

CRANIOMETRICAL STUDIES ON THE SKULL OF BACTRIAN CAMEL (*Camelus bactrianus*)

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ABSTRACT

A total of 10 skulls of adult male bactrian camels were utilized in this study. Craniometric measurements for 42 different parts of the skulls were made. All investigated features were expressed as mean±SD. Skull indices and ratios were calculated. A skull index of 46.64±1.02, a cranial index of 40.57±0.37, a facial index of 104.17±3.24 and a length-width of 2.21 ±0.06 were obtained. These indices and ratios have been compared with the ones of dromedary camel. The results of this study reveal that the dromedary camel has a longer face than the bactrian camel has; however, the bactrian camel has a longer cranium than the dromedary camel has.

Key words: Bactrian camel, craniometry, skull

The bactrian camel is an important domestic animal in high-altitude areas as a main source of work, power, milk and meat. The knowledge of the morphology and morphometric measurements of the skull is of great importance for surgical interference for collection of pathological conditions. Wang (1993) had described the external shape of the skull of the two-humped camel. However, no study on the craniometry of the bactrian camel has been reported.

The study was undertaken to establish a baseline data on the morphometric measurements of the skull of the two-humped camel. The skull indices and ratios were calculated and compared with the ones of the dromedary camel (Smuts and Bezuidenhout, 1987).

Materials and Methods

A total of 10 skulls of adult male two-humped camels were utilised in this study. These heads were apparently in good health conditions and without any skeletal deformities. The heads were macerated in accordance with the method described by Simoeas (1994) and Onar (1999). Forty two different craniometrical parameters were recorded with the help of measuring scale, thread and digital vernier calipers. These measurements were made by using the methods described by Zietzschmann (1943), Von Den Driesch (1976), Onar, (1999) and Yang and Xia (2005). The cephalic indices and ratios were calculated as described by Brehm *et al* (1985) and Onar *et al* (2001). All investigated parameters are expressed as mean±SD. Definitions of measuring points of cranium

were those described by Von Den Driesch (1976) and Yang and Xia (2005)

Results and Discussion

It was observed that the adult bactrian camel has a massive head. A skull length of 48.99±0.79 cm and a maximum zygomatic width of 22.27 ±0.29 cm were obtained. Craniometric measurements of the skulls were evaluated. The investigated features are presented as the mean±SD in table 1. The indices and ratios of the adult bactrian camel were calculated by using the investigated features. A skull index of 46.64±1.02, a cranial index of 40.57±0.37, a facial index of 104.17±3.24 and a length-width of 2.21 ±0.06 were obtained. The skull, cranial, facial and basal indices are shown in table 2 and those indices were compared with those of dromedary camel. It was observed that the skull length, maximum zygomatic width and skull index were close to that of the dromedary camel.

Cranial index was found to be smaller than that of the dromedary camel. According to the data and the formula, it was because the cranial length of bactrian camel is bigger than the one of dromedary camel. However, the facial index was found to be bigger than the one of the dromedary camel. According to the data and the formula, the viscerocranial length of bactrian camel was smaller than the one of dromedary camel. As the skull length of the two species was close to each other, the location of the nasion in the skull of bactrian camel is more cranial than the dromedary camel. The results of this study revealed that the dromedary

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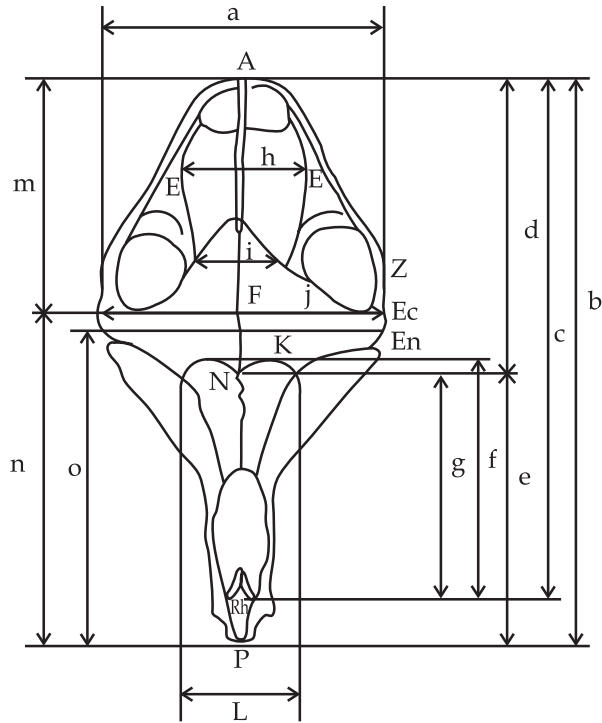


Fig 1. Measurement of the skull of the bactrian camel (dorsal view): akrokranium (A), ectorbitale (EC), entorbitale (EN) frontal midpoint (F), nasion (N), Maximum zygomatic width (a), Skull length (b), Short upper cranium length (c), Cranial length (d), Viscerocranial length (e), Greatest length of the nasals (f), Nasal suture length (g), Maximum width of the neurocranium (h), Least breadth of skull (i), Frontal breadth (j), Least breadth between the orbits (k), Greatest width of nasal (l), Upper neurocranium length (m), Facial length (n), Snout length (o).

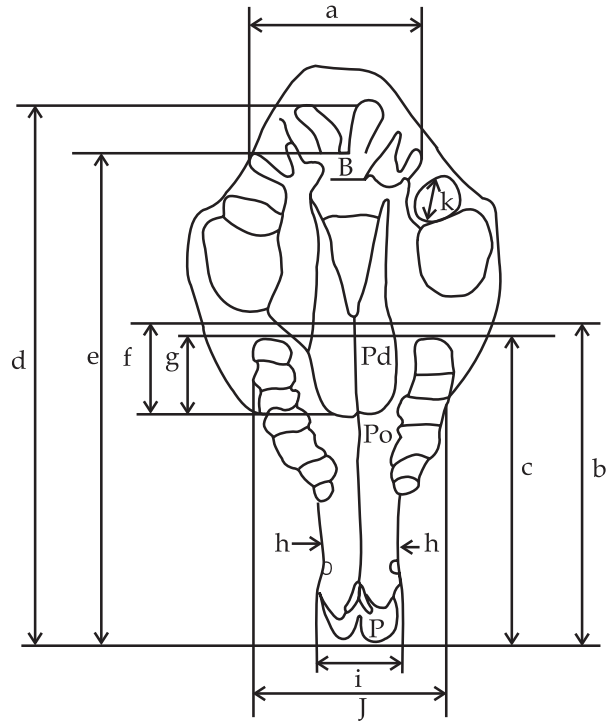


Fig 2. Measurement of the skull of the bactrian camel (ventral view): basion (B), Pd (Postdentale), Po (Palatino-orale), P (prosthion), Breadth dorsal to the external auditory meatus (a), Median palatal length (b), Palatal length (c), Condylobasal length (d), Basal length (e), Length of the horizontal part of the palatine (f), Length of the horizontal part of palatine-1 (g), Least breadth in the region of the diastema (h), Greatest breadth of snout (i), Greatest breadth of the palate (j) Greatest diameter of the auditory bulla (k).

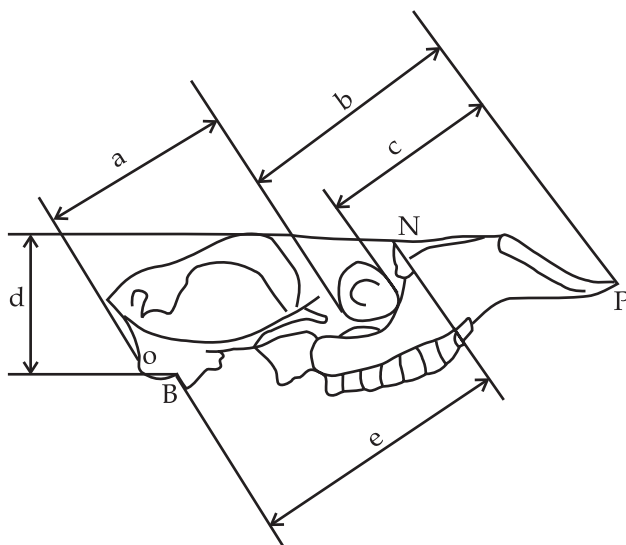


Fig 3. Measurement of the skull of the bactrian camel (lateral view): Length of the braincase (a), Lateral facial length (b), Short lateral facial length (c), Skull height (d), Neurocranium length (e).

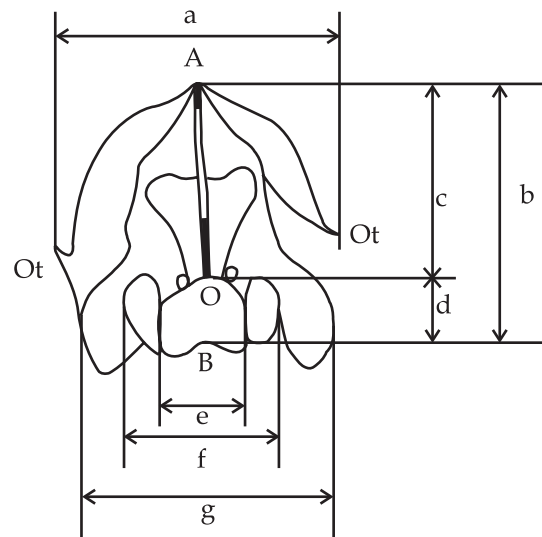


Fig 4. Measurement of the skull of the Bactrian camel (occipital area view), Greatest mastoid breadth (a), Height of the occipital triangle (b), Least height of the occipital region (c), Height of the foramen magnum (d), Greatest breadth of the foramen magnum (e), Greatest breadth of the occipital condyles (f), Greatest breadth of the bases of the jugular processes (g)

Table 1. The mean value of skull measurements of the adult bactrian camel (cm).

	Mean	SD
Maximum zygomatic width	22.27	0.29
Skull length	48.99	0.79
Short upper cranium length	46.79	0.79
Cranial length	22.03	0.53
Viscerocranial length	20.66	0.44
Greatest length of the nasals	16.63	0.38
Nasal suture length	11.38	0.16
Maximum width of the neurocranium	9.05	0.25
Least breadth of skull	24.38	0.39
Frontal breadth	18.20	0.26
Least breadth between the orbits	7.27	0.17
Greatest width of nasal	28.72	0.22
Upper neurocranium length	20.44	0.37
Facial length	17.24	0.37
Snout length	28.20	0.46
Breadth dorsal to the external auditory meatus	11.84	0.36
Median palatal length	26.54	0.42
Palatal length	28.68	0.50
Condylobasal length	46.42	0.51
Basal length	43.89	0.19
Length of the horizontal part of the palatine	5.21	0.23
Length of the horizontal part of palatine-1	8.14	0.28
Least breadth in the region of the diastema	3.87	0.07
Greatest breadth of snout	5.45	0.07
Greatest breadth of the palate	13.31	0.15
Greatest diameter of the auditory bulla	5.114	0.13
Length of the braincase	19.60	0.37
Lateral facial length	29.22	0.54
Short lateral facial length	23.17	0.45
Skull height	11.37	0.12
Neurocranium length	26.29	0.35
Greatest mastroid breadth	14.53	0.18
Height of the occipital triangle	10.96	0.12
Least height of the occipital region	7.02	0.13
Height of the foramen magnum	3.78	0.02
Greatest breadth of the foramen magnum	3.27	0.02
Greatest breadth of the occipital condyles	7.75	0.11
Greatest breadth of the bases of the jugular processes	11.14	0.41
Skull volume (ml)	505.46	24.68
Skull weight (g)	984.54	59.14

camel has a longer face than the bactrian camel; however, the bactrian camel has a longer cranium than the dromedary camel.

Skull volume was found to be bigger than that of the dromedary camel. Al-Sagair and ElMougy (2002) found that the skull volume of the dromedary

Table 2. Comparative incidences of the bactrian and dromedary camels.

	Bactrian camel		Dromedary camel
	Mean	SD	
Skull index	46.64	1.02	45.06
Cranial index	40.57	0.37	72.99
Facial index	104.17	3.24	79.83
Length-width-2	2.21	0.06	2.43

camel was 310.80±4.22 ml, which is smaller than the volume of the brain of bactrian camel (446±3.56 ml) as reported by Xie (2008). Hence, The volume of the brain of the dromedary camel may be smaller than that of the bactrian camel.

The data obtained in this study may be of some use in the clinical treatments of diseases, such as osteomyelitis of frontal bone.

Acknowledgement

Thanks to Biodiversity Conservation Research Group of QuJing Normal University for their zealous helps in this study.

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