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On the identity of the three young fur seals (genus *Arctocephalus*) stranded in New Caledonia (Mammalia, Pinnipedia)

JUDITH E. KING

ABSTRACT

In 1972 and 1973 a total of three young fur seals was stranded in New Caledonia, much further north than any fur seal normally occurs. Comparison of the skulls of these young animals with similar sized skulls of young fur seals from Australia (*Arctocephalus pusillus doriferus*) and New Zealand (*Arctocephalus forsteri*) shows that the New Caledonia strandings are *Arctocephalus forsteri*. Weather conditions suggest origin of the seals from Australian colonies of *A. forsteri*.

INTRODUCTION

In 1972 and 1973 a total of three young fur seals became stranded in New Caledonia. The circumstances of their finding have been reported by Rancurel (1975), so only the barest details will be repeated here:

1. 8 August 1972, at Touaourou, near Yat  , at the southern tip of New Caledonia. A thin young male fur seal stranded, length 80 cm. Lived in the Aquarium at Noum  a until it died on 5 April 1973. Whole animal sent frozen to the Institute of Taxonomic Zoology (Zoological Museum), University of Amsterdam, where the skull and skeleton were prepared. For the mounted skin, see fig. 1. Registered No. ZMA 17.798.

2. 10 August 1972, at Gadgi, at the north end of Ile des Pins, off the southern tip of New Caledonia. The body of a young fur seal washed up. Animal buried and remains not dug up until January 1973. Length less than 50 cm. Sex not recorded at the time, but the delicacy of the upper canine when compared with that of the known male above, suggests that it was a female. Incomplete skull housed at Zoological Museum, Amsterdam. Registered No. ZMA 17.797. Skull lacking left facial region, left tympanic and squamosal and left side lower jaw.

3. 21 September 1973, at Baie du Gu at the southern end of Ile des Pins.



Fig. 1. Mounted skin of juvenile male specimen *Arctocephalus forsteri*, stranded at Touaourou near Yaté, New Caledonia (ZMA 17.798).

Killed by a fisherman and left on beach. Decomposed when found several days later, and only a few bones saved. About 1 m in length. Sex not recorded at the time, but size of lower canine suggests female. Skull and scapula housed at Office de la Recherche Scientifique et Technique Outre-Mer (ORSTOM), Nouméa. Cranial region only of skull, and both rami of lower jaw.

In this report these specimens will be referred to as "Nouméa 1, 2 or 3".

Fur seals do not normally live in the vicinity of New Caledonia, so these young seals must be stragglers from some other locality. In his report Rancurel (1975) considers the two species of *Arctocephalus* that live to the south of New Caledonia; *Arctocephalus pusillus doriferus* Wood Jones, 1925, the Australian fur seal from Victoria and Tasmania, and *Arctocephalus forsteri* (Lesson, 1828), the New Zealand fur seal, from New Zealand, and South and Western Australia. He also considers the weather conditions and the currents in the area at the times of the strandings. He concludes that the animals are too immature to be identified to species from their skulls, but the very strong S.W. winds and currents that prevailed before the strandings could indicate an Australian origin for the seals rather than a New Zealand origin.

The specimens are thus three very young fur seals stranded in the middle of the southern winter, in an area far from their natural habitat. The breeding season of both *A. p. doriferus* and *A. forsteri* is in November - December, so these young seals would have been about 8 months old.

Although it is possible to identify skulls of adult *A. p. doriferus* and *A. forsteri* with reasonable success (King, 1969), there has always been difficulty in distinguishing between skulls of very young animals. The present strandings have stimulated a comparison of immature skulls with the object of determining the identity of these fur seals.

All three skulls from New Caledonia have been made available to the author, and they have been compared with skulls of *A. p. doriferus* and *A. forsteri* of comparable size in the collections of the Australian Museum, Sydney. For the final comparison, three skulls of *A. p. doriferus* and two of *A. forsteri* were used, as detailed in Table I, but all juvenile skulls were considered.

King (1969) and Repenning *et al.* (1971) note a number of characters which can be used to identify adult skulls of *A. p. doriferus* and *A. forsteri*, and these publications should be consulted for the details and measurements. These characters have now been applied to the immature skulls, and a search made for further distinguishing characters.

CHARACTERS USED ON ADULT SKULLS

1. Size and age. *A. forsteri* is a smaller animal and therefore the skull is more mature at a smaller size when compared with *A. p. doriferus*.

2. Postcanine teeth of *A. forsteri* are small and neat in appearance, and usually have only one small cusp, while the postcanines of *A. p. doriferus* are larger and less neat, usually with well developed anterior and posterior cusps.

3. There is a tendency, in *A. forsteri*, for the posterior part of the maxilla to be expanded into a "maxillary wing" ending in a sharp spine. This does not occur in *A. p. doriferus*.

4. The coronoid process of *A. forsteri* is narrow, and its posterior edge

becomes undercut. In *A. p. doriferus* the coronoid process is broad and the posterior margin either drops vertically or slopes towards the condyle.

5. In *A. forsteri* the lower postcanines are well spaced, with only rarely any overlap. In *A. p. doriferus* the lower postcanines are larger and tend to overlap.

From comparison of skulls of a range of ages it was found that characters 3 and 5 are applicable only to adult skulls, so they will not be considered further here. The other characters will now be considered in more detail*).

CHARACTER 1

Juvenile skulls of approximately the same size (condylobasal length) as *A. p. doriferus* and *A. forsteri* have been compared. It is obvious that the *A. p. doriferus* skulls are from much younger animals from the following characters.

a. The degree of eruption of the teeth. In the *A. p. doriferus* skulls milk canines are still present, the permanent canines are not, or are only barely erupted, and most of the postcanines are not fully erupted. In the *A. forsteri* skulls the permanent canines are well, if not fully erupted, as are all the postcanines.

b. The basioccipital-basisphenoid suture is completely open in *A. p. doriferus*; it is completely fused in *A. forsteri*.

c. In *A. p. doriferus* the condyles are tucked under the cranium and are not visible when the skull is viewed dorsally. In *A. forsteri*, being slightly more mature, the condyles have grown backwards and are visible in a dorsal view of the skull.

d. This is a character very difficult to describe, and rather subjective, but the young skulls of *A. p. doriferus* have about them a bulkiness, a roundness — that indicates both youth and that they will grow to large size. At the same size, *A. forsteri* skulls are more mature and will not grow so large, so their appearance is finer.

CHARACTER 1 - NOUMÉA SKULLS

Only Nouméa 1 has a full set of teeth present, and in the degree of eruption they are like *A. forsteri* — the canines are nearly fully erupted, there is no sign of milk teeth, and the postcanines are fully erupted. Such teeth as are present in the other two skulls are erupted.

The state of the basioccipital-basisphenoid suture is complicated in Nouméa 1 by the skull having been cracked in this area. The crack however, is at an angle to where the suture should be, and it is estimated with

*) As noted above, the final assessment of characters was made on the three *A. p. doriferus* and two *A. forsteri* skulls that were closest in size to the Nouméa specimens. In the consideration of characters, where the animals are mentioned, it is the selected skulls that are referred to more particularly, though all young skulls have been considered.

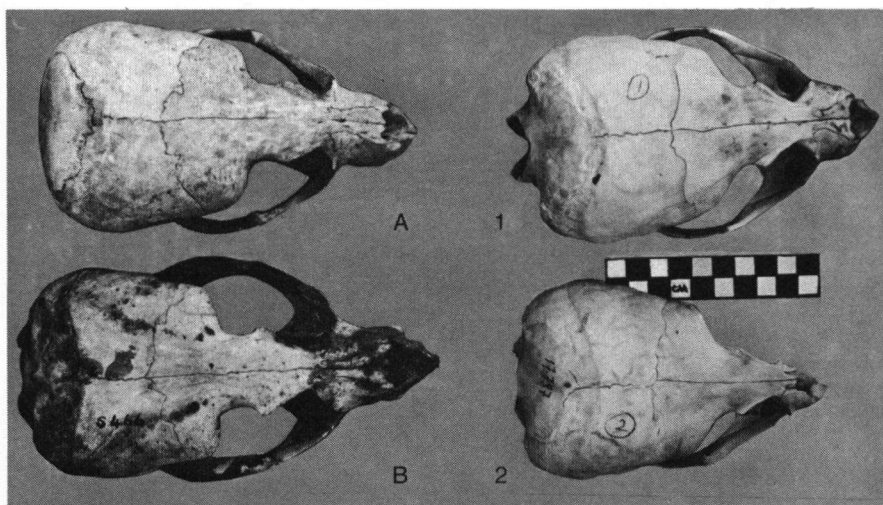


Fig. 2. Dorsal view skulls showing overall shape, and characters 1c, 6, 7 and 8. The skulls 1 and 2 are Nouméa skulls 1 and 2. A = *Arctocephalus pusillus doriferus* M 8080; B = *Arctocephalus forsteri* S 466.

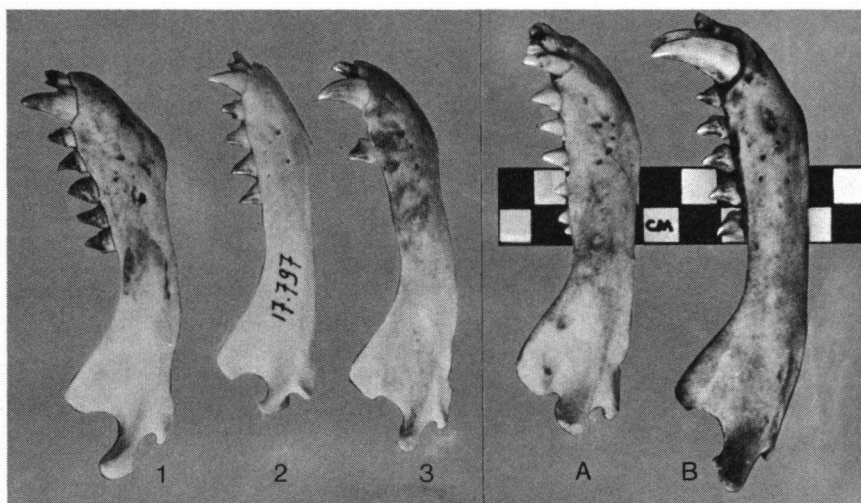


Fig. 3. Lateral view right sides of lower jaws showing characters 1a, 2 and 4. 1, 2, 3 are Nouméa 1, 2, 3. A = *A. p. doriferus* M 8080; B = *A. forsteri* S 466.

reasonable certainty that the suture was fused. Nouméa 2 and 3 are smaller and younger than any of the other skulls under consideration, and this suture in them is open.

The condyles of all three Nouméa skulls are visible in dorsal view, indicating a maturity comparable to *A. forsteri*.

TABLE I. Condylbasal length and basioccipital-basisphenoid suture in skulls of juvenile *Arctocephalus forsteri* and *Arctocephalus pusillus doriferus*. Localities of comparative material from Australian Museum: *A. forsteri* M 3664, Saltpetre Rocks, King Id, Bass Strait, Pres. A. S. LeSouef 1925; *A. forsteri* S 466, New Zealand, Exch. Canterbury Museum 1894; *A. p. doriferus* M 8080, M 8081, M 8082, Launceston, Tasmania, coll. 1960.

	condylbasal length mm	basioccipital- basisphenoid suture
Nouméa 1	172.5	fused (broken)
Nouméa 2	154 est.	open
<i>A. forsteri</i>		
M 3664	182	fused
S 466	188.5	fused
<i>A. p. doriferus</i>		
M 8080	165.5	open
M 8081	174	open
M 8082	161.5	open

The overall appearance of the Nouméa skulls is less juvenile than *A. p. doriferus* and is very similar to *A. forsteri*.

Thus on the several facets of Character 1, the Nouméa skulls are similar to those of *A. forsteri*, and show no similarity to *A. p. doriferus*.

CHARACTER 2

As noted earlier, the postcanine teeth of *A. forsteri* are smooth and neat, with the minimum of cusping — usually a small anterior cusp, while those of *A. p. doriferus* are larger and more bulky, with well developed anterior and posterior cusps.

The teeth of Nouméa 1, and the lower postcanines of Nouméa 2 correspond exactly in their shape and cusping with those of *A. forsteri*. Anteroposterior lengths of the 3rd upper postcanine are given in Table II and show the correspondance of the Nouméa 1 measurements with those of *A. forsteri*.

CHARACTER 3

Not applicable to pups.

CHARACTER 4

Not an easy character in these young skulls, but the coronoid process is narrower in *A. forsteri* and more broadly rounded in *A. p. doriferus*.

The Nouméa jaws agree with *A. forsteri* in the shape of their coronoid process.

TABLE II. Antero-posterior length upper postcanine 3 (in mm) (character 2) in skulls of juvenile *Arctocephalus forsteri* and *Arctocephalus pusillus doriferus*.

Nouméa 1	7.5	<i>A. p. doriferus</i>	
		M 8080	9.6
<i>A. forsteri</i>		M 8081	9.7
M 3664	8.2	M 8082	9.0
S 466	7.1		
Range in King (1969)	7.0—9.3	Range in King (1969)	8.7—11.8

CHARACTER 5

Not applicable to pups.

CHARACTER 6

Not previously recorded for adult or juvenile skulls. The size of the infraorbital foramen is very much bigger in *A. forsteri* than it is in *A. p. doriferus*, and normally this holds for all ages of skulls. Sometimes a big adult male *A. p. doriferus* will have a foramen of the same absolute size as that of an *A. forsteri*, but in such circumstances the size and age of the skull should leave no doubt as to its identity, and the foramen will appear small in proportion to the size of the skull.

Normally, when the skull is placed on a horizontal surface and viewed dorsally, it is possible to see through the infraorbital foramen in *A. forsteri*, but not in *A. p. doriferus*.

This is not an area that lends itself to accurate measurement, but if the greatest length of the foramen is measured, taken parallel with the upper zygomatic branch of the maxilla (Table III), the greater size of this foramen in *A. forsteri* can be seen.

The skulls of Nouméa 1 and 2 have this large infraorbital foramen as in *A. forsteri*, and it is possible to see through it when the skull is viewed dorsally.

TABLE III. Length of infraorbital foramen (in mm) (character 6) in skulls of juvenile *Arctocephalus forsteri* and *Arctocephalus pusillus doriferus*.

Nouméa 1	14.1	<i>A. p. doriferus</i>	
Nouméa 2	11.5	M 8080	8.3
		M 8081	7.4
<i>A. forsteri</i>		M 8082	7.7
M 3664	11.7		
S 466	11.4		
5 adults	10.5—14.1	7 adults	7.3—11.7

CHARACTER 7

There is a certain delicacy of the postorbital processes in *A. forsteri* which is difficult to describe. The posterior corner is sharply pointed and the antero-lateral edge very straight, whereas in *A. p. doriferus* the posterior corner

is rounded and the antero-lateral edge has a tendency to be slightly convex. The three Nouméa skulls agree with *A. forsteri* in this respect.

CHARACTER 8

An expression of the potentially greater size of *A. p. doriferus* can be seen in the juvenile skull in the greater width of the interorbital region, both posterior, and particularly anterior to the postorbital processes (Table IV). Repenning *et al.* (1971) note the "convex 'forehead' between the orbits" of the adult *A. p. doriferus*, while that of the adult *A. forsteri* is "flat to slightly convex". This character can be seen to a lesser degree in the juvenile skulls.

The Nouméa skulls agree with *A. forsteri* in their narrowness in the interorbital region, particularly anterior to the postorbital processes, and the skull between the processes is considerably flatter than in the *A. p. doriferus* skulls.

TABLE IV. Width of interorbital region (in mm) (character 8) in skulls of juvenile *Arctocephalus forsteri* and *Arctocephalus pusillus doriferus*. * = least width, taken posterior or anterior to the postorbital processes.

	posterior*	anterior*		posterior*	anterior*
Nouméa 1	34.3	18.1	<i>A. p. doriferus</i>		
Nouméa 2	27.1	14.2	M 8080	32	22.3
Nouméa 3	26.7	13.2	M 8081	36.8	25.9
			M 8082	32.7	23.2
<i>A. forsteri</i>					
M 3664	30.2	19.4			
S 466	30.9	18.4			

CONCLUSION

Thus, in all the characters that have been listed — those concerned with the size and age of the skull; the shape of the teeth and coronoid process; the size of the infraorbital foramen and the ability to see through it from a dorsal position; the narrowness and relative flatness of the interorbital region and the pointed postorbital processes — in all these characters juvenile skulls of *A. forsteri* may be distinguished from those of *A. p. doriferus*. In every instance the three Nouméa skulls correspond with skulls of *A. forsteri* and differ from skulls of *A. p. doriferus*.

The identity of the seal pups that stranded in New Caledonia has thus been shown to be *Arctocephalus forsteri* — the New Zealand fur seal. Even so, their place of origin is still uncertain. From the currents and weather conditions Rancurel (1975) suggests an Australian origin, and at the present time the nearest known group of Australian *A. forsteri* to the Tasman Sea is that on Kangaroo Island (King, 1969). The present identity and status of fur seals on the islands in Bass Strait is not accurately known, and this is an area where work is needed.

I am indebted to Dr. Paul Rancurel, ORSTOM, Nouméa for bringing the interesting subject of these strandings to my notice and for lending one of the skulls; to Dr. Peter J. H. van Bree, Zoological Museum, Amsterdam for lending the other two skulls, and to Basil J. Marlow, Curator of Mammals, Australian Museum, Sydney, for making the comparative material available.

REFERENCES

KING, J. E.

1969 The identity of the fur seals of Australia. — *Aust. J. Zool.*, 17 : 841—853.

RANCUREL, P.

1975 Echouages d'Otaries à fourrure dans le sud de la Nouvelle-Calédonie — *Mammalia*, 39 (3): 499—504.

REPENNING, C. A., PETERSON, R. S., HUBBS, C. L.

1971 Contributions to the systematics of the southern fur seals, with particular reference to the Juan Fernandez and Guadelupe species. *Antarctic Pinnipedia*. — *Am. Geophys. Union. Ant. Res. Series*, 18: 1—34.

JUDITH E. KING

School of Zoology, University of New South Wales

P.O. Box 1

Kensington, N.S.W., 2033 — Australia