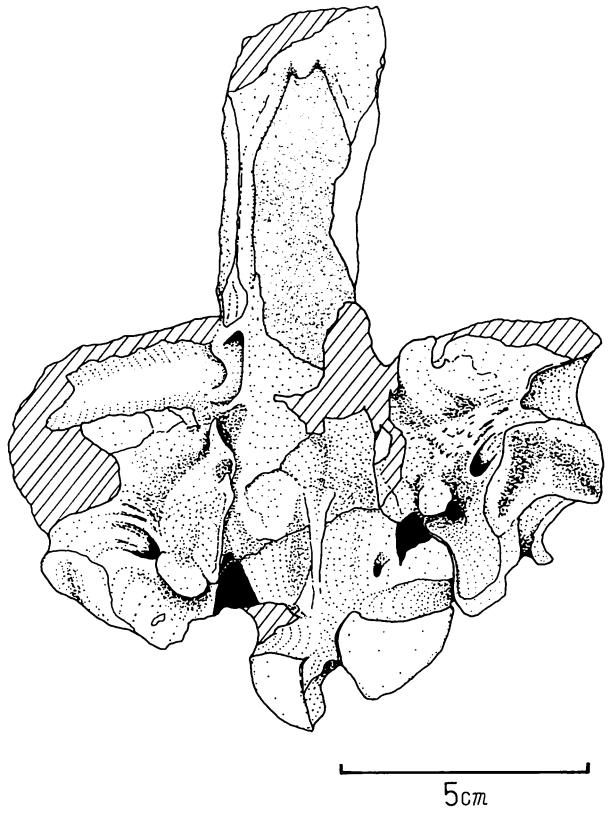

Fig. 3. *Thalassoleon inouei*, new species, holotype basicranium, CBMPV 087, from CBM locality 661835, ventral view.

Tympanic-The auditory bullae are compressed dorsoventrally, but were probably somewhat inflated originally. The external surface of the bullae are penetrated by numerous vascular foramina. The ectotympanic comprises most of the bulla. It extends anteriorly below the medial portion of the postglenoid process and is delimited between the medial side of the mastoid process and paroccipital process. The posterolateral corner of the ectotympanic forms a rounded, knob-like posterior bullar projection. The medial side of the ectotympanic is nearly vertical, less ornamented, and projects ventrally to the lateral margin of the basioccipital. The entotympanic contributes only by surrounding the carotid canal, and its surface is slightly rugose. The anterior opening of the carotid canal and the auditory tube is situated at the flattened anteromeidal corner of the bulla. The posterior opening of the carotid canal is directed posteriorly, and it closely abuts the anterior margin of the posterior lacerate foramen. The stylomastoid foramen is located between the auditory bulla and the mastoid process, and separated from the hyoid fossa by the lateral swelling of the posterior bullar projection. This foramen is directed anterolaterally at the medial side of the mastoid process. The hyoid fossa is relatively large and faces posteroventrally. The external auditory meatus is nearly circular, approximately 7.4 mm in diameter, and directed laterally. A small horizontal crest projects laterally dorsal to the external auditory meatus.

Palatine-Most of the palatine bone is missing. Only the posterior margin of the palate is preserved and is V-shaped in outline. There is a posterior median palatal spine beneath the internal choana. The opening of the internal choana, still in matrix, is deep and narrow as far as can be observed.

Mandible-The dentaries are incompletely preserved. The left dentary is lacking the mid-portion of horizontal ramus and coronoid and

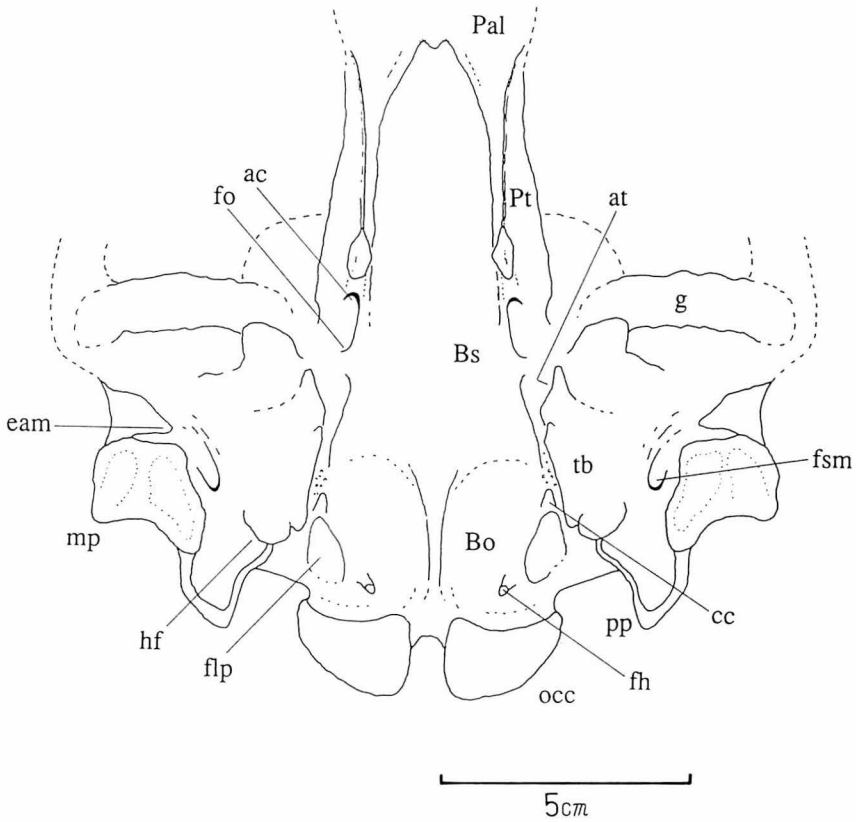

Fig. 4. *Thalassoleon inouei*. new species, restoration of the holotype basicranium CBMPV 087, Abberviations : ac-alisphenoid canal ; Bo-basioccipital ; Bs-basisphenoid ; cc-carotid canal ; eam-external acoustic meatus; fh-hypoglossal foramen ; flp-posterior lacerate foramen ; fo-foramen ovale ; fsm-stylomastoid foramen ; g-glenoid fossa ; hf-hyoid fossa ; mp-mastoid process ; Occ-occipital condyle ; Pal-palatine ; Pt-pterygoid ; pp-paroccipital process ; tb-tympanic bulla.

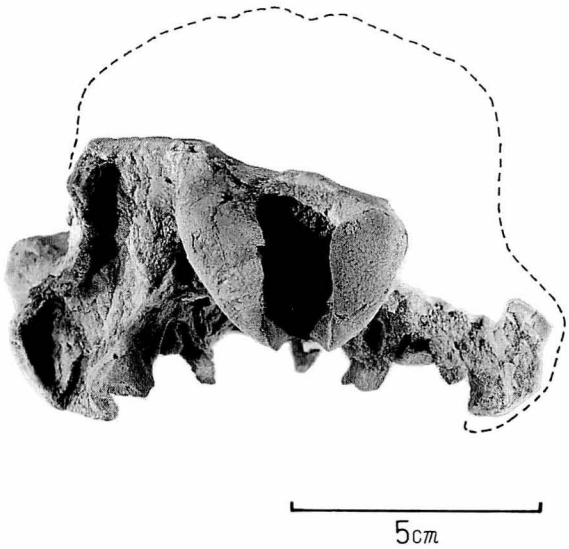

Fig. 5. *Thalassoleon inouei*, new species, holotype basicranium, CBMPV 087, from CBM locality 661835, posterior view.

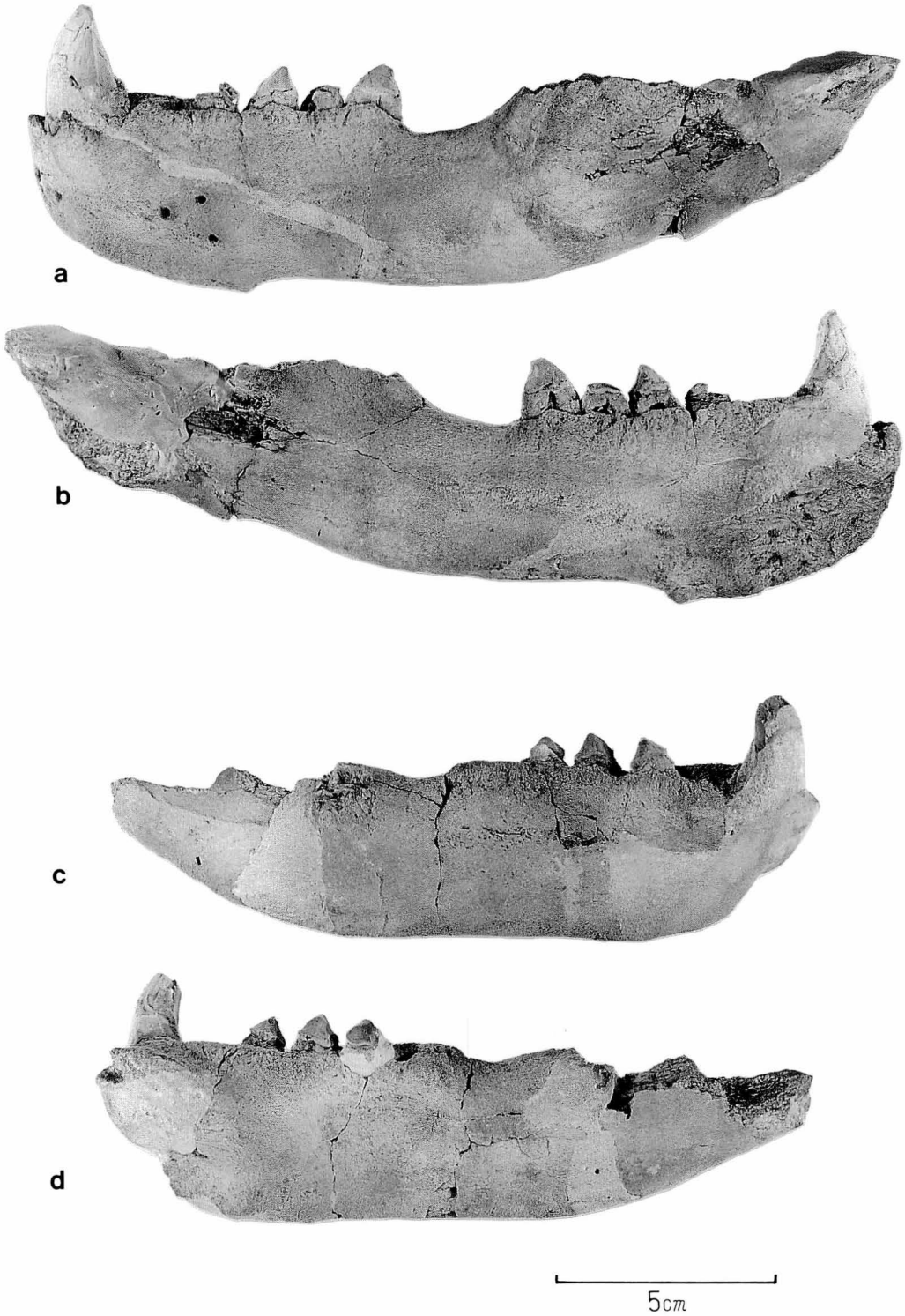

Fig. 6. *Thalassoleon inouei*, new species, holotype left and right dentaries, CBMPV 087, from CBM locality 661835 ; a and c, lateral views ; b and d, medial views.

Fig. 7. *Thalassoleon inouei*, new species, holotype left and right dentaries, CBMPV 087, from CBM locality 661835, occlusal view.

condyloid processes, however, the structure of the horizontal ramus and parts of the pterygoid and condyloid processes have been reconstructed with the assistance of the natural mold of the ramus that was preserved on a piece of matrix prior to removal through preparation. The left canine and P_2-M_1 are imperfectly preserved in their alveoli, but the incisors and P_1 are totally missing. The right dentary is also considerably damaged. The anterior portion of horizontal ramus and most of the ascending ramus are lacking. The right canine and P_2-P_4 are imperfectly preserved in their alveoli, but the incisors, P_1, and M_1 are missing.

The following description refers mainly to the left dentary. The horizontal ramus is quite long, massive and deep dorsoventrally. The anterior half of the ramus is strongly inflated and stout, with its maximum depth beneath the P_3, and posteriorly it becomes low, being lowest behind the M_1. The dorsal half of the horizontal ramus is thickened around the base of the cheek teeth and dorsally projected. The bone surface of this dorsal crest is very rugose and highly sculptured by numerous sulci. The symphysis, although it has been broken obliquely at its posterodorsal portion, is spindle-shaped in its ventral half but probably rounded dorsally. The ventral margin of the symphysis forms a rather sharp crest, and the posteroventral border of this crest flares downward into a prominent genial tuberosity beneath

Table 2. Measurements (in mm on items 1-3 and 5-11, and in degree on item 4) of the holotype dentaries of *Thalassoleon inouei*, new species, CBMPV 087; asterisks indicate estimated measurements, "a" indicates measurements of alveoli.

	Left	Right
Total length	202.0	—
Greatest length of symphysis	49.4	47.9
Greatest breadth of symphysis	33.1*	—
Symphysis angle relative to alveolar row	40°	42°
Length of alveolar row, C-M_1	84.3*	79.4*
Length of alveolar row, P_1-M_1	56.4	57.5
Depth of horizontal ramus at P_3	44.6	42.1
Width of horizontal ramus at P_3	20.6	19.6
Depth of horizontal ramus at M_1	42.3	41.3
Width of horizontal ramus at M_1	19.6	19.2
Width of condyloid process	38.5*	—
I_1 Anteroposterior diameter	—	—
I_1 Transverse diameter	4.0a	—
I_2 Anteroposterior diameter	—	—
I_2 Transverse diameter	6.4a	—
C Anteroposterior diameter	18.2	—
C Transverse diameter	—	—
P_1 Anteroposterior diameter	7.0a	6.1a
P_1 Transverse diameter	6.8a	7.2a
P_2 Anteroposterior diameter	12.0a	9.0
P_2 Transverse diameter	6.1*	5.9
P_3 Anteroposterior diameter	9.5*	9.8*
P_3 Transverse diameter	6.2	6.3
P_4 Anteroposterior diameter	12.1a	—
P_4 Transverse diameter	—	—
M_1 Anteroposterior diameter	10.4*	15.3a
M_1 Transverse diameter	6.3	—

the P_3. There are two mental foramina on the anterior end of the horizontal ramus and three foramina beneath the P_1 and P_2 just adjacent to the midline of the symphysis. In occlusal view, the cheek tooth row is parallel with the sagittal plane at P_1-P_3 but diverges at P_4-M_1, creating a lingually lunate tooth row. The length of the cheek tooth row relative to the distance from P_1 to the anterior margin of the coronoid process is relatively long, whereas M_2 is lost. The coronoid process is very broad, as far as it is preserved. On the lateral surface of the coronoid process, the masseteric fossa is relatively deep and large in area, and its outline is well delimited. The medial surface of the coronoid process is obscure because of breakage of most of the process. The mandibular foramen is relatively large and lies midway between the anterior and posterior margins of the ascending ramus. The opening of this foramen is considerably damaged, and the direction of the anterior margin of the foramen is not discernible. The digastric prominence is very weak and turned smoothly up to a long and shallow pterygoid process which is indicated only by the matrix impression. The condyloid process is transversely very wide, and is relatively high above the level of the alveolar row.

Dentition-There are two incisors, one canine, four premolars, and one molar in each dentary. Two incisors, the larger one anterolaterally and the smaller one posteromedially, are both missing, but their alveoli, as preserved, are subcircular in cross section. The canine is large, long, and moderately worn. Breakage of the anterior portion of the horizontal ramus reveals that the pulp cavity of the canine root is filled in by thick dentine. The P_1 is missing but was single rooted, and has a conical alveolus. The P_2-M_1 are in

place and the crowns are heavily worn. The crowns of P_2-P_4 each form a simply pointed cusp with smooth enamel surface and very small but distinct accessory cuspules on the lingual cingula. In addition, the crown of P_4 has a slight indication of a posterior accessory cusp. The crown of M_1 forms a simpler cusp with no accessory cusp and/or cuspule on its lingual cingulum. The lower cheek teeth, except P_1, are distinctly double-rooted, although they have a very thick (0.5 mm-1.6 mm thick) outer layer of cementum around the roots. The P_2 roots especially tend to form a coalesced, laterally bilobed, fused root. The thickness of an interalveolar septum between the canine and P_1 is 7.2 mm in the left dentary and 6.9 mm in the right dentary, but the remainder following P_1 are all approximately 2 mm or less.

Comparisons. Although most of the chracters of the new fossil from the earliest Pliocene Senhata Formation are apparently primitive for the otariine pinnipeds, several characters such as the combination of very large size, posteriorly expanded basisphenoid and basioccipital, somewhat inflated tympanic bulla with rounded, knob-like posterior bullar projection, plate-like large paroccipital process of exoccipital, very broad coronoid process of the dentary, double rooted P_2-P_4, and M_2 lost, are diagnostic of the genus *Thalassoleon* as originally defined by Repenning and Tedford (1977). The combination of characters together precludes assignment of the species to any other known genus within the family Otariidae, *sensu lato*. Of the two previously known species of *Thalassoleon* from the eastern North Pacific, *T. mexicanus* from the late Late Miocene Almejas Formation of Baja California resembles more closely the Senhata specimen in that the auditory bulla lacks conspicuous medial ornamentation of the ectotympanic, the paroccipital process of the exoccipital is large, and the cheek teeth are large relative to the mandible. However, the Senhata specimen differs from *T. mexicanus* by having a much larger skull with a long and narrow pterygoid strut, a more prominent medial edge of the ectotympanic a much larger paroccipital process, a larger mandible in which the horizontal ramus is more massive and deep with a prominent genial tuberosity, a digastric prominence that is very weak and smooth, and the P_4 and M_1 located on the dorsal margin of the horizontal ramus rather than on the medial side of it. Another species of the genus, *T. macnallyae*, from the Early Pliocene Purisima (formerly Drakes Bay) Formation of California, is distinguishable further from the Senhata specimen by having a less prominent postglenoid process, a much smaller paroccipital process, greater ornamentation of the medial edge of the ectotympanic, and smaller cheek teeth relative to the mandible. These differences seen in the Senhata specimen are indicative of a different species within the genus. Therefore, I propose *Thalassoleon inouei* as a new species. These differences among the three species within the genus *Thalassoleon*, on the other hand, are likewise nearly as great as those among some Recent genera within the subfamily Otariinae as suggested by Berta and Deméré (1986) and is also the case for the genus *Allodesmus* (see Barnes, 1972). However, here I regard these differences as species level differences until much more material of *T. inouei* is gained.

Discussion

Notwithstanding that *T. inouei* is morphologically close to *T. mexicanus* as mentioned above, the former species appears to be more derived than the latter and to have somewhat more sea lion-like dental and mandibular characters. Compared with *T. mexicanus*, the cheek tooth crowns of *T. inouei* are much larger and have small but distinct accessory cuspules on the lingual cingula and a slight indication of a posterior accessory cusp, at least on the P_4, as in some Recent arctocephaline fur seals and some sea lions. In addition, *T. inouei* has a dentary with a massive and deep horizontal ramus, rather than a thin and shallow one as in *Callorhinus* and some species of *Arctocephalus*. Also, the P_2 of *T. inouei* shows coalescence of the tooth roots in contrast with the explicit double rooted condition in *T. mexicanus*. Furthermore, the long, narrow, nearly straight pterygoid strut between the palatine and braincase seen in *T. inouei* appears to be an unique derived condition not only for the genus *Thalassoleon* but also for the subfamily Otariinae. However, the same conditon is exceptionally seen in some arctocephaline fur seals and *Phocarctos hookeri* (Gray, 1844).

Some workers (e.g., Repenning and Tedford,

1977 ; Berta and Deméré, 1986) agree that *T. macnallyae*, another derived species of the genus, might have a close relationship with the genus *Callorhinus* in the possession of smaller cheek teeth, greater ornamentation of the medial margin of the ectotympanic, postcruciate sulcus separating post cruciatus, and posterior position of the frontal-parietal suture. Some of these characters cannot be compared with *T. inouei* because it lacks the braincase, however, the first two characters at least are not present in *T. inouei*. Also, as far as I can see from the illustration of the holotype (UCMP 112809) of *T. macnallyae* (Repenning and Tedford, 1977 : plate 23), most of the derived characters seen in *T. inouei* are not present in *T. macnallyae*. In these respects, *T. inouei* appears to be separable from the *T. macnallyae-Callorhinus* species lineage, and may have been another derivative of Late Miocene *T. mexicanus* from the eastern North Pacific. However, the question as to whether the living fur seals might be monophyletic (e.g., Morejohn, 1975 ; Berta and Deméré, 1986) or not (Repenning *et al.*, 1971 ; Kim *et al.*, 1975 ; Repenning and Tedford, 1977 ; de Muizon, 1978 ; Barnes *et al.*, 1985) is not affected by this study owing to the incompleteness of the holotype skull of *T. inouei*.

The eastern North Pacific has long been considered as a potential center of evolution of otariine pinnipeds on the basis of the continuous record of this group in the eastern North Pacific (Mitchell, 1975 ; Repenning and Tedford, 1977 ; Repenning *et al.*, 1979). In deed, the fossil records of pre-Pleistocene otariine pinnipeds were almost lacking in the western North Pacific (Horikawa *et al.*, 1985 ; Tomida, 1990). Likewise, there has been no evidence so far that the otariine pinnipeds migrated south along the western side of the Pacific Ocean (Repenning *et al.*, 1979). Therefore, the occurrence of *T. inouei* not only provides evidence for an earlier dispersal of otariine pinnipeds than previously known in the western North Pacific, but also may offer some clues for the migratory and evolutionary history of the South Pacific, Australian and New Zealand sea lions and fur seals. In fact, the occurrences of the planktonic cephalopod and gastrtopods, *Aturia coxi*, *Harturingia* sp., and *Cypraea (Zoila) itoigawai* indicate the existence of a strong warm ocean current at the time of accumulation the Senhata Formation, and also imply a relationship with the mollucan fauna in the equivalent age formations of India, the Indo-Malay archipelago, Australia, and New Zealand (Tomida, 1983 ; 1990). These conditions might have been part of the living environment of *T. inouei*. Therefore, it does not seem necessary to consider the equatorial warm current as a formidable barrier for otariine dispersal in the western Pacific Ocean.

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房総半島の鮮新統千畑層から産出したオットセイ（食肉目，アシカ科）の１新種

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房総半島中西部に局地的に分布する前期鮮新世の千畑層より産出した，同一個体に由来する頭蓋片と左右下顎骨化石に基づいて，原始的なオットセイの一新種，*Thalassoleon inouei* を記載した．*Thalassoleon inouei* は，１）鼓室包が比較的よく豊隆し，外鼓室骨の内側面は平坦となること，２）外鼓室骨の後突起の発達がよいこと，３）外後頭骨突起が薄板状によく発達すること，４）翼状骨梁が長くほぼ平行に伸長すること，５）頑健な下顎骨を持ちその前縁部が背腹方向に強く肥厚すること，６）第２～第４前臼歯は歯冠舌側に小咬頭を持つこと，７）第２前臼歯に単根化の兆候がみられること，８）下顎の第２大臼歯が失われていること，などをその特徴としている．当該化石はこの属の北西太平洋から最初の記録であり，アシカ亜科の鰭脚類が少なくともこの時期にはすでに北東太平洋から北西太平洋へ分布を広げていたことを示している．さらに，黒潮の影響を強く受けた古環境を示す千畑層からの当該化石の産出は，アシカ亜科の南半球への分布の拡大が暖流に乗って西廻りにも行われた可能性をも暗示させるものとして極めて興味深い．