Was *Cuon alpinus* a member of the Mammoth Steppe Fauna?

Appendices

Appendices of the master thesis by

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Photo cover: fossil Canidae specimen NMR90, suspected to belong to *Cuon alpinus* (Dick Mol, pers. comm.).

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Appendix II: List of all 100 Canidae specimens

Material	Reg. no.	Scientific name	Locality	Age	Sexe	Part	Collection
Canidae indet.	534	Canidae sp.	North Sea	Late Pleist?	?	L HM	Kommer Tanis
Fossil (13)	535	Canidae sp.	North Sea	Late Pleist?	?	R HM	Kommer Tanis
	667	Canidae sp.	North Sea	Late Pleist?	?	R HM	Kommer Tanis
	1683	Canidae sp.	North Sea	Late Pleist?	?	R HM	Kommer Tanis
	2103	Canidae sp.	North Sea	Late Pleist?	?	L HM	Kommer Tanis
	2104	Canidae sp.	North Sea	Late Pleist?	?	L HM	Kommer Tanis
	2196	Canidae sp.	North Sea	Late Pleist?	?	L HM	Kommer Tanis
	2329	Canidae sp.	North Sea	Late Pleist?	?	L HM	Kommer Tanis
	2620	Canidae sp.	North Sea	Late Pleist?	?	R HM	Kommer Tanis
	3219	Canidae sp.	North Sea	Late Pleist?	?	L HM	Kommer Tanis
	3293	Canidae sp.	North Sea	Late Pleist?	?	L HM	Kommer Tanis
	NMR89	Canidae sp.	North Sea, Southern Bight	Late Pleist?	?	L HM	NMR
	NMR90	Canidae sp.	North Sea, Southern Bight	Late Pleist?	?	R HM	NMR

Legend	
Material	the 13 fossil North Sea specimens (Canidae indet.) and the three comparative (sub)species, including sample sizes and indication which specimens are fossil and which recent;
Reg. no.	registration number and category number (a-m);
Scientific name	taxonomic classification of the specimen (see also Chapter 3) incuding breed name for *C. l. familiaris* specimens, Canidae sp. = species yet indetermined;
Locaility	locaility where the specimen was acquired;
Age	age of fossil specimens, n/a (not applicable) for recent specimens, Late Pleist.? = of estimated Late Pleistocene age;
Sexe	m (male), f (female) or unknown (?);
Part	specimen consists of an entire mandible (EM) or left (L) or right (R) hemimandible (HM);
Collection	specimen comes from the collection deposited in NCB Naturalis, the collection of the Natuurhistorisch Museum Rotterdam (NMR) or the private collection of Mr. Kommer Tanis.

Appendix II: List of all 100 Canidae specimens

Material	Reg. no.	Scientific name	Locality	Age	Sexe	Part	Collection
Canis l. lupus	3129	*Canis l. lupus* LINNAEUS, 1758	From captivity	n/a	f	EM	Naturalis
Recent (14)	*lupus*-a	*Canis l. nubilus* SAY, 1823	Tennessee	n/a	?	EM	Naturalis
	lupus-b	*Canis l. lupus* LINNAEUS, 1758	Europe	n/a	?	EM	Naturalis
	lupus-c	*Canis l. lupus* LINNAEUS, 1758	Norway	n/a	?	EM	Naturalis
	lupus-d	*Canis l. lupus* LINNAEUS, 1758	-	n/a	?	EM	Naturalis
	lupus-e	*Canis l. lupus* LINNAEUS, 1758	Kamtchatka (Russia)	n/a	f	EM	Naturalis
	lupus-f	*Canis l. lupus* LINNAEUS, 1758	Smyrne	n/a	?	EM	Naturalis
	lupus-g	*Canis l. lupus* LINNAEUS, 1758	-	n/a	m	EM	Naturalis
	lupus-h	*Canis l. lupus* LINNAEUS, 1758	-	n/a	f	EM	Naturalis
	lupus-l	*Canis l. lupus* LINNAEUS, 1758	Austrian Silesia	n/a	f	EM	Naturalis
	lupus-m	*Canis l. lupus* LINNAEUS, 1758	-	n/a	?	EM	Naturalis
	RMNH43490	*Canis l. lupus* LINNAEUS, 1758	-	n/a	?	EM	Naturalis
	RMNH43491	*Canis l. lupus* LINNAEUS, 1758	-	n/a	?	EM	Naturalis
	RMNH43492	*Canis l. lupus* LINNAEUS, 1758	-	n/a	?	EM	Naturalis
Fossil (4)	445834	*Canis l. lupus* LINNAEUS, 1758	Westerschelde, Ellewoutsdijk, Netherlands	Weichselien	?	R HM	Naturalis
	NMR86	*Canis l. lupus* LINNAEUS, 1758	North Sea, Southern Bight, west of Brown Bank	?	?	L HM	NMR
	NMR87	*Canis l. lupus* LINNAEUS, 1758	North Sea, Southern Bight	?	?	L HM	NMR
	NMR88	*Canis l. lupus* LINNAEUS, 1758	North Sea, Southern Bight, Eurogeul	?	?	R HM	NMR
Canis l. familiaris	7028	*Canis l. familiaris* LINNAEUS, 1758 (Bouvier)	Leiden, Netherlands	n/a	m	EM	Naturalis
Recent (20)	12547	*Canis l. familiaris* LINNAEUS, 1758	Paramaribo, Suriname	n/a	?	EM	Naturalis
	12548	*Canis l. familiaris* LINNAEUS, 1758	Paramaribo, Suriname	n/a	m	EM	Naturalis
	17755	*Canis l. familiaris* LINNAEUS, 1758	Paramaribo, Suriname	n/a	f	EM	Naturalis
	17758	*Canis l. familiaris* LINNAEUS, 1758	Paramaribo, Suriname	n/a	f	EM	Naturalis
	17792	*Canis l. familiaris* LINNAEUS, 1758	Paramaribo, Suriname	n/a	m	EM	Naturalis
	17793	*Canis l. familiaris* LINNAEUS, 1758	Paramaribo, Suriname	n/a	m	EM	Naturalis
	18049	*Canis l. familiaris* LINNAEUS, 1758	Paramaribo, Suriname	n/a	f	EM	Naturalis
	18050	*Canis l. familiaris* LINNAEUS, 1758	Paramaribo, Suriname	n/a	m	EM	Naturalis
	18051	*Canis l. familiaris* LINNAEUS, 1758	Paramaribo, Suriname	n/a	?	EM	Naturalis
	18052	*Canis l. familiaris* LINNAEUS, 1758	Paramaribo, Suriname	n/a	f	EM	Naturalis
	18065	*Canis l. familiaris* LINNAEUS, 1758	Paramaribo, Suriname	n/a	m	EM	Naturalis
	21960	*Canis l. familiaris* LINNAEUS, 1758	Zanderij, Suriname	n/a	?	EM	Naturalis

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Material	Reg. no.	Scientific name	Locality	Age	Sexe	Part	Collection
Canis l. familiaris	33824	*Canis l. familiaris* LINNAEUS, 1758 (German Shepherd dog)	Buitenzorg, W Java, Indonesia	n/a	?	EM	Naturalis
Recent	34601	*Canis l. familiaris* LINNAEUS, 1758 (Airdale terrier)	Netherlands	n/a	f	EM	Naturalis
	34605	*Canis l. familiaris* LINNAEUS, 1758 (Irish Setter)	Netherlands	n/a	m	EM	Naturalis
	34608	*Canis l. familiaris* LINNAEUS, 1758 (Bastard Poodle)	Netherlands	n/a	m	EM	Naturalis
	34614	*Canis l. familiaris* LINNAEUS, 1758 (Fox terrier)	Netherlands	n/a	f	EM	Naturalis
	34617	*Canis l. familiaris* LINNAEUS, 1758 (Collie)	Netherlands	n/a	f	EM	Naturalis
	34618	*Canis l. familiaris* LINNAEUS, 1758 (Collie)	Netherlands	n/a	m	EM	Naturalis
Fossil (22)	29780	*Canis l. familiaris* LINNAEUS, 1758	Wiene, Delden, Overijssel, Netherlands	Weichselien	?	R HM	Naturalis
	30457	*Canis l. familiaris* LINNAEUS, 1758	Wiene, Delden, Overijssel, Netherlands	Weichselien	?	L HM	Naturalis
	30807	*Canis l. familiaris* LINNAEUS, 1758	Dinther, N Brabant, Netherlands	Weichselien	?	L HM	Naturalis
	30818	*Canis l. familiaris* LINNAEUS, 1758	Dinther, N Brabant, Netherlands	Weichselien	?	L HM	Naturalis
	30828	*Canis l. familiaris* LINNAEUS, 1758	Dinter, N Brabant, Netherlands	Weichselien	?	R HM	Naturalis
	30841	*Canis l. familiaris* LINNAEUS, 1758	Veghel, N Brabant, Netherlands	Weichselien	?	L HM	Naturalis
	30900	*Canis l. familiaris* LINNAEUS, 1758	Heeswijk, N brabant, Netherlands	Weichselien	?	R HM	Naturalis
	32044	*Canis l. familiaris* LINNAEUS, 1758	Dinter, N Brabant, Netherlands	Weichselien	?	L HM	Naturalis
	32050	*Canis l. familiaris* LINNAEUS, 1758	Heeswijk, N Brabant, Netherlands	Weichselien	?	R HM	Naturalis
	35036	*Canis l. familiaris* LINNAEUS, 1758	Rotterdam Maastunnel, S Holland, Netherlands	Weichselien	?	R HM	Naturalis
	69408	*Canis l. familiaris* LINNAEUS, 1758	Tjummarum, Friesland, Netherlands	Weichselien	?	L HM	Naturalis
	74489	*Canis l. familiaris* LINNAEUS, 1758	Bolsward St. Maartenskerk, Friesland, Netherlands	Weichselien	?	R HM	Naturalis
	74506	*Canis l. familiaris* LINNAEUS, 1758	Bolsward St. Maartenskerk, Friesland, Netherlands	Weichselien	?	L HM	Naturalis
	93211	*Canis l. familiaris* LINNAEUS, 1758	Hasselt, Zwarte Water, Overijssel, Netherlands	Weichselien	?	L HM	Naturalis
	97302	*Canis l. familiaris* LINNAEUS, 1758	?	Weichselien	?	L HM	Naturalis
	117724	*Canis l. familiaris* LINNAEUS, 1758	Rossum, Maas river, Gelderland, Netherlands	Weichselien	?	L HM	Naturalis
	117731	*Canis l. familiaris* LINNAEUS, 1758	Rossum, Maas river, Gelderland, Netherlands	Weichselien	?	L HM	Naturalis
	123156	*Canis l. familiaris* LINNAEUS, 1758	Heukelum, Linge river, S holland, Netherlands	Weichselien	?	R HM	Naturalis
	123547	*Canis l. familiaris* LINNAEUS, 1758	Vogelenzang, N Holland, Netherlands	Weichselien	?	R HM	Naturalis
	124605	*Canis l. familiaris* LINNAEUS, 1758	Beegden, Maas river, Limburg, Netherlands	Weichselien	?	R HM	Naturalis
	154234	*Canis l. familiaris* LINNAEUS, 1758	Deventer, Overijssel, Netherlands	Weichselien	?	R HM	Naturalis
	154355	*Canis l. familiaris* LINNAEUS, 1758	Zandweerd, Deventer, Overijssel, Netherlands	Weichselien	?	L HM	Naturalis

Appendix II: List of all 100 Canidae specimens

Material	Reg. no.	Scientific name	Locality	Age	Sexe	Part	Collection
Cuon alpinus	945	*Cuon alpinus* PALLAS, 1811	?	n/a	m	EM	Naturalis
Recent (27)	1546	*Cuon a. javanicus* DESMAREST, 1820	?	n/a	?	EM	Naturalis
	1694	*Cuon alpinus* PALLAS, 1811	?	n/a	?	EM	Naturalis
	2680	*Cuon a. javanicus* DESMAREST, 1820	East Java	n/a	?	EM	Naturalis
	2681	*Cuon a. javanicus* DESMAREST, 1820	West Java, Soebang	n/a	?	EM	Naturalis
	4681	*Cuon a. rutilans* MÜLLER, 1839	?	n/a	f	EM	Naturalis
	4682	*Cuon a. rutilans* MÜLLER, 1839	Java	n/a	f	EM	Naturalis
	4683	*Cuon a. javanicus* DESMAREST, 1820	Toeloeng Agoeng Wilis, East Java, Residence Kediri	n/a	f	EM	Naturalis
	15751	*Cuon a. rutilans* MÜLLER, 1839	Tjipandak	n/a	?	EM	Naturalis
	20551	*Cuon a. dukhunensis* SYKES, 1831	Peninsula south of Ganges, India	n/a	f	EM	Naturalis
	33819	*Cuon a. javanicus* DESMAREST, 1820	Tjibadak, Preanger, West Java	n/a	?	EM	Naturalis
	33820	*Cuon a. javanicus* DESMAREST, 1820	Panoembangan, Tjibadak, Preanger, West Java	n/a	?	EM	Naturalis
	33821	*Cuon a. javanicus* DESMAREST, 1820	Soembar, Brabtas, Batoe Pasoeroean, East Java	n/a	?	EM	Naturalis
	33822	*Cuon a. javanicus* DESMAREST, 1820	Panoembangan, Tjibadak, Preanger, West Java	n/a	?	EM	Naturalis
	33823	*Cuon a. javanicus* DESMAREST, 1820	Gamboeng, Tjiwideij, Preanger, West Java	n/a	m	EM	Naturalis
	33841	*Cuon a. javanicus* DESMAREST, 1820	Telawa, East Java, Indonesia	n/a	m	EM	Naturalis
	1694-java	*Cuon a. javanicus* DESMAREST, 1820	Java, Indonesia	n/a	m	EM	Naturalis
	Cuon#1	*Cuon alpinus* PALLAS, 1811	?	n/a	?	EM	Naturalis
	Cuon#2	*Cuon alpinus* PALLAS, 1811	?	n/a	?	EM	Naturalis
	Cuon-a-java	*Cuon alpinus* PALLAS, 1811	Java	n/a	?	EM	Naturalis
	Cuon-a-sib	*Cuon alpinus* PALLAS, 1811	Siberie	n/a	?	EM	Naturalis
	Cuon-b	*Cuon alpinus* PALLAS, 1811	Java	n/a	?	EM	Naturalis
	Cuon-e	*Cuon a. rutilans* MÜLLER, 1839	Java	n/a	?	EM	Naturalis
	Cuon-f	*Cuon a. rutilans* MÜLLER, 1839	Java	n/a	?	EM	Naturalis
	Cuon-g	*Cuon a. rutilans* MÜLLER, 1839	Java	n/a	?	EM	Naturalis
	Cuon-h	*Cuon a. rutilans* MÜLLER, 1839	Java	n/a	f	EM	Naturalis
	Cuon-j	*Cuon alpinus* PALLAS, 1811	Preanger Regentschappen, Java	n/a	m	EM	Naturalis

Appendix III: Glossary

Box III.1: General definitions and terminology	
Alveole	Tooth socket in the mandibular body in which the roots of teeth are held[1].
Alveolar process	Thickened ridge of bone that contains the alveoles of the teeth (*g* in fig. IV.1)[2].
Angular process	Most posterior, inferior and lateral bony protuberance of the lower mandible, where the mandible angles upwards (fig. III.2 and IV.1). Also termed: gonion[2].
Breadth	Synonym for width.
Carnassial	One of the teeth of the shearing teeth pair (P^4 and M_1) that are adapted for slicing flesh. Carnassials are a common characteristic to all land carnivores[1].
Cervical third	Vertical component of a tooth. In dental anatomy a tooth is divided into three sections: the upper apical/incisal/occlusal third (crown), middle third and lower cervical third (root)[3].
Condylar process	Condyle of the ramus of the mandible that articulates with the skull (fig. III.2 and IV.1). Also termed: condyle or mandibular condyle [4].
Coronoid process	Triangular flattened process of the ramus that provides an attachment for the temporal muscle (fig. III.2 and IV.1)[5].
Cusp	Elevated point of a tooth, having structural of functional occlusal areal components delimited by developmental grooves and having independent apexes[8].
Dental formula	Dentition is expressed in a dental formula of incisors (I), canines (C), premolars (P) and molars (M). A dental formula presents half of the hemimaxilla (first value) and hemimandible (second value), because dentition is symmetrical. The typical mammal dental formula is I 3/3, C 1/1, P 4/4, M 3/3. The typical Canidae dental formula is 3/3 - 1/1 - 4/4 - 2/3[6]. (See also: fig. IV.1)
Diastema	Vacant space between two teeth (fig. III.2)[7].
Foramen	Natural hole in a bone through which nerves and blood vessels pass. A mental foramen is one of two foramina located on the anterior surface of the mandible, trough which the mental nerve passes (fig. III.2)[5].
Hemimandible	One half of a mandible[6].
Inf.	Inferior. Concerning the mandible. For example: P1 inf. = P_1 = mandibular P1. See also: sup.[1]
Maxilla	Upper jawbone[6].
Mandible	Lower jawbone[6].
Mandibular symphyse	Anterior part of the mandible where the two hemimandibles are grown together (fig. IV.1)[2].
Masseteric fossa	Depression in the ascending ramus where the masseter in situated in living specimens (fig. III.2)[4].
Ramus	The posterior vertical extension of each hemimandible that ends posterior in the angular and condylar process and at the apex in the coronoid process. Also termed: ascending or mandibular ramus (fig. III.2)[4].
Sup.	Superior. Concerning the maxilla. For example: P1 sup. = P^1 = maxillar P1. See also: inf.[1]

Box III.2: Directions	
The following terminology is used with reference to the skull and mandible:	
Anterior	In the direction of the mouth. Also termed: oral or front (fig. III.2)[6].
Posterior	In the direction opposite to the mouth. Also termed: aboral or rear (fig. III.2)[6].
The following terminology is used with reference to teeth and aspects of teeth:	
Mesial	Facing towards the front of the oral cavity (fig. III.1)[6].
Distal	Facing towards the back of the oral cavity (fig. III.1). Termed lateral when concerning incisors[6].
Lingual	Facing towards the tongue (fig. III.1). Termed palatinal when concerning the maxilla[6].
Buccal	Facing towards the cheek (fig. III.1). Termed labial when concerning canines and incisors[6].

Box III.3: Dental topography	
Nomenclature of dental topography is not clearly defined in literature. The different cusps, conules, stylids and crests connecting these structures have had different names trough the years and at the present many different names still exist for each dental topographical feature. Since there is frequent confusion regarding dental terminology in the literature (Swindler, 2002), hereby the nomenclature as it is used in this study is clearly (re)defined (by the author, where no reference is given).	
Principal cusp	The main, highest and largest cusp of the tooth. A principal cusp is always present in all specimens of the species (it is not an optional cusp).
Accessory cusp	A secondary, supplementary cusp that shows a higher degree of morphological variability and is not always necessarily present in all specimens of the species.
-id	Suffix added to the names of mandibular dental features to distinguish between mandibular and maxillar terminology[8].
-cone	Principal cusp[9].
-ule/ulid	Suffix added to the name of an accessory cusp that is part of a principal cusp, part of a crest connecting the principal cusps or part of the cingulum[10].
-stylid	Suffix added to the name of an independent accessory cusp that is not part of another tooth structure[10]. Compare the metastylid and hypoconulid in fig. III.1: the metal*stylid* is not part of the cingulum (as indicated by the stippled line or indentation), while the hypo*conulid* is part of the cingulum.
Trigonid	The triangular cutting region of the crown of a mandibular molar, usually the mesial part, consisting of the paraconid, protoconid and metaconid (fig. III.1)[8].
Talonid	Low extension on the distal aspect of the trigonid of the mandibular molar, consisting of the hypoconid, entoconid (and hypoconulid) (fig. III.1)[8].
Protoconid	One of the principal cusps (fig. III.1 and fig. IV.1)[9].
Paraconid	One of the principal cusps (fig. III.1 and fig. IV.1)[9].
Metaconid	One of the principal cusps (fig. III.1 and fig. IV.1)[9].
Hypoconid	One of the principal cusps (fig. III.1 and fig. IV.1)[9].
Entoconid	One of the principal cusps (fig. III.1 and fig. IV.1)[9].
Following dental topographical features were observed in the 100 Canidae specimens besides the principal cusps:	
Cingulum	Part of the tooth that forms a convex protuberance at the cervical third of the anatomic crown[11].
Mesial cingulum	Cingulum that is a continuation of a lingual cingulum towards the mesial side of the tooth.
Parastylid	Relatively small, but independent accessory cusp on the mesial side of the protoconid (fig. III.1)[12]. Smaller than a metastylid.
Metastylid	A low, small, but independent accessory cusp on the distocentral part of the tooth (positioned above the distal root) (fig. III.1)[10].
Metaconulid	Cingular accessory cusp positioned on the cingulum, distally of the metastylid. Smaller than the metastylid[12].
Distal cingulum	Cingulum that is a continuation of the lingual cingulum towards the distal side of the tooth.

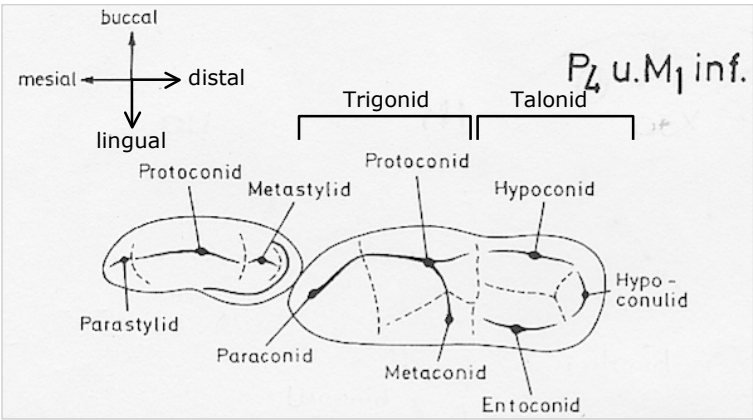

Figure III.1: P_4-M_1 (right) of carnivores indicating dental topography. Adapted from Abb. 455 from Thenius (1989).

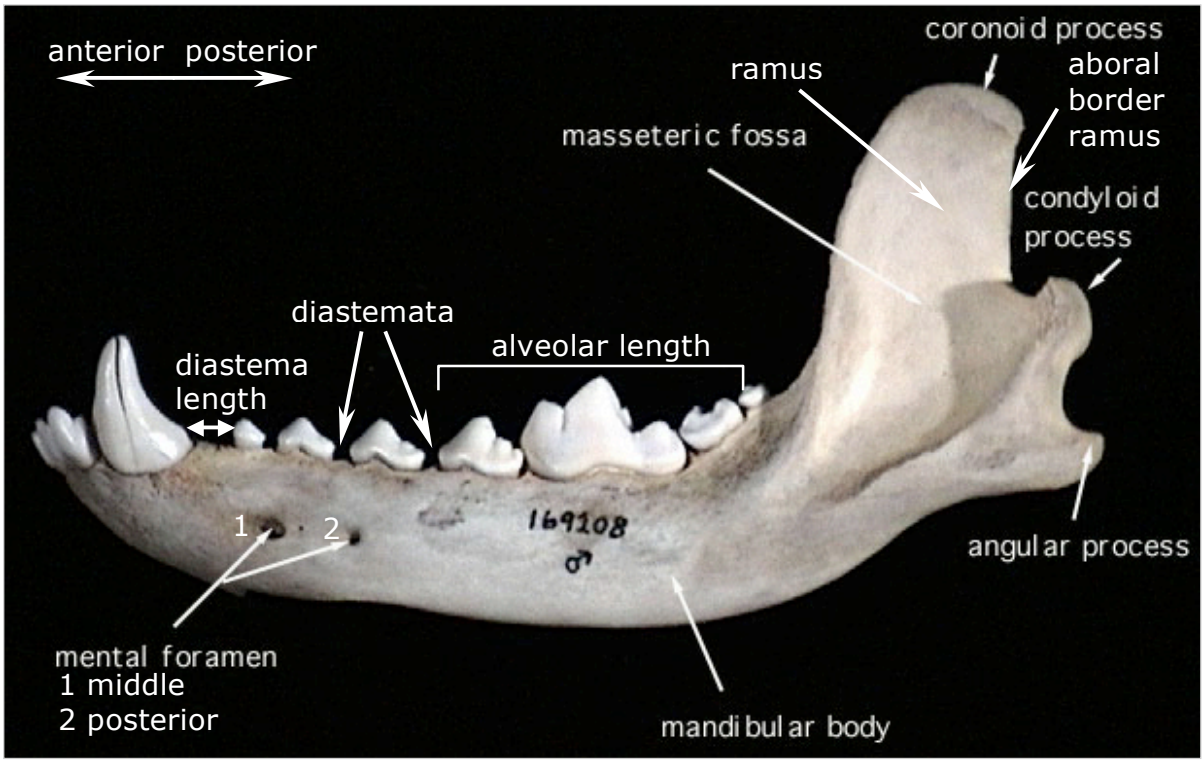

Figure III.2: Left hemimandible of a dog (buccal view) indicating several morphological and osteometrical features of a hemimandible. Adapted from: Myers, P., Espinosa, R., Parr, C. S., Jones, T., Hammond, G. S. and Dewey, T. A. (2006). The Animal Diversity Web (online). Accessed April 13, 2011 at http://animaldiversity.org.

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[1] Thenius (1989)

[2] Hue (1907)

[3] Scott and Turner (2000)

[4] Tedford and Xiaoming (2010)

[5] Myers, P., Espinosa, R., Parr, C. S., Jones, T., Hammond, G. S. and Dewey, T. A. (2006). The Animal Diversity Web (online). Accessed April 13, 2011 at http://animaldiversity.org.

[6] Schmid (1972)

[7] Pérez Ripoll et al. (2010)

[8] Swindler (2002)

[9] Reig (1977)

[10] Definition is based on fig. III.1.

[11] Ash, M. and Nelson, J.S., (2003). *Wheeler's Dental Anatomy, Physiology, and Occlusion.* 8th edition.

[12] Definition is based on Ripoll et all. (2010) and fig. III.1.

Appendix IV: Morphological and osteometrical parameters

Appendix IVa: Description of the parameters

Box IV.1: Parameters concerning mandible length	
Length of the mandible (a-b)	Measured from the center of the posterior side of the angular process (*a*) to the anterior side of the mandibular symphyse (*b*) (fig. IV.1). The length is line *a-b* in mm (measured from along the buccal side of the hemimandible, with the caliper being parallel to the hemimandible)[1].
Length of the mandible (c-b)	Measured from the center of the posterior side of the condyle (*c*) to the anterior side of the mandibular symphyse (*b*) (fig. IV.1). The length is line *c-b* in mm (measured from along the buccal side of the hemimandible, with the caliper being parallel to the hemimandible)[1].
Alveolar length of a specified tooth row	Parameter of the alveolar length of the mandibular tooth row of P_1-M_2, P_4-M_1-M_2 and M_1-M_2, measured from the mesial margin of the alveolus of the anterior tooth to the distal margin of the alveolus of the posterior tooth (in mm) (fig.III.2)[2]. NB When the most anterior or posterior tooth of the tooth row was missing and a diastema was present instead, a reasonable guess was made of the possible alveolar length or the parameter was not taken.
Diastema length between two specified teeth of the mandible	Distance from the distal margin of the alveolus of the anterior tooth to the mesial margin of the alveolus of the posterior tooth for C-P_1 (in mm) (fig.III.2)[3]. Diastema length for P_2-P_3 and P_3-P_4 was only described qualitatively: diastema is not present/diastema is present, and when present as: 'yes' (equal or smaller than approximately 2 mm) or 'yes+' (larger than approximately 2 mm).
Mental foramina (middle and posterior)	Parameter of the position of the middle and posterior foramina in the mandible with respect to the teeth (premolars) under which the foramina are present (fig. III.2 and IV.3)[2]. The position was recorded as follows: P_x (foramen is positioned under the central part of the tooth), P_x anterior (foramen is positioned under the mesial root of the tooth), P_x posterior (foramen is positioned under the distal root of the tooth), P_x-P_x (foramen is positioned in the mandible between the two specified teeth or below the diastema between these two teeth).
Incisors	Parameter of the amount of 'crowdedness' of the mandibular incisors. Lower incisor alveoli can be positioned nicely in a row or form an almost equilateral triangle due to crowding of the incisors[4].

Box IV.2: Parameters concerning mandible width, height and ratios	
Width of the mandible (i-i')	Measured below M_1 at the position of the center of the alveolar process (fig. IV.2). Width *i-i'* is given in mm[1].
Width of the mandible (k-k')	Measured from the posterior part of the mandibular symphyse alongside the distal part of P_1 to the buccal side of the hemimandible (fig. IV.2). Width *k-k'* is given in mm[1].
Distance h-h' under each mandibular tooth	Height of the mandibular body, measured from the center of the alveolar process of the tooth (*h*) straight down to the lower edge of the mandible (*h'*) (fig. IV.1). The length is line *h-h'* in mm[1]. Note that for P_1 (*h*) was not measured at the center of the alveolar process, but at the posterior side of the alveole and line *h-h'* was measured posterior along the mandibular symphyse. *h-h'* M_1 = *g-g'* in fig. IV.1.
Ratios	Mandibular ratios were calculated with three subparameters: alveolar length P_1-M_2, width of the mandible *i-i'* and height *h-h'* P_3. There was chosen for these three parameters to represent mandibular length, width and height, because these are most similar to the parameters used by Pérez Ripoll et al. (2010), who used alveolar length P_1-M_2, mandibular width below P_4-M_1 and height *h-h'* below P_2 and P_3. To calculate the ratios the mean *C. l. lupus* value (x) for these three parameters was set as reference value (*C. l. lupus* has a mandibular length, height and width of 100%). Subsequently the mean values (x) of *C. l. familiaris* and *Cuon alpinus* for each parameter were converted to percentages using *C. l. lupus* as reference (thereby calculating how much the mandibular length, height and width of *C. l. familiaris* and *Cuon alpinus* is reduced or increased in comparison to *C. l. lupus*).

Box IV.3: Parameters concerning the ramus	
Distance a-d of the mandible	Measured from the center of the posterior side of the angular process (*a*) to the posterior angle of the coronoid process (*d*) (fig. IV.1). The length is line *a-d* in mm[1].
Distance e-e' of the mandible	Vertical parameter on the ramus of the mandible. Measured along a line perpendicular to line *a-b*, starting at the apex of the coronoid process (*e*) and passing the mandibular process (*m*) anterior, perpendicular to line *a-b* (fig. IV.1). The length is line *e-e'* in mm[1].
Coronoid angle (ν)	Angle of the coronoid process with respect to line *a-b*. Measured between line *a-b* and a straight line along the anterior part of the coronoid process (fig. IV.1). The angle is given in degrees (°)[1].
Aboral border of the ramus	Parameter of the direction in which the aboral border of the ramus is facing: facing the front (anterior) as in *Cuon alpinus*, facing the rear (posterior) as in *C. l. lupus* or facing neither way (a vertical border) with respect to a line horizontally along the lower part of the mandible (which is approximately parallel to line *a-b*) (fig. III.2 and IV.3)[2].
Anterior border of the coronoid process	Parameter of the amount of development of the anterior border of the coronoid process: well developed, rounded and thick (as in *Cuon alpinus*) or poorly developed and thin (as in *C. l. lupus*) (fig. IV.3)[2].
Angular process	Parameter of the presence or absence of a crest as a continuation of the angular process. The angular process can continue in a crest towards the masseteric fossa (as in *Cuon*) or the crest is absent or less marked in an oblique position (as in *C. l. lupus*) (fig. IV.3)[2].
Relation between the angular process and the mandibular condyle (line k)	Parameter of the size relation between the angular process and the mandibular condyle in the aboral direction, when the mandible is being held horizontally. The angular process can be larger in the aboral direction compared to the condyle (as in *Cuon alpinus*), vice versa (as in *C. l. lupus*) or both processes are equal in size (fig. IV.3)[2].

Box IV.4: Parameters concerning teeth	
Dental formula (mandibular)	This parameter consists of three parts: a record of the actual dental formula (box III.1) including an explicit note on whether an M_3 is present or not, an indication whether this dental formula is typical for *Canis* or *Cuon* (4.4.1) and a record of missing teeth (appendix XI). When not al teeth are present, the dental formula can be derived from the alveoles by knowing the size and amount of roots of each teeth: incisors and canines of both *Cuon* and *Canis* have one root and the alveole of the canine is much larger than those of the incisors and premolars (alveoles of incisors, canines and P_1 can thus be distinguished from each other). The premolars of both *Cuon* and *Canis* possess: P_1: one root[5,6,7]; P_2, P_3 and P_4: two roots[5,6,7]. The premolar alveoles are small and rounded compared to the alveole of M_1. The M_1 of *Cuon* and *Canis* possess two very large, well developed roots and the M_2 of *Cuon* and *Canis* possess two smaller roots[5,6]. In *Cuon* the roots of the M_2 can be merged. The genus *Canis* also possesses an M_3 with one small and rounded root[5,7]. The size and amount of roots can thus also be used to distinguish between premolars and molars.
Height of the crown of a specified tooth	Parameter of the height of the crown of P_1, P_4 and M_1 (in mm), measured from the top of the principal conid to just below the cingulum, at the position of the center of the alveolar process of that tooth, with the caliper being parallel to the tooth. This parameter was not taken for teeth with severely worn cusps and crowns.
Length of a specified tooth	Parameter of the maximum mesial-distal length of M_1 and M_2 taken on the occlusal surface (in mm). For M_1 this length is defined as a line along the center of the tooth over the main cusps, mesially from the margin of the tooth anterior of the paraconid to distally the margin of the tooth posterior of the hypoconid. For M_2 this length is defined as a line along the center of the tooth over the main cusps, mesially from the margin of the tooth anterior of the protoconid to distally the middle of the margin of the tooth (which is different for different species: the distal middle of the margin of the tooth for *Cuon* is as described above and not further specified, but for *Canis* this middle is positioned behind the hypoconid)[8].
Breadth of a specified tooth	Parameter of the maximum buccal-lingual width of M_1 and M_2, taken on the occlusal surface (in mm). Measured along the thickest part of the tooth: at the position of the protoconid (the principal cusp of the trigonid) for both the M_1 and M_2.

Box IV.4: Parameters concerning teeth (continued)	
Cusps of the premolars	Record of the absence, presence and state of the different cusps that can be present on the premolars of *Cuon* and *Canis* (box III.3). The following information was recorded: The P_1 of *Cuon* and *Canis* always has one principal cusp, the protoconid, which can be flattened (as in *Canis*) or more conical/pointy (as in *Cuon*)[5]. The P_2 of *Cuon* and *Canis* possesses one principal cusp (protoconid), which was recorded as present or absent, and several accessory cusps: mesiallly the parastylid, a cingulum or no mesial feature and distally the metastylid, which was recorded as present or absent[5]. The P_3 and P_4 of *Cuon* and *Canis* possess one principal cusp (protoconid), which was recorded as present or absent, and several accessory cusps: mesiallly the parastylid, a cingulum or no mesial feature and distally a metastylid, which was recorded as present or absent, a metaconulid, a cingulum or no distal feature[5,6].
Cusps of the molars	Record of the absence, presence and state of the different cusps that can be present on the molars of *Cuon* and *Canis* (box III.3 and fig. IV.1). This parameter was only taken for the M_1 and M_2, because *Cuon* does not possess an M_3. The following information was recorded: M_1: protoconid (present/absent); paraconid (present/absent), metaconid (present/absent), hypoconid (present/absent) and entoconid (present/absent). M_2: protoconid (present/absent), metaconid (present/absent), hypoconid (present/absent). When a cusp was present, but not well developed or positioned differently than the typical position of that cusp, it was recorded as: weak, edge or centered respectively.

Appendix IVb: Planches 6 and 7 (Hue, 1907)

PLANCHE 6.

PROFIL INTERNE DE LA MANDIBULE

(CHIEN)

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a. Apophyse mandibulaire. — b. Bord antérieur de la symphise mandibulaire. — c. Centre du condyle. — d. Angle postérieur de l'apophyse coronoïde. — e. Sommet de l'apophyse coronoïde. — m. Trou maxillaire postérieur. — ʋ. *Angle coronoïde.*

Divisions dentaires : *pa.* Paraconide. — *pr.* Protoconide. — *mc.* Métaconide. — *hy.* Hypoconide. — *en.* Entoconide. — *hyc.* Hypoconulide.

I. Incisive. — C. Canine. — Pm. Prémolaire. — M. Molaire.

a Angular process.
b Anterior point of the mandibular symphyse.
c Center of the condylar process.
d Angle posterior of the coronoid process.
e Apex of the coronoid process.
m Mandibular foramen.
ν Coronoid angle.

MENSURATIONS

Mensurations longitudinales.

a.b. longueur de la mandibule : prise du milieu du bord postérieur de l'apophyse mandibulaire (*gonion*) au bord antérieur de la symphise mandibulaire (corde gonio-symphysienne).

c.b. longueur prise du milieu postérieur du condyle au bord antérieur de la symphise mandibulaire.

Mensurations verticales.

a.d. distance du milieu du bord postérieur de l'apophyse mandibulaire à l'angle postérieur de l'apophyse coronoïde.

e.e'. dimension verticale de la branche montante de la mandibule, suivant une perpendiculaire à la ligne qui va du bord postérieur de l'apophyse mandibulaire au bord antérieur de la symphise mandibulaire. Cette perpendiculaire passe par le bord antérieur du trou maxillaire postérieur.

g.g'. hauteur de la branche horizontale de la mandibule, prise au milieu de l'apophyse alvéolaire de M' (hauteur molaire).

g-g' = *h-h'* M_1 in this thesis

h.h'. hauteur de la branche horizontale de la mandibule, prise au niveau de la partie postérieure de la symphise.

ʋ. *Angle coronoïde.* A. Ligne allant du milieu du bord postérieur de l'apophyse mandibulaire au bord antérieur de la symphise mandibulaire.

B. Ligne du bord antérieur de la branche montante de la mandibule (apophyse coronoïde).

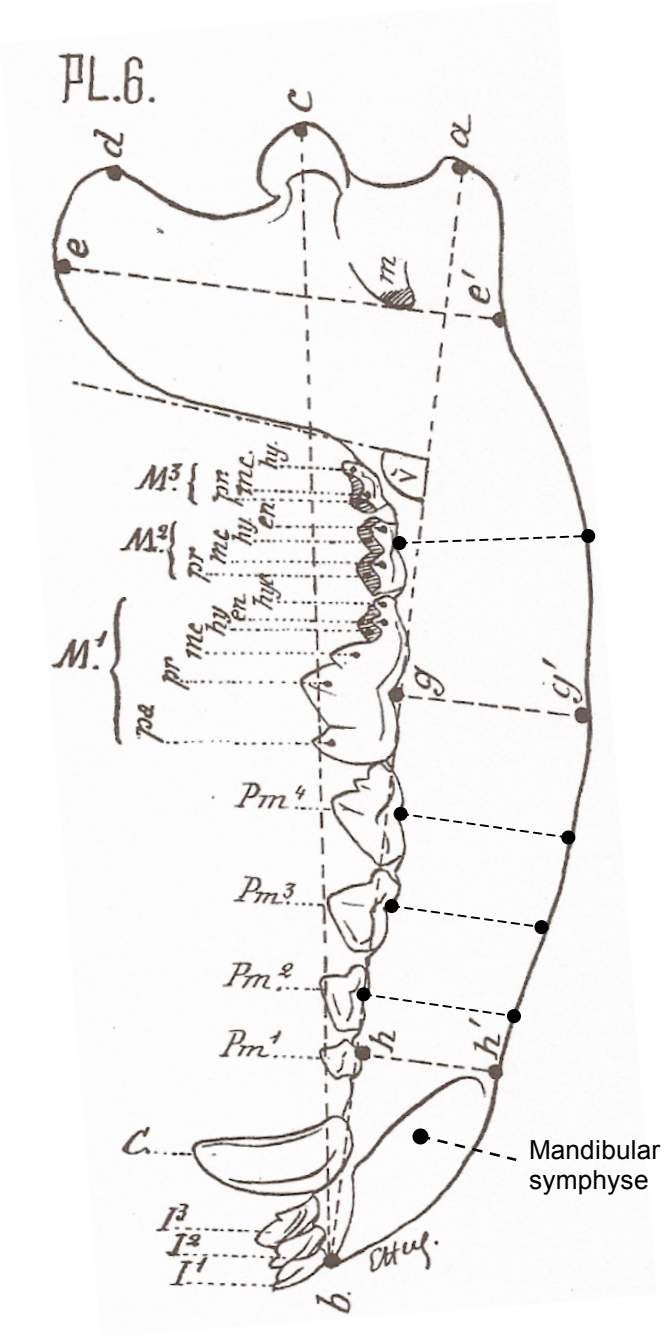

Figure IV.1: Planche 6 from Hue (1907) indicating several morphological and osteometrical parameters that can be taken on a hemimandible. Adapted from Hue (1907).

PLANCHE 7.

TABLE DENTAIRE

(CHIEN)

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a. Apophyse mandibulaire. — b. Bord antérieur de la symphise mandibulaire. — c. Centre du condyle. — k. Bord postérieur de la symphise mandibulaire.

β — *Angle mandibulaire.*

Divisions dentaires : pa. Paraconide. — pr. Protoconide. — mc. Metaconide. — hy. Hypoconide. — en. Entoconide. — hyc. Hypoconulide.

I. Incisive. — C. Canine. — Pm. Prémolaire. — M. Molaire.

a Angular process.
b Anterior point of the mandibular symphyse.
c Center of the condylar process.
k Posterior point of the mandibular symphyse.

MENSURATIONS

MENSURATIONS TRANSVERSALES.

c.c′. distance entre les centres des surfaces condyliennes.

i.i′. épaisseur de la branche horizontale de la mandibule au niveau du milieu de M¹.

k.k′. épaisseur de la branche horizontale de la mandibule au niveau de la partie postérieure de la symphise.

l.l′. dimensions du corps mandibulaire : entre la symphise et le milieu du bord externe de l'alvéole de la canine.

m.m′. Longueur du condyle.

β. *Angle mandibulaire.* — A. ligne passant par le milieu de l'alvéole de la dent la plus postérieure et la partie antérieure de la symphyse mandibulaire. — B. Même ligne pour la deuxième branche du maxillaire inférieur.

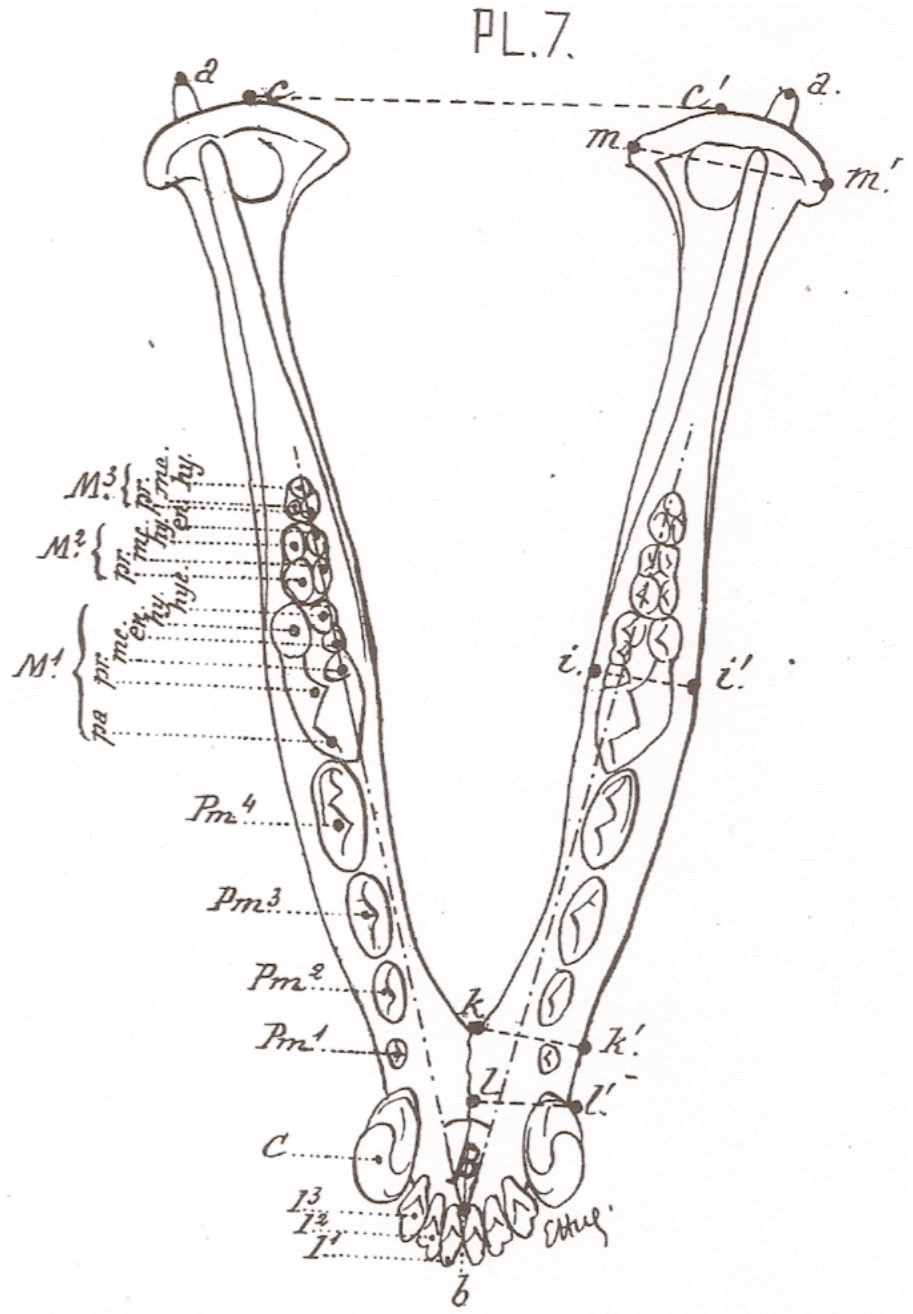

Figure IV.2: Planche 7 from Hue (1907) indicating several morphological and osteometrical parameters that can be taken on a hemimandible.

Appendix IVc: Figure of the parameters from Ripoll et al. (2010)

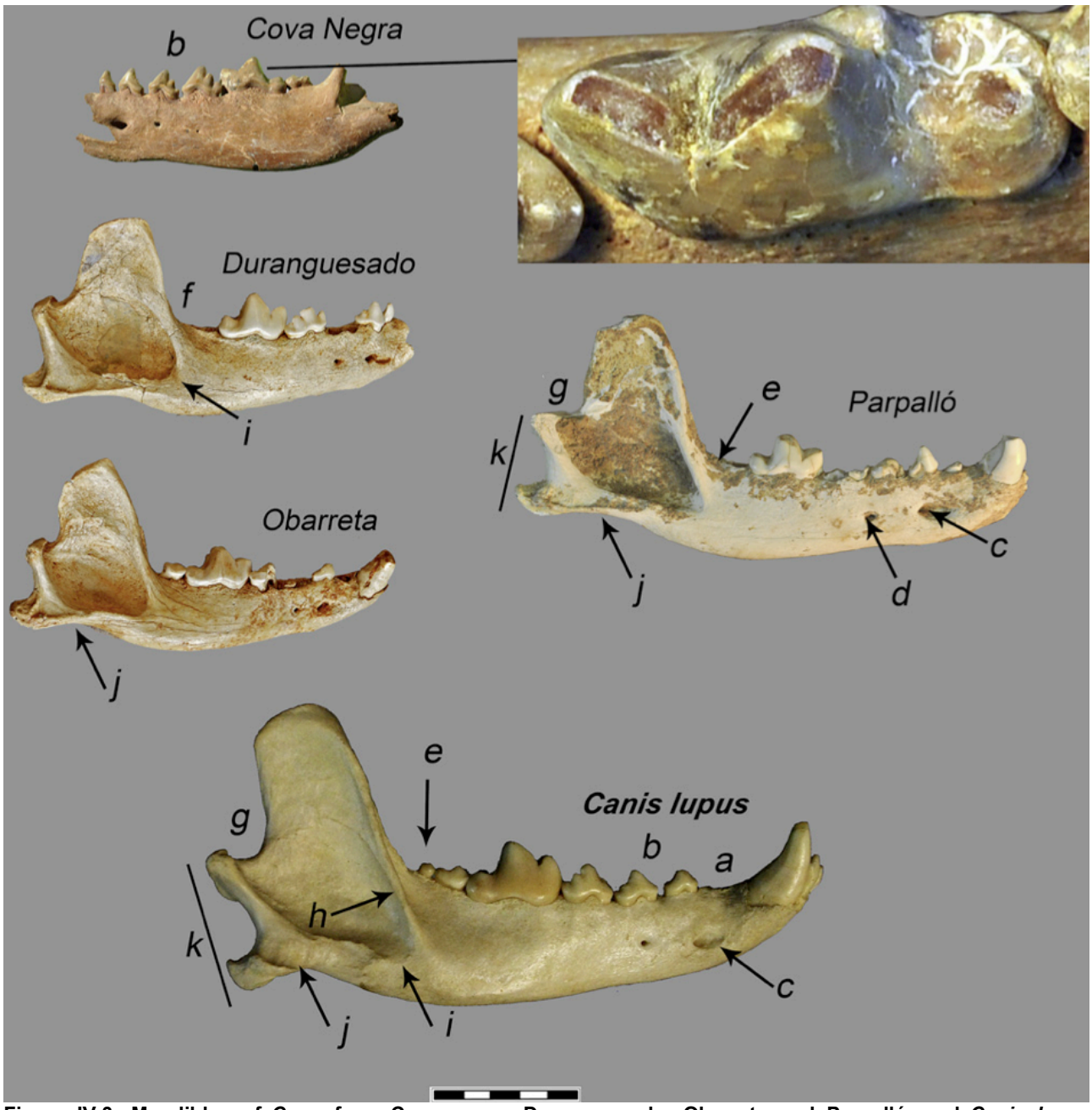

Figure IV.3: Mandibles of *Cuon* from Cova negra, Duranguesado, Obarreta and Parpalló, and *Canis lupus* (down). This figure illustrates the typical morphological differences between *Cuon* and *Canis*. The meaning of the letters is as follows (and is not necessarily consistent with the letters as used in the parameters of this study): a: diastema C-P_1; b: diastema P_2-P_3; c: middle mental foramen; d: posterior mental foramen; e: M_3; f: angle between the coronoid process and the body of the mandible; g: aboral border of the ramus; h: anterior border of the coronoid process; i: basal region of the masseteric fossa; j: angular process; k: relation between angular process and mandibular condyle. This figure is Fig. 10 from Pérez Ripoll et al. (2010).

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[1] Measured in accordance to Hue (1907)

[2] Parameter based on Ripoll et all. (2010)

[3] Parameter based on the definition of the parameter 'Alveolar length of a specified tooth row'

[4] Parameter based on García and Arsuaga (1998)

[5] Ripoll et all. (2010)

[6] Thenius (1989)

[7] García and Arsuaga (1998)

[8] Parameter based on Swindler (2002)

Appendix V: Margin of error on *Canis l. lupus* specimen RMNH43492

Table V.1: 10 repeated measurements on comparative *C. l. lupus* specimen RMNH43492 for 10 parameters (12 subparameters) including statistics (in mm)

	Length mandible		Width mandible		Distance		Coronoid	Height *h-h'*	Alv. Length	Height crown	Length	Breadth
Reg. no.	***a-b***	***c-b***	***i-i'***	***k-k'***	***a-d***	***e-e'***	**angle**	**M1**	**P1-M2**	**M1**	**M1**	**M1**
RMNH43492	160	161	13,42	11,75	47,32	66,62	105	26,25	82,29	17,68	27,19	10,80
RMNH43492	160	161	13,30	11,79	46,82	67,31	105	26,03	82,32	17,53	28,13	10,84
RMNH43492	161	161	13,22	12,57	47,05	69,24	105	26,02	82,42	17,62	27,27	10,89
RMNH43492	160	161	13,23	12,06	48,17	68,21	106	26,06	82,50	17,61	27,31	10,70
RMNH43492	161	162	13,32	11,77	46,93	67,88	106	26,10	82,28	17,45	27,79	10,65
RMNH43492	160	162	13,31	12,24	48,06	69,97	107	26,05	82,26	17,53	28,08	10,69
RMNH43492	161	162	13,16	12,37	47,72	68,20	108	25,84	82,40	17,65	27,00	10,94
RMNH43492	160	161	13,24	12,51	46,98	67,86	109	25,79	82,17	17,49	28,12	10,58
RMNH43492	160	162	13,21	12,63	47,85	68,80	108	25,98	82,35	17,55	27,17	10,88
RMNH43492	161	161	13,24	12,11	48,69	68,82	108	25,79	82,24	17,56	27,76	10,77
AVERAGE	**160,4**	**161,4**	**13,27**	**12,18**	**47,56**	**68,29**	**107**	**25,99**	**82,32**	**17,57**	**27,58**	**10,77**
MIN	**160**	**161**	**13,16**	**11,75**	**46,82**	**66,62**	**105**	**25,79**	**82,17**	**17,45**	**27,00**	**10,58**
MAX	**161**	**162**	**13,42**	**12,63**	**48,69**	**69,97**	**109**	**26,25**	**82,50**	**17,68**	**28,13**	**10,94**
ΔMAX-MIN	**1**	**1**	**0,26**	**0,88**	**1,87**	**3,35**	**4**	**0,46**	**0,33**	**0,23**	**1,13**	**0,36**
STDEVP	**0,49**	**0,49**	**0,07**	**0,32**	**0,60**	**0,92**	**1,42**	**0,14**	**0,09**	**0,07**	**0,42**	**0,11**

Table V.2: Summary of table V.1 including calculation of the margin of error (2*STDEVP) (in mm).

Parameters	**ΔMAX-MIN**	**STDEVP**	**2*STDEVP**
Coronoid angle ν (°)	4	1,42	3
Distance *e-e'*	3,35	0,92	1,83
Distance *a-d*	1,87	0,60	1,20
Length mandible *a-b*	1	0,49	0,98
Length mandible *c-b*	1	0,49	0,98
Length M1	1,13	0,42	0,84
Width mandible *k-k'*	0,88	0,32	0,64
Height *h-h'* M1	0,46	0,14	0,28
Breadth M1	0,36	0,11	0,22
Alveolar length P1-M2	0,33	0,09	0,18
Width mandible *i-I'*	0,26	0,07	0,14
Height crown M1	0,23	0,07	0,14

Legend	
Reg. No	registration number of the fossil specimen
AVERAGE	arithmetic mean of the 10 repeated measurements (box VI.1)
MIN	the smallest value in this set of values (box VI.1)
MAX	the largest value in this set of values (box VI.1)
ΔMAX-MIN	difference between MIN and MAX
STDEVP	population standard deviation (appendix VI)
2*STDEVP	margin of error (2.2.3)

Appendix VI: Statistics

Box VI.1: Definitions and terminology	
Argument	An independent variable on which a function's variable depends[1].
Arithmetic mean (x)	The value obtained by dividing the sum of a set of quantities by the number of quantities in the set. Also termed: average or mean[2].
Dispersion	The degree of scatter of data about the average value i.e. variation from the mean[3].
MAX	The largest value in a set of values.
MIN	The smallest value in a set of values.
Sample size (n)	The number of individual data points in a set.
Standard deviation (SD)	A statistic that is used as a parameter of the dispersion from the arithmetic mean of a distribution[4].

Standard deviation

One way of describing the standard deviation is that the SD (box VI.1) is the average deviation from the arithmetic mean (box VI.1) of a dataset (see the formula's in the next paragraph 'Calculation of the SD'). The standard deviation itself (a number) indicates whether the dispersion (box VI.1) of data points from the arithmetic mean in a distribution is high or low: a low SD indicates that the data points lie close to the mean and a high SD indicates that the data points lie far from the mean. This is visualized in a normal distribution ('bell') curve, where a small SD results in a small curve and a large SD in a broad curve (fig. VI.1). The normal distribution is a good approximation of many different naturally occurring distributions[5].

The standard deviation can be used to calculate intervals in a normal distribution in which a fixed percentage of the data lies. If for a given distribution the data are (assumed to be) normally distributed the following holds true (fig. VI.1)[4]:

- 68.26895% of the data in the entire distribution has a value within 1SD from the arithmetic mean (mathematically $\mu \pm SD$);
- 95.44997% of the data in the entire distribution has a value within 2SDs from the arithmetic mean (mathematically $\mu \pm 2SD$);
- 99.73002% of the data in the entire distribution has a value within 3SDs from the arithmetic mean (mathematically $\mu \pm 3SD$).

When taking the example of the 2SD interval, this means that 4.55003% of the data in the entire distribution has a value that falls outside the 2SD confidence interval from the arithmetic mean: approximately 2.3% (4.55003/2) of the data has a value that falls below this interval and approximately 2.3% of the data has a value that falls above this interval.

The probability that an arbitrary data point from this normal distribution falls within or outside the 2SD interval is equal to these percentages: there is approximately a 95% that a data point from the normal distribution falls within the 2SD interval, a 2.3% chance that the data point falls below this interval and a 2.3% chance that the data point falls above this interval[6]. This holds also true for the other SD intervals.

All sites last visited March 20, 2011.

[1] Weisstein, Eric W. "Argument." From *MathWorld*--A Wolfram Web Resource. http://mathworld.wolfram.com/Argument.html

[2] Weisstein, Eric W. 'Arithmetic Mean.' From *MathWorld*--A Wolfram Web Resource. http://mathworld.wolfram.com/ArithmeticMean.html

[3] http://www.thefreedictionary.com/dispersion

[4] Weisstein, Eric W. "Standard Deviation." From *MathWorld*--A Wolfram Web Resource. http://mathworld.wolfram.com/StandardDeviation.html

[5] Weisstein, Eric W. "Normal Distribution." From *MathWorld*--A Wolfram Web Resource. http://mathworld.wolfram.com/NormalDistribution.html

[6] Weisstein, Eric W. "Confidence Interval." From *MathWorld*--A Wolfram Web Resource. http://mathworld.wolfram.com/ConfidenceInterval.html

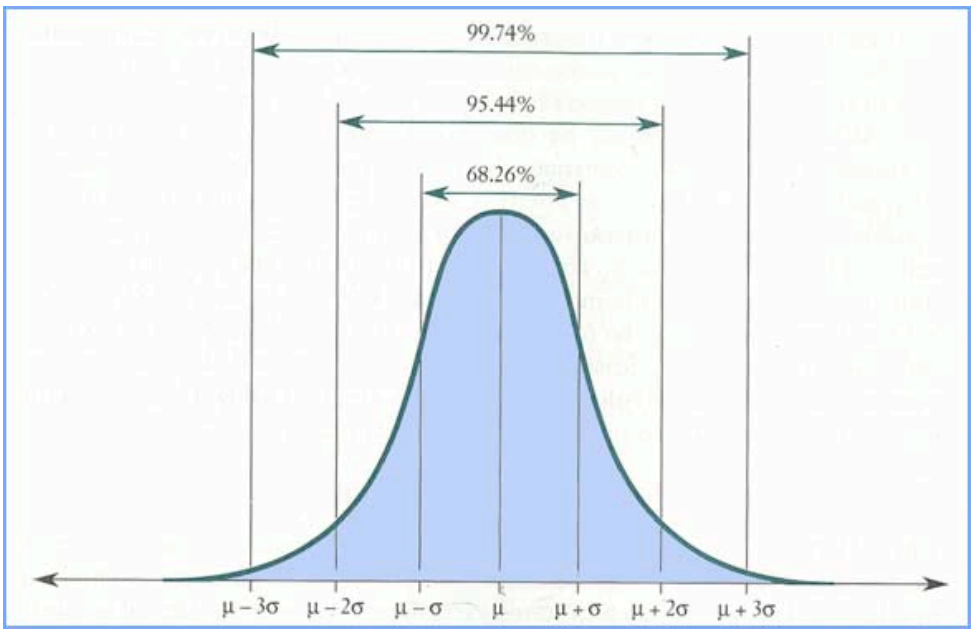

Figure VI.1: Normal distribution plot. The x-axis describes the range of possible values within the distribution and the y-axis describes the corresponding probability of each value to occur in the distribution[5]. μ = arithmetic mean; σ = SD; [μ-σ, μ+σ] = confidence interval of 1SD; [μ-2σ, μ+2σ] = confidence interval of 2SD; [μ-3σ, μ+3σ] = confidence interval of 3SD; 68.26% of the data of the entire distribution has a value within the 1SD confidence interval. This percentage is also the probability that an arbitrary data point from this normal distribution falls within this interval;95.44% of the data of the entire distribution has a value within the 2SD confidence interval. This percentage is also the probability thatan arbitrary data point from this normal distribution falls within this interval; 99.74% of the data of the entire distribution has a value within the 3SD confidence interval. This percentage is also the probability that an arbitrary data point from this normal distribution falls within this interval[6]. (Figure from: http://curvebank.calstatela.edu/gaussdist/normal.jpg).

Calculation of the standard deviation

The standard deviation can be calculated in two different ways (the population standard deviation or the sample standard deviation) depending on whether all arguments (box VI.1) or only a sample of the entire dataset are known.

Population standard deviation (STDEVP)[7]

The population standard deviation calculates the standard deviation based on the entire population given as arguments. The STDEVP is calculated using the 'biased' or 'n' method that assumes that its arguments are the entire population. The STDEVP uses the following formula:

STDEVP $= \sqrt{\frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^2}$ where $n =$ the sample size and $\bar{x}$ = the sample arithmetic mean.

Sample standard deviation (STDEV)[7]

The sample standard deviation estimates the standard deviation based on a sample of the entire population. The STDEV is calculated using the 'unbiased' or 'n-1' method that assumes that its arguments are a sample of the entire population. For large sample size the STDEV and STDEVP return approximately equal values. The STDEV uses the following formula:

STDEV $= \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2}$ where $n =$ the sample size and $\bar{x}$ = the sample arithmetic mean.

[7] Microsoft Office Help, Microsoft Excel 2004 for Mac. Version 11.5.5

Appendix VII: *C. l. familiaris*, fossil NL vs. recent SR

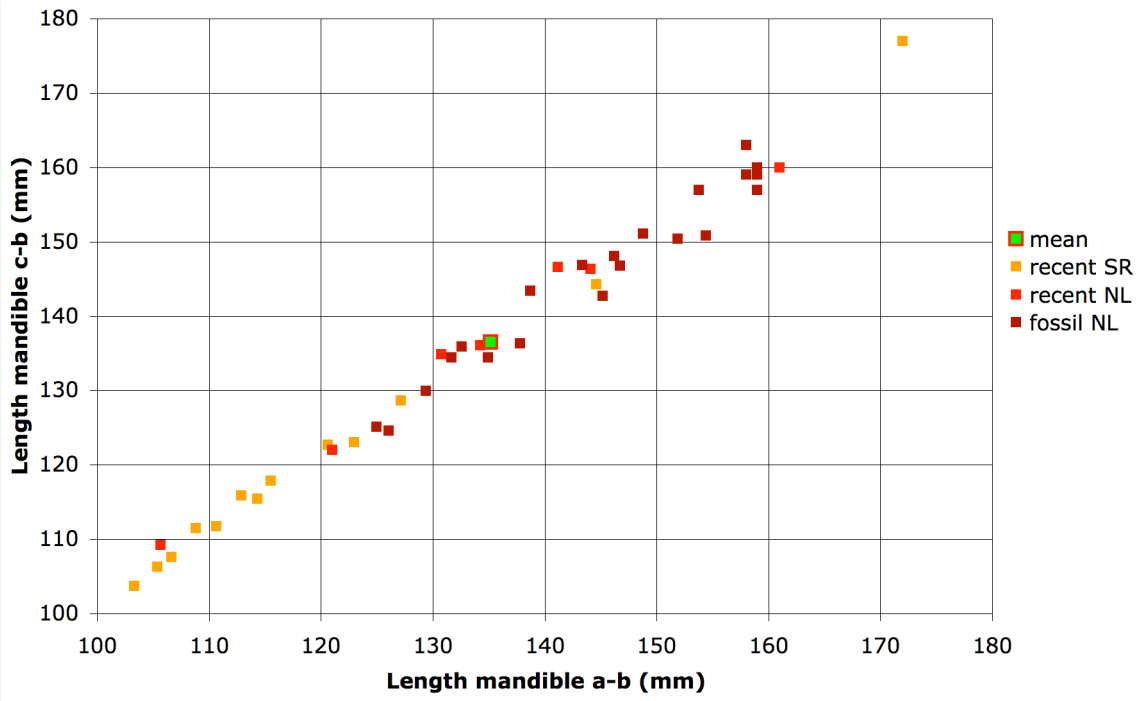

Figure VII.1: Scatter plot of parameters 'Length mandible' *a-b* vs. *c-b* for the comparative *C. l. familiaris* material (in mm). All individual specimens of the comparative *C. l. familiaris* samples for these parameters are plotted (closed squares) as well as the *C. l. familiaris* mean (green filling). A distinction is made between the fossil (Weichselien) specimens from the Netherlands (fossil NL, dark red squares) and the recent specimens from Suriname (recent SR, orange squares). In this graph an additional distinction is made between the recent specimens from the Netherlands (recent NL, red squares) and the recent specimens from Suriname (recent SR). See also: 2.1.2,4.1.1.1, 5.1.1 and 5.2.1.

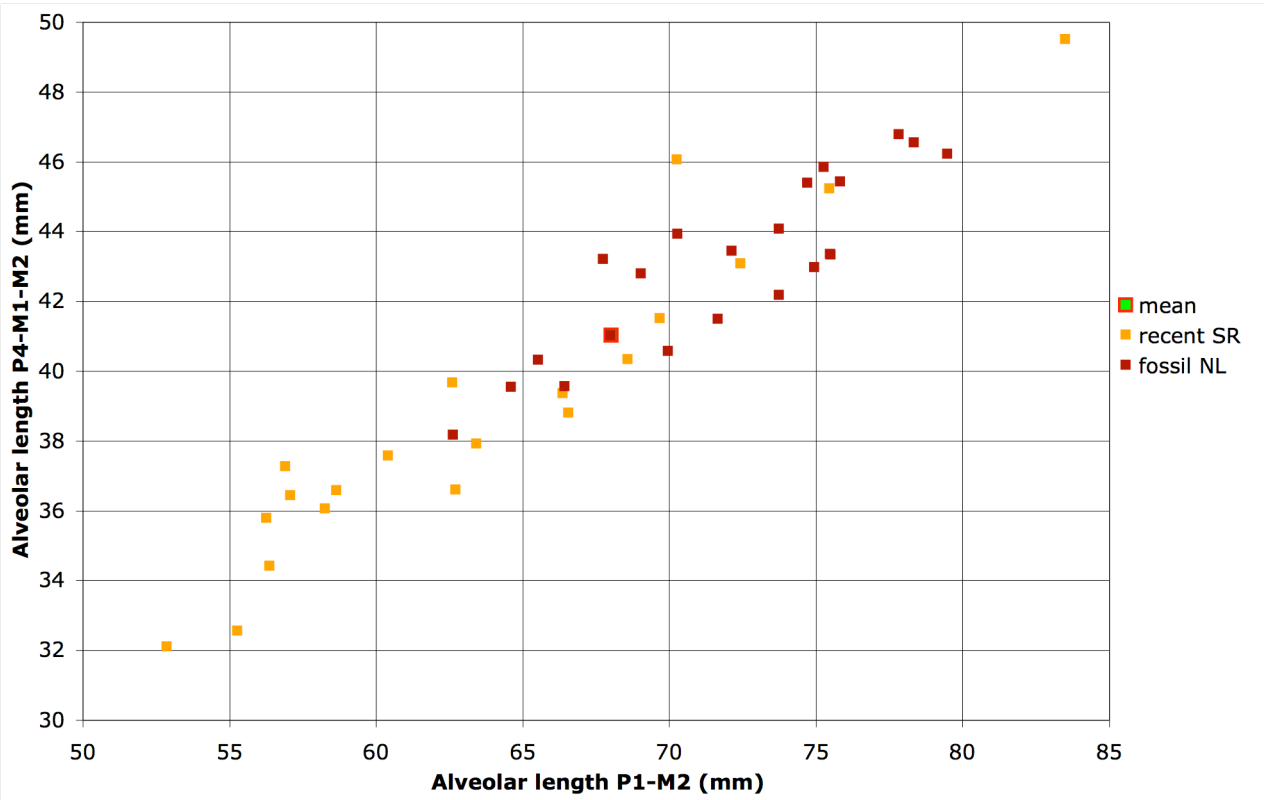

Figure VII.2: Scatter plot of parameters 'Alveolar length' P_1-M_2 vs. P_4-M_2 for the comparative *C. l. familiaris* material (in mm). Legend, see table VII.1. See also: 2.1.2, 4.1.2.1, 5.1.1 and 5.2.2.1.

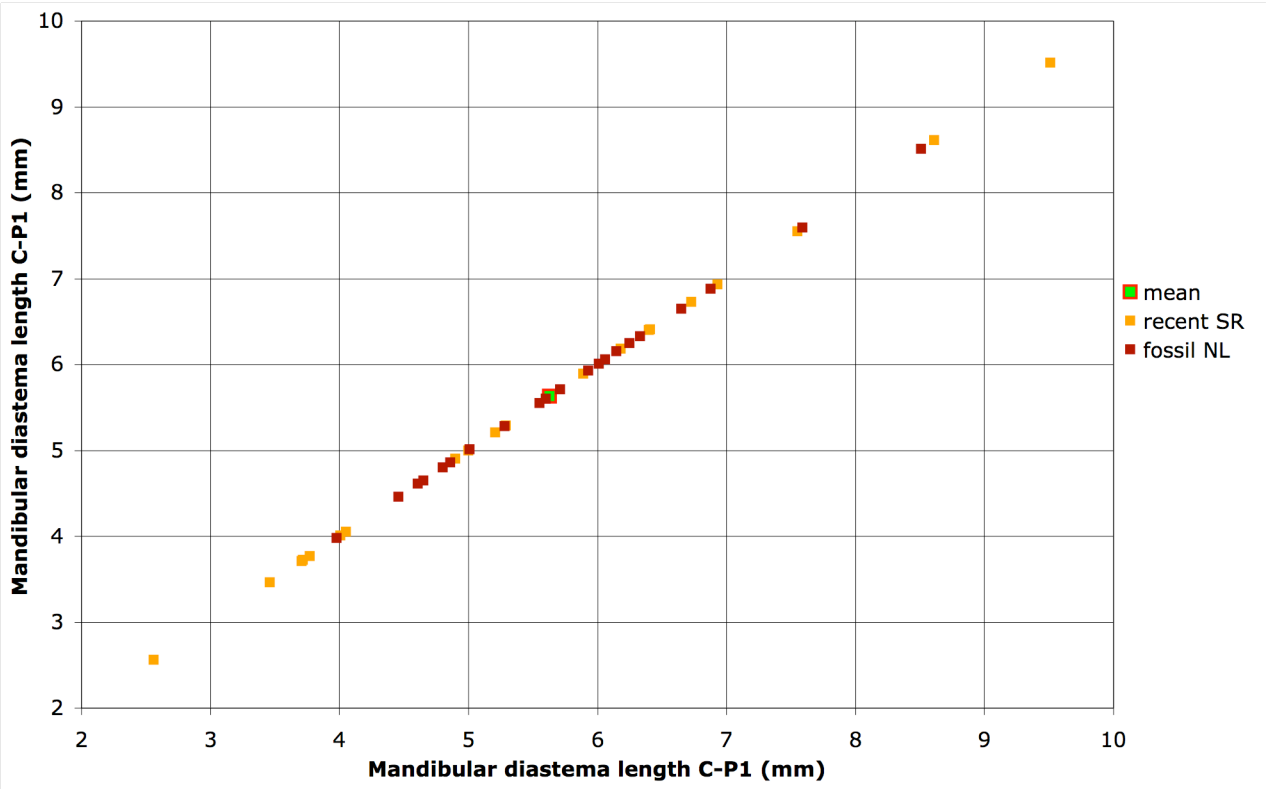

Figure VII.3: Scatter plot of parameter 'Mandibular diastema length' C-P_1 vs. itself for the comparative *C. l. familiaris* material (in mm). Legend, see table VII.1. See also: 2.1.2, 4.1.4.1a, 5.1.1 and 5.2.3.1a

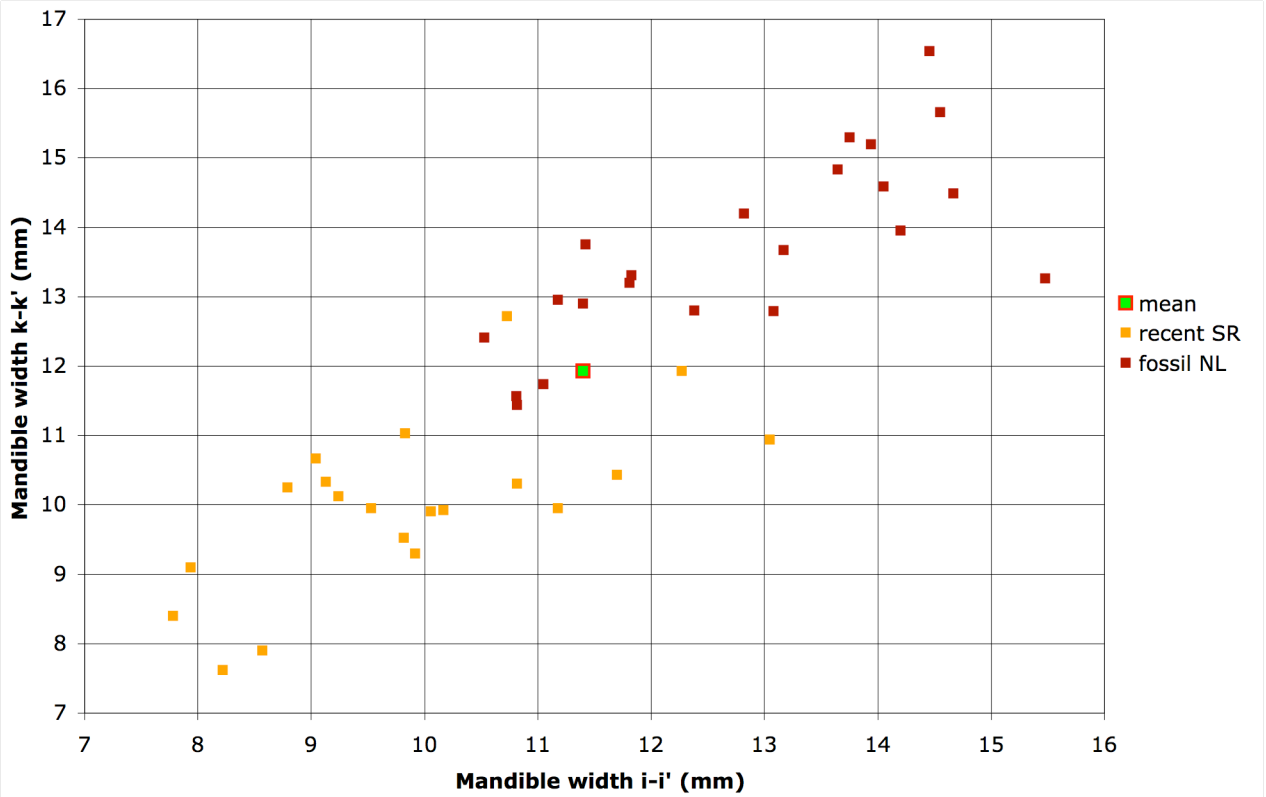

Figure VII.4: Scatter plot of parameters 'Mandible width' *i-i'* vs. *k-k'* for the comparative *C. l. familiaris* material (in mm). Legend, see table VII.1. See also: 2.1.2, 4.2.1.1, 5.1.1 and 5.3.1.1.

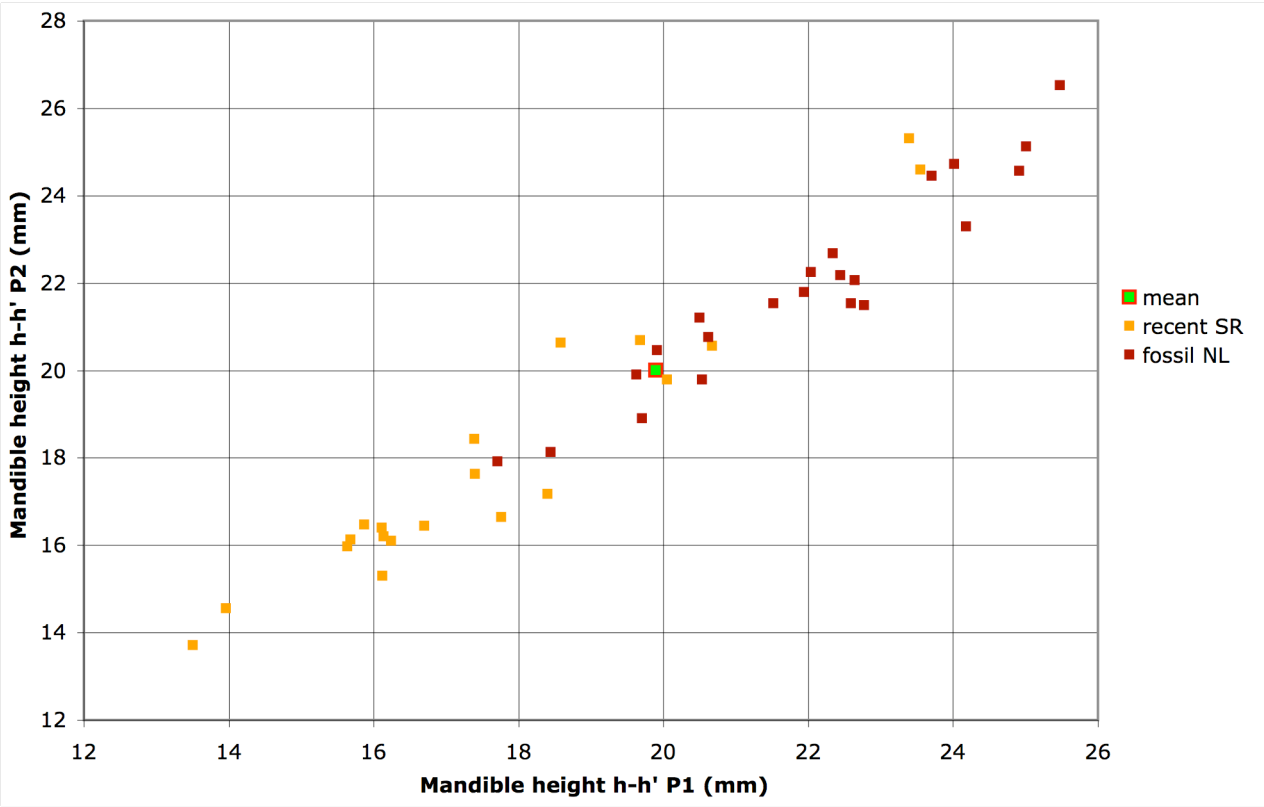

Figure VII.5: Scatter plot of parameter 'Mandible height' *h-h'* P_1 vs. P_2 for the comparative *C. l. familiaris* material (in mm). Legend, see table VII.1. See also: 2.1.2, 4.2.2.1, 5.1.1 and 5.3.2

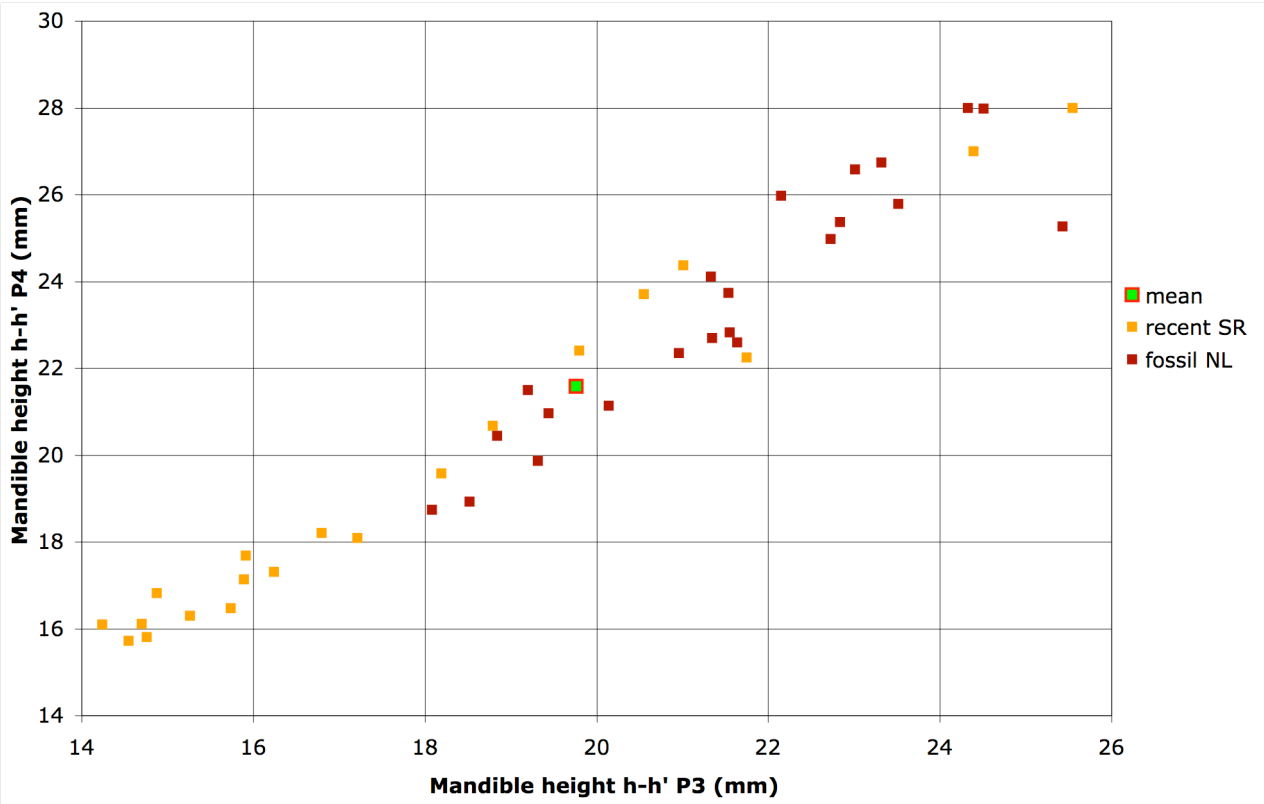

Figure VII.6: Scatter plot of parameter 'Mandible height' *h-h'* P_3 vs. P_4 for the comparative *C. l. familiaris* material (in mm). Legend, see table VII.1. See also: 2.1.2, 4.2.3.1, 5.1.1 and 5.3.2.

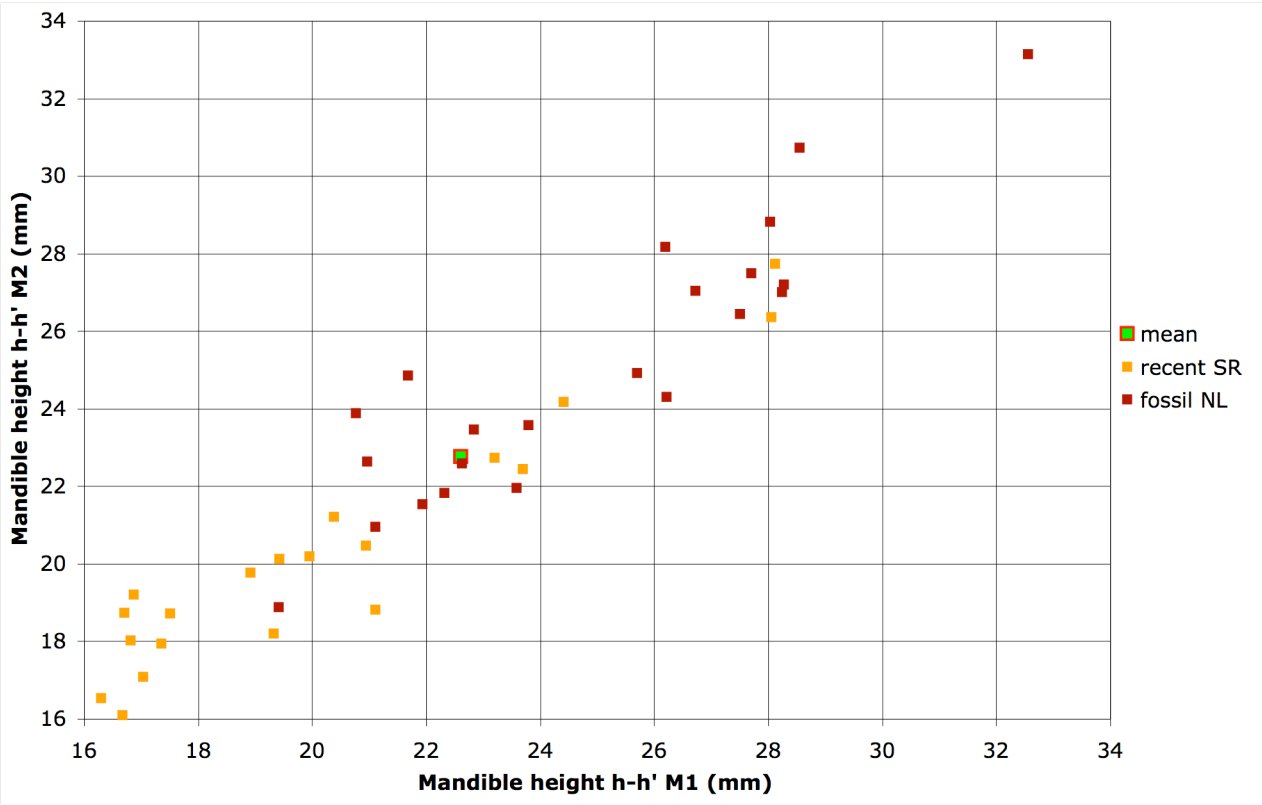

Figure VII.7: Scatter plot of parameter 'Mandible height' *h-h'* M_1 vs. M_2 for the comparative *C. l. familiaris* material (in mm). Legend, see table VII.1. See also: 2.1.2, 4.2.4.1, 5.1.1 and 5.3.2.

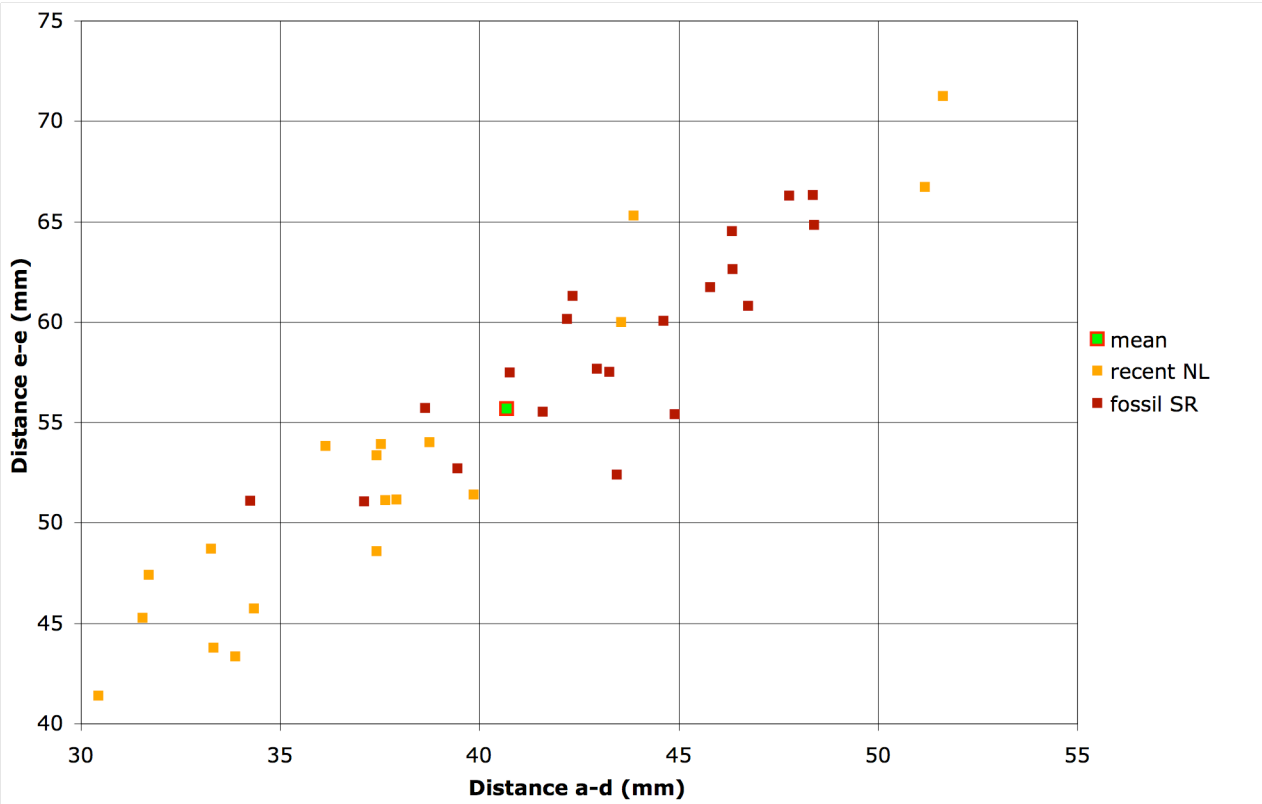

Figure VII.8: Scatter plot of parameter 'Distance' *a-d* vs. *e-e'* for the comparative *C. l. familiaris* material (in mm). Legend, see table VII.1. See also: 2.1.2, 4.3.1.1, 5.1.1 and 5.4.1.1.

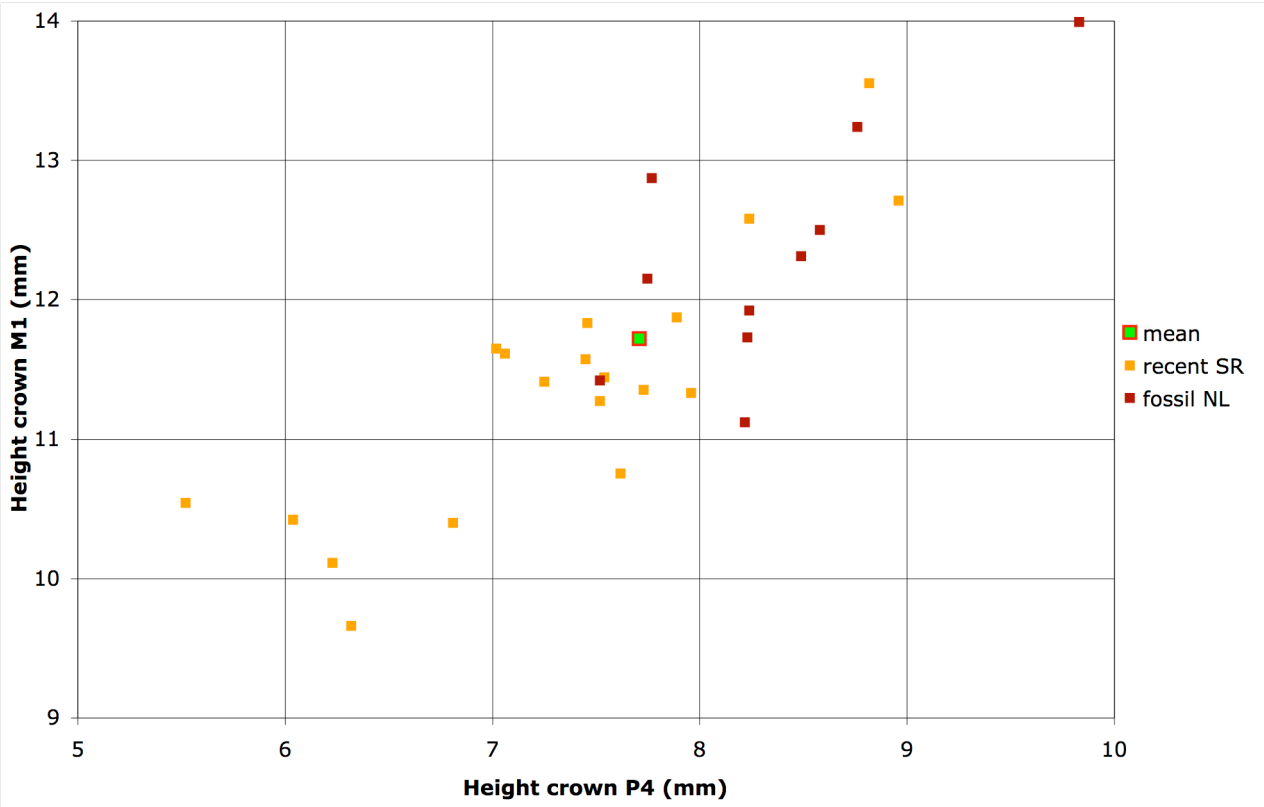

Figure VII.9: Scatter plot of parameter 'Height crown' P_4 vs. M_1 for the comparative *C. l. familiaris* material (in mm). Legend, see table VII.1. See also: 2.1.2, 4.4.2.2a, 5.1.1 and 5.5.2.1.

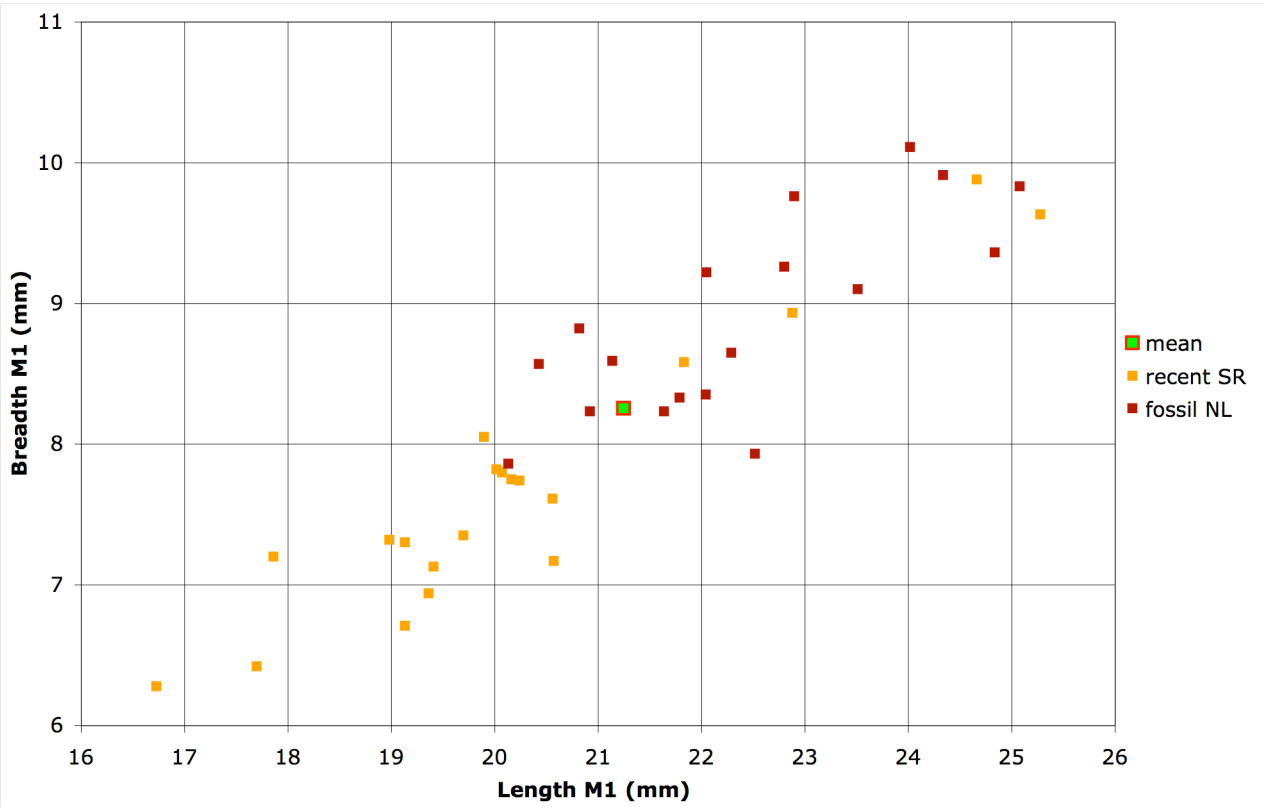

Figure VII.10: Scatter plot of parameter 'Length' M_1 vs. 'Breadth' M_1 for the comparative *C. l. familiaris* material (in mm). Legend, see table VII.1. See also: 2.1.2, 4.4.3.1a, 5.1.1 and 5.5.3.

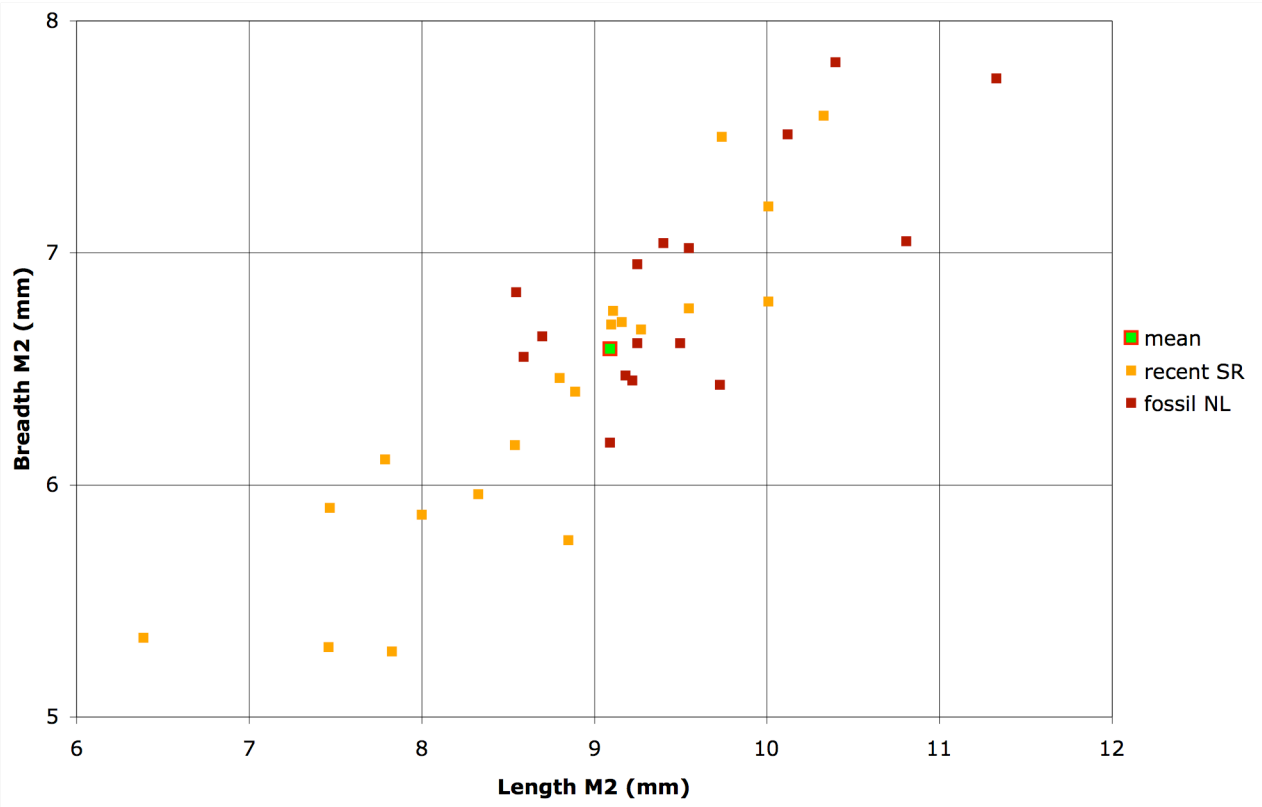

Figure VII.11: Scatter plot of parameter 'Length' M_2 vs. 'Breadth' M_2 for the comparative *C. l. familiaris* material (in mm). Legend, see table VII.1. See also: 2.1.2, 4.4.3.2a, 5.1.1 and 5.5.3.

Appendix VIII: Scatter plots including trend lines

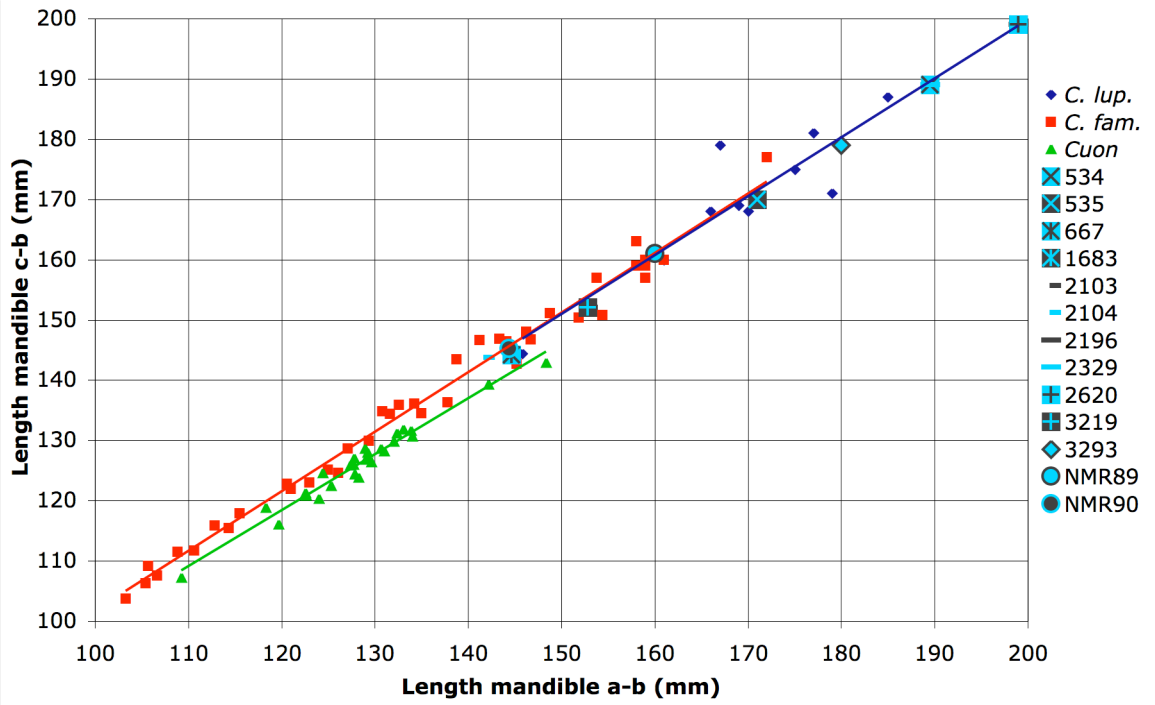

Figure VIII.1: Scatter plot of parameters 'Length mandible' *a-b* vs. *c-b* for the fossil North Sea specimens and the comparative material including trend lines (in mm). Blue trend line for *C. l. lupus*, red trend line for *C. l. familiaris* and green trend line for *Cuon alpinus*. All trend lines are calculated with the standard linear regression function of Excel of the form of y = a*x* + b. Legend, see tables 4.1 and 4.2. See also: 4.1.1.1.

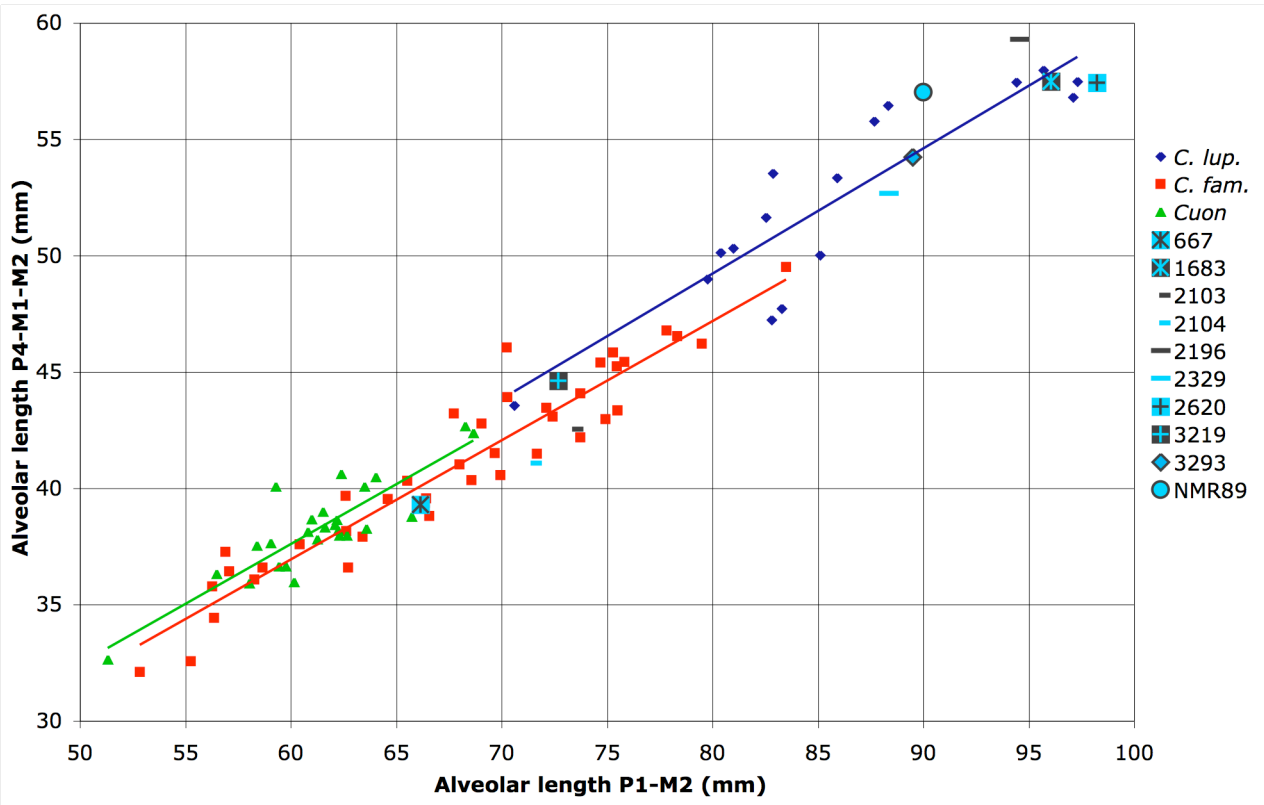

Figure VIII.2: Scatter plot of parameters 'Alveolar length' P_1-M_2 vs. P_4-M_2 for the fossil North Sea specimens and the comparative material including trend lines (in mm). Legend, see fig. VIII.1. See also: 4.1.2.1.

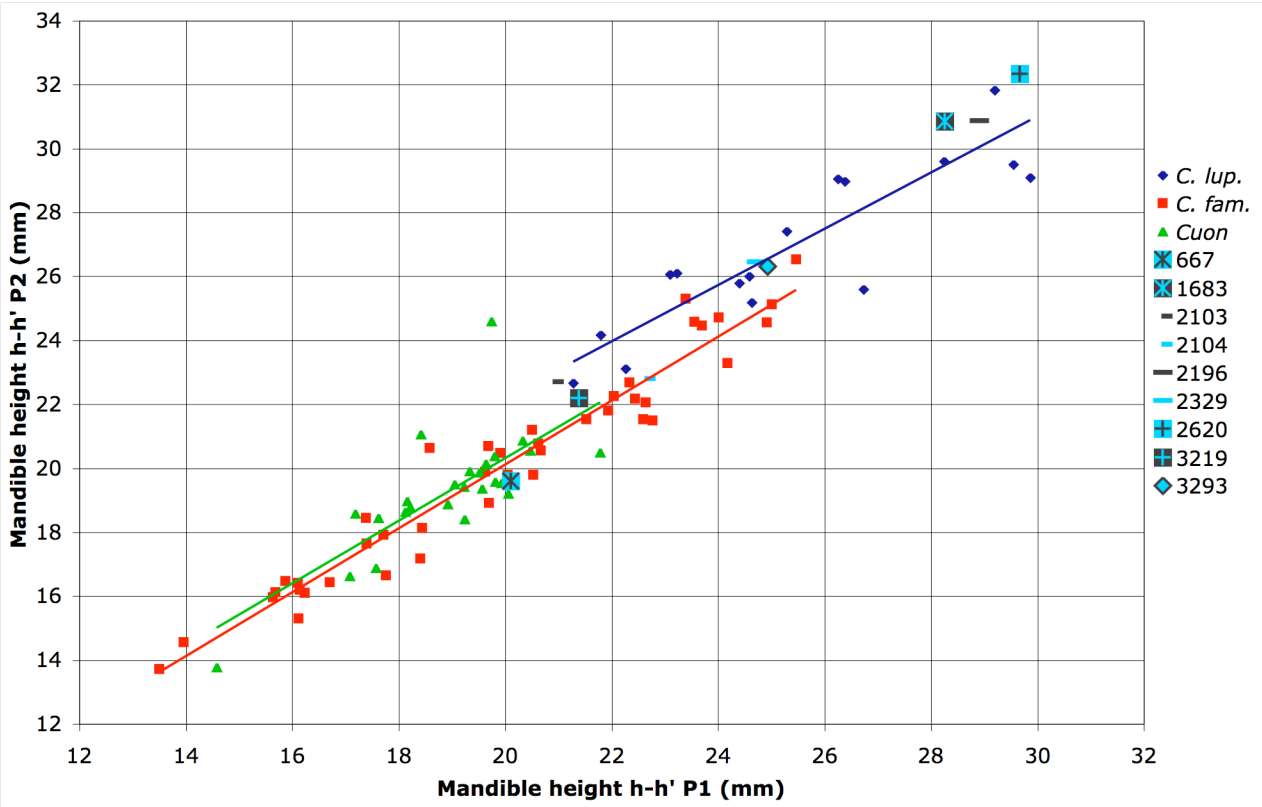

Figure VIII.3: Scatter plot of parameters 'Mandible height' *h-h'* P_1 vs. P_2 for the fossil North Sea specimens and the comparative material including trend lines (in mm). Legend, see fig. VIII.1. See also: 4.2.2.1.

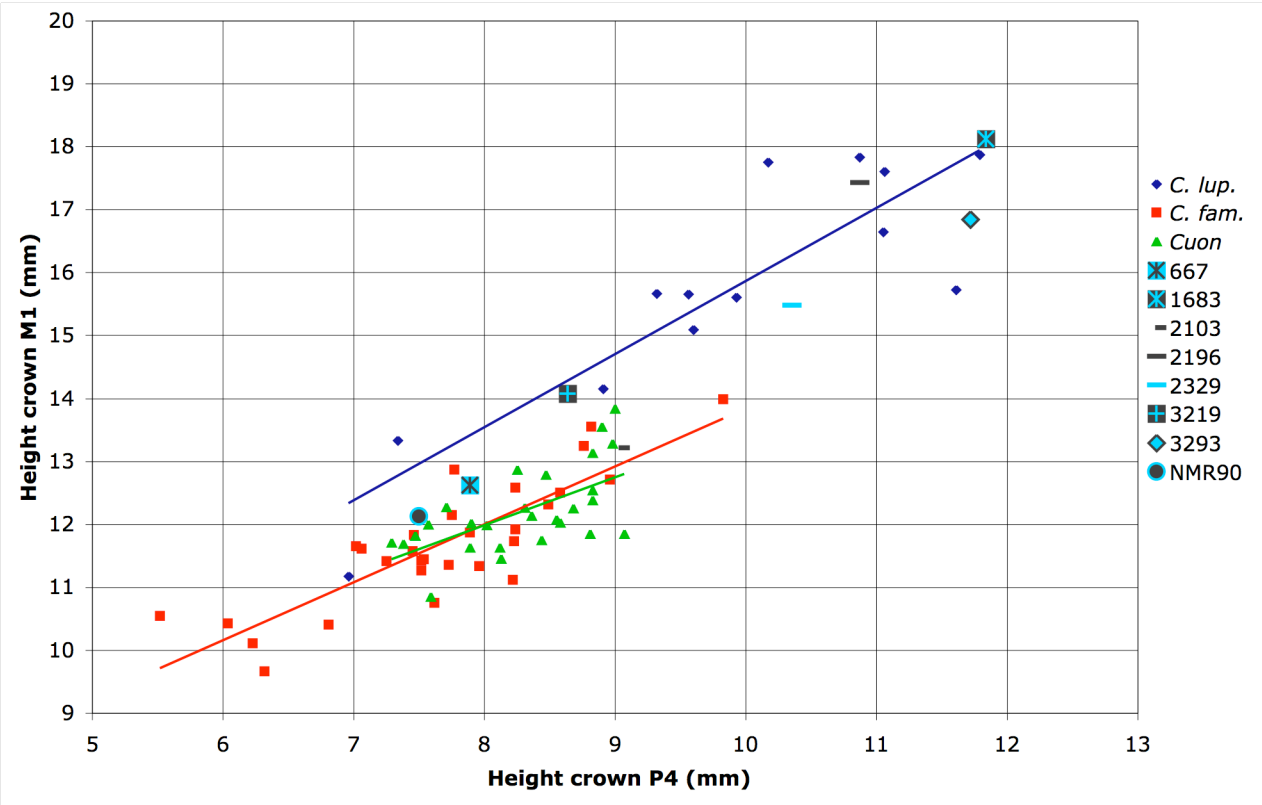

Figure VIII.4: Scatter plot of parameters 'Height crown' P_4 vs. M_1 for the fossil North Sea specimens and the comparative material including trend lines (in mm). Legend, see fig. VIII.1. See also: 4.4.2.2a.

Appendix IX: Literature values and new statistics

Alveolar lengths P_1-M_2 and M_1-M_2

Table IX.1: Values of the parameters 'Alveolar length' P_1-M_2 and M_1-M_2 for 6 *Cuon alpinus* specimens from Pérez Ripoll et al. (2010) (table 8, therein) (in mm).

Specimen	Alveolar length P_1-M_2	Alveolar length M_1-M_2
Par left (Pérez Ripoll et al., 2010)	72,50	29,74
CN (Pérez Ripoll et al., 2010)	77,10	34,10
TG1 (Pérez Ripoll et al., 2010)	72,80	31,00
TG3 (Pérez Ripoll et al., 2010)	73,90	32,40
Obar (Pérez Ripoll et al., 2010)	67,00	32,50
Dur (Pérez Ripoll et al., 2010)	67,61	31,51

Table IX.2: New statistics of the parameters 'Alveolar length' P_1-M_2 (left) and and M_1-M_2 (right) of the comparative *Cuon alpinus* material (in mm). The new statistics were calculated after including the 6 *Cuon alpinus* values from literature (given in table IX.1) in the comparative dataset. Legend: see table 4.1.

Statistics	Alveolar length P_1-M_2	Alveolar length M_1-M_2
Sample size (n)	32	33
Sample mean (x)	63,33	28,86
Standard deviation (SD)	5,42	2,06
Minimum (MIN)	51,32	23,51
Maximum (MAX)	77,10	34,10
Sample range MIN	51,14	23,33
Sample range MAX	77,10	34,10
Population range MIN	52,49	24,74
Population range MAX	74,18	32,98

Mandible height *h-h'* under M_1

Table IX.3: Values of the parameter 'Mandible height *h-h"* M_1 for 11 *Cuon alpinus* specimens from Pérez Ripoll et al. (2010) (table 8, therein) and Adam (1959) (tabelle 1&2 therein) (in mm).

Specimen	Mandible height *h-h'* M_1
Par left (Pérez Ripoll et al., 2010)	27,78
CN (Pérez Ripoll et al., 2010)	28,12
LC (Pérez Ripoll et al., 2010)	24,80
Obar (Pérez Ripoll et al., 2010)	24,00
Dur (Pérez Ripoll et al., 2010)	27,87
Cuon alpinus fossilis (Adam, 1959)	28,50
Cuon alpinus priscus (Adam, 1959)	27,50
Cuon alpinus fossilis (Adam, 1959)	28,50
Cuon alpinus europaeus (Adam, 1959)	26,00
Cuon alpinus europaeus (Adam, 1959)	30,00
Cuon alpinus europaeus (Adam, 1959)	26,00

Table IX.4: New statistics of the parameter 'Mandible height *h-h'* M_1 of the comparative *Cuon alpinus* material (in mm). The new statistics were calculated after including the 11 *Cuon alpinus* values from literature (given in table IX.3) in the comparative dataset. Legend: see table 4.1.

Statistics	Mandible height *h-h'* M_1
Sample size (n)	38
Sample mean (x)	22,87
Standard deviation (SD)	3,10
Minimum (MIN)	19,26
Maximum (MAX)	30,00
Sample range MIN	18,98
Sample range MAX	30,00
Population range MIN	16,67
Population range MAX	29,07

Length M_1, Breadth M_1 and Breadth M_2

Table IX.5: Values of the parameters 'Length' M_1, 'Breadth' M_1 and 'Breadth' M_2 for 29 *Cuon alpinus* specimens from Pérez Ripoll et al. (2010) (table 8, therein) and Adam (1959) (tabelle 1&2 therein) (in mm).

Specimen	Length M_1	Breadth M_1	Breadth M_2
CN (Pérez Ripoll et al., 2010)	24,80	9,70	7,10
Obar (Pérez Ripoll et al., 2010)	23,00	8,60	6,20
Dur (Pérez Ripoll et al., 2010)	22,89	9,17	-
Ama (Pérez Ripoll et al., 2010)	22,70	9,00	-
TG1 (Pérez Ripoll et al., 2010)	22,20	8,70	-
TG2 (Pérez Ripoll et al., 2010)	23,60	8,90	6,60
TG3 (Pérez Ripoll et al., 2010)	24,20	9,60	-
Cuon alpinus fossilis (Adam, 1959)	24,00	9,00	7,20
Cuon alpinus fossilis (Adam, 1959)	24,50	9,00	6,50
Cuon alpinus fossilis (Adam, 1959)	24,60	9,30	6,50
Cuon alpinus fossilis (Adam, 1959)	24,50	9,60	-
Cuon alpinus fossilis (Adam, 1959)	-	-	6,40
Cuon alpinus priscus (Adam, 1959)	23,20	9,80	7,20
Cuon alpinus priscus (Adam, 1959)	23,30	9,80	6,90
Cuon alpinus priscus (Adam, 1959)	24,00	9,50	-
Cuon alpinus priscus (Adam, 1959)	25,10	9,70	7,60
Cuon alpinus fossilis (Adam, 1959)	24,00	9,00	7,20
Cuon alpinus fossilis (Adam, 1959)	24,60	9,30	6,50
Cuon alpinus fossilis (Adam, 1959)	24,50	9,60	6,40
Cuon alpinus europaeus (Adam, 1959)	21,00	9,00	6,00
Cuon alpinus europaeus (Adam, 1959)	-	-	-
Cuon alpinus europaeus (Adam, 1959)	21,00	-	-
Cuon alpinus europaeus (Adam, 1959)	21,00	-	-
Cuon alpinus europaeus (Adam, 1959)	21,00	-	-
Cuon alpinus europaeus (Adam, 1959)	21,00	9,00	-
Cuon alpinus europaeus (Adam, 1959)	22,00	10,00	7,10
Cuon alpinus europaeus (Adam, 1959)	23,00	9,90	7,30
Cuon alpinus europaeus (Adam, 1959)	23,00	8,50	-
Cuon alpinus europaeus (Adam, 1959)	20,30	9,50	-

Table IX.6: New statistics of the parameters 'Length' M_1, 'Breadth' M_1 and 'Breadth' M_2 of the comparative *Cuon alpinus* material (in mm). The new statistics were calculated after including the 29 *Cuon alpinus* values from literature (given in table IX.5) in the comparative dataset. Legend: see table 4.1.

Statistics	Length M_1	Breadth M_1	Breadth M_2
Sample size (n)	55	50	42
Sample mean (x)	21,78	8,35	6,21
Standard deviation (SD)	1,75	1,00	0,62
Minimum (MIN)	18,70	6,77	4,71
Maximum (MAX)	25,10	10,00	7,60
Sample range MIN	17,86	6,55	4,49
Sample range MAX	25,10	10,00	7,60
Population range MIN	18,29	6,34	4,98
Population range MAX	25,28	10,36	7,44

Appendix X: Subsidiary results

Table X.1: Comparison of the specimen ranges of the fossil North Sea specimens with the sample and population ranges of the comparative material for parameter 'Alveolar length' M_1-M_2 (in mm). Specimen ranges were calculated as explained in table 4.2. See 4.1.3.

Canidae material		Alveolar length M_1-M_2			
		- Sample range +		- Population range +	
Comp.	*C. l. lupus*	32,11	44,70	32,42	43,43
	C. l. familiaris	24,09	38,25	24,30	35,52
	Cuon alpinus	23,33	31,55	25,20	31,19
Fossil North Sea	535	39,56	39,92	-	-
	667	28,76	29,12	-	-
	1683	41,14	41,50	-	-
	2103	31,24	31,60	-	-
	2104	29,59	29,95	-	-
	2196	42,91	43,27	-	-
	2329	39,66	40,02	-	-
	2620	43,26	43,62	-	-
	3219	33,47	33,83	-	-
	3293	36,97	37,33	-	-
	NMR89	43,23	43,59	-	-
	NMR90	32,08	32,44	-	-

Table X.2: Comparison of the specimen ranges of the fossil North Sea specimens with the sample and population ranges of the comparative material for parameter 'Coronoid angle' (in °). Specimen ranges were calculated as explained in table 4.2. See 4.3.2.

Canidae material		Coronoid angle (°)			
		- Sample range +		- Population range +	
Comp.	*C. l. lupus*	98	118	101	115
	C. l. familiaris	91	114	94	111
	Cuon alpinus	99	114	102	111
Fossil North Sea	534	111	117	-	-
	667	97	103	-	-
	1683	105	111	-	-
	2103	99	105	-	-
	2104	102	108	-	-
	2196	100	106	-	-
	2329	103	109	-	-
	2620	106	112	-	-
	3293	105	111	-	-
	NMR89	108	114	-	-
	NMR90	102	108	-	-

Table X.3: Comparison of the specimen ranges of fossil North Sea specimens 2196 and 3293 with the sample and population ranges of the comparative material for parameter 'Height of the crown' P_1 (in mm). Specimen ranges were calculated as explained in table 4.2. See 4.4.2.1.

Canidae material		Height crown P_1			
		- Sample range +		- Population range +	
Comp.	*C. l. lupus*	3,61	6,82	3,58	6,97
	C. l. familiaris	3,05	7,08	2,80	5,79
	Cuon alpinus	3,96	6,49	4,27	6,67
NS	2196	5,78	6,06	-	-
	3293	5,27	5,55	-	-

Appendix XI: Results of missing teeth of all comparative material

Table XI.1: Missing teeth. (See also appendix XIII)

			I1	I2	I3	C	P1	P2	P3	P4	M1	M2	M3	Remarkable:
C. l. lupus	Sup.	R	D/A	D/A	A		D		D			D		
		L	A	A	A	A	D	D	A	D		D		
	Inf.	R	A	A	A	A	D/A	D					A	
		L	D/A	A	A	A	D/A	D			A	A	A	
C. l. familiaris	Sup.	R	D/A				D/A	A						extra C (small) in adult specimen
		L					A	A						extra P1 in adult specimen
	Inf.	R	D/A	A	A	A	D/A	D/A	A	A	A	D/A	A	
		L	D/A	A	A	A	D/A	A	A	A	A	A	X/A	
Cuon alpinus	Sup.	R	A	A	A	A	A	A	A			A		
		L	A	A	A	A	A	A	A			X/A		
	Inf.	R	A	A	A	A	D/A	A	A			A		
		L	A	A	A		D/A	A	A			A		

Legend	
I1-M3	teeth
sup.	Superior. Concerning the maxilla. (Box III.1)
inf.	Inferior. Concerning the mandibula. (Box III.1)
R	right
L	left
D	diastema present instead of tooth
A	alveole present instead of tooth
D/A	both diastema and alveole were observed instead of tooth
X	tooth misses and no diastema or alveole is present instead
text	all diastemata that were observed
text	interesting cases
	no missing teeth observed

Appendix XII: Overview of all results

Table XII.1: Summary of all results of specimens 534 (left) and 535 (right). For quantitative parameters the following legend is applied: X = the specimen range falls within the sample range of that comparative species. / = the specimen range falls outside the sample range for that species (/- below, /+ above). M = marginal: the specimen range only partially overlaps with the sample range of that species (M- overlap on the lower margin, M+ overlap on the upper margin). X = the specimen range (also) falls within the population range of that species. / = the specimen range falls outside the population range of that species (/- below, /+ above). M = marginal: the specimen range only partially overlaps with the population range of that species (M- overlap on the lower margin, M+ overlap on the upper margin). For qualitative parameters (that were analyzed with percentages) the following legend applies: **X** = the specimen is certainly this species/genus, X = the specimen is very probably this species/genus, X = the specimen is more likely this species, although the others cannot be excluded, / = it is less likely that the specimen is this species than the others, but this species cannot be excluded, // = it is not likely that this specimen is this species, *//* = this specimen is certainly not this species. The following holds true for all parameters: * = the specimen range of this specimen was estimated for this parameter. Not all specimens have (conclusive) results for all parameters: - = absence of data for this parameter and ? = data are present for this parameter, but do not clearly indicate which of the three (sub)species the specimen is. **X** = identity of the fossil specimen based on all evidence and interpretations as presented in Chapters 3, 4 and 5. *Article* = results of the comparison of the specimen with the comparative material, when *Cuon alpinus* values from articles were added to the comparative dataset (appendix IX). With *C. lupus* and *C. familiaris*, *C. l. lupus* and *C. l. familiaris* are meant.

			Specimen 534			**Specimen 535**		
	Parameters		*C. lupus*	*C. familiaris*	*Cuon alpinus*	*C. lupus*	*C. familiaris*	*Cuon alpinus*
Mandible length	Mandible length	*a-b*	X M+	/+ /+	/+ /+ *	X	X	/+ /+ *
		c-b	X M+	/+ /+	/+ /+ *	X	X	/+ /+ *
	Alveolar length	P_1-M_2	-	-	-	-	-	-
		P_4-M_1-M_2	-	-	-	-	-	-
		M_1-M_2	-	-	-	X	/+ /+	/+ /+
		Article	-	-	-	-	-	/+ /+
	Diastema	C-P_1	-	-	-	-	-	-
		P_2-P_3 / P_3-P_4	-	-	-	-	-	-
	Mental foramina	middle	-	-	-	-	-	-
		posterior	-	-	-	-	-	-
	Incisors		-	-	-	-	-	-
Mandible	Mandible width	*i-i'*	-	-	-	X	X	X
		k-k'	-	-	-	-	-	-
	Mandible height *h-h'*	P_1	-	-	-	-	-	-
		P_2	-	-	-	-	-	-
		P_3	-	-	-	-	-	-
		P_4	-	-	-	-	-	-
		M_1	-	-	-	X	X	/+ /+
		Article	-	-	-	-	-	M+ /+
		M_2	X	M+ /+	/+ /+	X	X	/+ /+
	Mandible ratios		-	-	-	-	-	-
Ramus	Distance	*a-d*	X	/+ /+	/+ /+ *	-	-	-
		e-e'	X	X M+	/+ /+ *	-	-	-
	Aboral border of ramus		X	X	/	-	-	-
	Anterior border coronoid process		?	?	?	-	-	-
	Angular process		-	-	-	X	X	/
	Line k		-	-	-	-	-	-
Teeth	Dental formula		**X**	**X**	*//*	**X**	**X**	*//*
	Height crown	P_4	-	-	-	-	-	-
		M_1	-	-	-	X	/+ /+	/+ /+
	Length tooth	M_1	-	-	-	X	/+ /+	/+ /+
		Article	-	-	-	-	-	/+ /+
		M_2	X	M+ /+	/+ /+	X	M+ /+	/+ /+
	Breadth tooth	M_1	-	-	-	X	/+ /+	/+ /+
		Article	-	-	-	-	-	/+ /+
		M_2	X	/+ /+	/+ /+	X	/+ /+	/+ /+
		Article	-	-	/+ /+	-	-	/+ /+
	Cusps molars	M_1	-	-	-	**X**	**X**	*//*
		M_2	**X**	**X**	*//*	**X**	**X**	*//*
	Specimen is identified as:		**X**			**X**		

Table XII.2: Summary of all results of specimens 667 (left) and 1683 (right). Legend, see table XII.1.

			Specimen 667			Specimen 1683		
	Parameters		*C. lupus*	*C. familiaris*	*Cuon alpinus*	*C. lupus*	*C. familiaris*	*Cuon alpinus*
Mandible length	Mandible length	*a-b*	M- /-	X	X /+ *	X M+	/+ /+	/+ /+ *
		c-b	X /-	X	M+ /+ *	X M+	/+ /+	/+ /+ *
	Alveolar length	P_1-M_2	/- /-	X	X	X	/+ /+	/+ /+
		Article	-	-	X	-	-	/+ /+
		P_4-M_1-M_2	/- /-	X	X	X	/+ /+	/+ /+
		M_1-M_2	/- /-	X	X	X	/+ /+	/+ /+
		Article	-	-	X	-	-	/+ /+
	Diastema	C-P_1	X	X	X /+	X	X /+	/+ /+
		P_2-P_3 / P_3-P_4	?	?	?	X	X	/
	Mental foramina	middle	X	X	//	X	X	//
		posterior	X	X	//	/	/	X
	Incisors		-	-	-	-	-	-
Mandible	Mandible width	*i-i'*	X	X	X	X	/+ /+	/+ /+
		k-k'	X	X	X M+	X	X M+	/+ /+
	Mandible height *h-h'*	P_1	/- M-	X	X	X	/+ /+	/+ /+
		P_2	/- /-	X	X	X	/+ /+	/+ /+
		P_3	/- /-	X	X	X	/+ /+	/+ /+
		P_4	/- M-	X	X	X	/+ /+	/+ /+
		M_1	/- X	X	X M+	X	/+ /+	/+ /+
		Article	-	-	X	-	-	/+ /+
		M_2	X	X	X /+	X	/+ /+	/+ /+
	Mandible ratios		/	X	X	X	//	//
Ramus	Distance	*a-d*	X	X	X M+	-	-	-
		e-e'	X	X	X M+	-	-	-
	Aboral border of ramus		X	X	/	-	-	-
	Anterior border coronoid process		X	X	//	X	X	//
	Angular process		X	X	/	-	-	-
	Line k		-	-	-	-	-	-
Teeth	Dental formula		**X**	**X**	//	**X**	**X**	//
	Height crown	P_4	X	X	X *	X	/+ /+	/+ /+ *
		M_1	X	X	X *	M+ X	/+ /+	/+ /+ *
	Length tooth	M_1	M- /-	X	X	X	/+ /+	/+ /+
		Article	-	-	X	-	-	/+ /+
		M_2	X M-	X	M+ /+	X	M+ M+	/+ /+
	Breadth tooth	M_1	M- /-	X	X M+	M+ X	/+ /+	/+ /+
		Article	-	-	X	-	-	/+ /+
		M_2	/- /-	X	X	X	/+ /+	/+ /+
		Article	-	-	X	-	-	/+ /+
	Cusps molars	M_1	**X**	**X**	//	**X**	**X**	//
		M_2	**X**	**X**	//	**X**	**X**	//
	Specimen is identified as:			**X**		**X**		

Table XII.3: Summary of all results of specimens 2103 (left) and 2104 (right). Legend, see table XII.1.

			Specimen 2103			Specimen 2104		
	Parameters		*C. lupus*	*C. familiaris*	*Cuon alpinus*	*C. lupus*	*C. familiaris*	*Cuon alpinus*
Mandible length	Mandible length	*a-b*	M- M-	X	M+ /+ *	/- /-	X	X
		c-b	X M-	X	M+ /+ *	M- /-	X	M+ /+
	Alveolar length	P_1-M_2	X	X	/+ /+	X M-	X	/+ /+
		Article	-	-	X	-	-	X
		P_4-M_1-M_2	/- /-	X	X /+	/- /-	X	X
		M_1-M_2	/- /-	X	M+ /+	/- /-	X	X
		Article	-	-	X	-	-	X
	Diastema	C-P_1	X	X	X /+	X	X	/+ /+
		P_2-P_3 / P_3-P_4	X	X	/	X	X	/
	Mental foramina	middle	?	?	?	X	X	//
		posterior	-	-	-	X	X	/
	Incisors		-	-	-	X	X	/
Mandible	Mandible width	*i-i'*	/- M-	X	X	X	X	X
		k-k'	X	X	X M+	X	X	X
	Mandible height *h-h'*	P_1	M- X	X	X	X	X	/+ /+
		P_2	X	X	X M+	X	X	X M+
		P_3	X	X	X /+	X	X	X M+
		P_4	X	X	X /+	X	X	X /+
		M_1	X	X	/+ /+	M- X	X	X /+
		Article	-	-	X	-	-	X
		M_2	X	X	/+ /+	X	X	X M+
	Mandible ratios		/	X	/	X	X	/
Ramus	Distance	*a-d*	X	X	X	M- M-	X	X
		e-e'	M- M-	X	X	M- M-	X	X
	Aboral border of ramus		X	X	/	X	X	/
	Anterior border coronoid process		X	X	//	-	-	-
	Angular process		X	X	/	X	X	/
	Line k		X	X	//	X	X	//
Teeth	Dental formula		**X**	**X**	//	**X**	**X**	//
	Height crown	P_4	X	X	X	X	X	X
		M_1	X	X	X	-	-	-
	Length tooth	M_1	X M-	X	M+ M+	M- /-	X	X
		Article	-	-	X	-	-	X
		M_2	-	-	-	M- M-	X	M+ M+
	Breadth tooth	M_1	X /-	X	M+ /+	-	-	-
		Article	-	-	X	-	-	-
		M_2	-	-	-	/- /-	X	M+ M+
		Article	-	-	-	-	-	X
	Cusps molars	M_1	**X**	**X**	//	**X**	**X**	//
		M_2	-	-	-	**X**	**X**	//
	Specimen is identified as:			**X**			**X**	

Table XII.4: Summary of all results of specimens 2196 (left) and 2329 (right). Legend, see table XII.1.

			Specimen 2196			Specimen 2329		
	Parameters		*C. lupus*	*C. familiaris*	*Cuon alpinus*	*C. lupus*	*C. familiaris*	*Cuon alpinus*
Mandible length	Mandible length	*a-b*	X M+	/+ /+	/+ /+ *	X M+	/+ /+	/+ /+ *
		c-b	X M+	/+ /+	/+ /+ *	X M+	/+ /+	/+ /+ *
	Alveolar length	P_1-M_2	X	/+ /+	/+ /+	X	/+ /+	/+ /+
		Article	-	-	/+ /+	-	-	/+ /+
		P_4-M_1-M_2	M+	/+ /+	/+ /+	X	/+ /+	/+ /+
		M_1-M_2	X	/+ /+	/+ /+	X	/+ /+	/+ /+
		Article	-	-	/+ /+	-	-	/+ /+
	Diastema	C-P_1	X	X	/+ /+	X	X	/+ /+
		P_2-P_3 / P_3-P_4	X	X	/	X	X	/
	Mental foramina	middle	?	?	?	X	X	//
		posterior	?	?	?	X	X	//
	Incisors		-	-	-	-	-	-
Mandible	Mandible width	*i-i'*	X	/+ /+	/+ /+	X	X	X /+
		k-k'	X M+	M+ /+	/+ /+	X	X	/+ /+
	Mandible height *h-h'*	P_1	X	/+ /+	/+ /+	X	X	/+ /+
		P_2	X	/+ /+	/+ /+	X	X M+	/+ /+
		P_3	X	/+ /+	/+ /+	X	/+ M+	X /+
		P_4	X	/+ /+	/+ /+	X	/+ /+	/+ /+
		M_1	X	/+ /+	/+ /+	X	X /+	/+ /+
		Article	-	-	/+ /+	-	-	/+ /+
		M_2	X	X /+	/+ /+	X	X M+	/+ /+
	Mandible ratios		X	//	//	X	X	/
Ramus	Distance	*a-d*	X M+	/+ /+	/+ /+ *	X	/+ /+	/+ /+
		e-e'	X M+	/+ /+	/+ /+ *	X	M+ /+	/+ /+
	Aboral border of ramus		-	-	-	X	X	/
	Anterior border coronoid process		-	-	-	X	X	//
	Angular process		-	-	-	X	X	/
	Line k		-	-	-	X	X	//
Teeth	Dental formula		X	X	//	X	X	//
	Height crown	P_4	X	/+ /+	/+ /+	X	/+ /+	/+ /+ *
		M_1	X	/+ /+	/+ /+ *	X	/+ /+	/+ /+ *
	Length tooth	M_1	X	/+ /+	/+ /+	X	/+ /+	/+ /+
		Article	-	-	/+ /+	-	-	/+ /+
		M_2	X M+	M+ /+	/+ /+	-	-	-
	Breadth tooth	M_1	X	/+ /+	/+ /+	X	M+ M+	/+ /+
		Article	-	-	/+ /+	-	-	/+ M+
		M_2	X	/+ /+	/+ /+	-	-	-
		Article	-	-	/+ /+	-	-	-
	Cusps molars	M_1	X	X	//	X	X	//
		M_2	?	?	?	-	-	-
	Specimen is identified as:		**X**			**X**		

Table XII.5: Summary of all results of specimens 2620 (left) and 3219 (right). Legend, see table XII.1.

			Specimen 2620			Specimen 3219		
	Parameters		*C. lupus*	*C. familiaris*	*Cuon alpinus*	*C. lupus*	*C. familiaris*	*Cuon alpinus*
Mandible length	Mandible length	*a-b*	X M+	/+ /+	/+ /+ *	M- M-	X	M+ /+ *
		c-b	X M+	/+ /+	/+ /+ *	X M-	X	M+ /+ *
	Alveolar length	P_1-M_2	/+ X	/+ /+	/+ /+	X	X	/+ /+
		Article	-	-	/+ /+	-	-	X
		P_4-M_1-M_2	X	/+ /+	/+ /+	X	X	/+ /+
		M_1-M_2	X M+	/+ /+	/+ /+	X	X	/+ /+
		Article	-	-	/+ /+	-	-	X /+
	Diastema	C-P_1	X	X	X /+	X	X	M+ /+
		P_2-P_3 / P_3-P_4	X	X	/	X	X	/
	Mental foramina	middle	?	?	?	?	?	?
		posterior	/	/	X	?	?	?
	Incisors		X	X	/	X	X	/
Mandible	Mandible width	*i-i'*	X	X	/+ /+	X	X	X
		k-k'	X	M+ M+	/+ /+	X	X	/+ /+
	Mandible height *h-h'*	P_1	X	/+ /+	/+ /+	X	X	X
		P_2	M+ X	/+ /+	/+ /+	M- X	X	X
		P_3	X	/+ /+	/+ /+	X	X	X M+
		P_4	-	-	-	X	X	X /+
		M_1	-	-	-	X	X	/+ /+
		Article	-	-	-	-	-	X
		M_2	-	-	-	X	X	M+ /+
	Mandible ratios		X	//	//	X	X	/
Ramus	Distance	*a-d*	-	-	-	-	-	-
		e-e'	-	-	-	-	-	-
	Aboral border of ramus		-	-	-	-	-	-
	Anterior border coronoid process		X	X	//	-	-	-
	Angular process		-	-	-	-	-	-
	Line k		-	-	-	-	-	-
Teeth	Dental formula		X	X	//	-	-	-
	Height crown	P_4	-	-	-	X	X	X *
		M_1	-	-	-	X	M+ /+	M+ /+ *
	Length tooth	M_1	X	/+ /+	/+ /+	X M-	X	M+ M+
		Article	-	-	/+ /+	-	-	X
		M_2	M+ /+	/+ /+	/+ /+	-	-	-
	Breadth tooth	M_1	X	/+ /+	/+ /+	X /-	X	M+ /+
		Article	-	-	/+ /+	-	-	X
		M_2	X	/+ /+	/+ /+	-	-	-
		Article	-	-	/+ /+	-	-	-
	Cusps molars	M_1	X	X	//	X	X	//
		M_2	X	X	//	-	-	-
	Specimen is identified as:		**X**				**X?**	

Table XII.6: Summary of all results of specimens 3293 (left) and NMR89 (right). Legend, see table XII.1.

	Parameters		Specimen 3293			Specimen NMR89		
			C. lupus	*C. familiaris*	*Cuon alpinus*	*C. lupus*	*C. familiaris*	*Cuon alpinus*
Mandible length	Mandible length	*a-b*	X	/+ /+	/+ /+ *	X	X	/+ /+ *
		c-b	X	/+ /+	/+ /+ *	X	X	/+ /+ *
	Alveolar length	P_1-M_2	X	/+ /+	/+ /+	X	/+ /+	/+ /+
		Article			/+ /+			/+ /+
		P_4-M_1-M_2	X	/+ /+	/+ /+	X	/+ /+	/+ /+
		M_1-M_2	X	X /+	/+ /+	X M+	/+ /+	/+ /+
		Article	-	-	/+ /+	-	-	/+ /+
	Diastema	C-P_1	X	X	X /+	-	-	-
		P_2-P_3 / P_3-P_4	X	X	/	X	X	/
	Mental foramina	middle	X	X	//	?	?	?
		posterior	X	X	/	?	?	?
	Incisors		-	-	-	-	-	-
Mandible	Mandible width	*i-i'*	X	X M+	/+ /+	X	X	X M+
		k-k'	-	-	-	-	-	-
	Mandible height *h-h'*	P_1	X	X	/+ /+	-	-	-
		P_2	X	X	/+ /+	/- /-	X	X
		P_3	X	X	X /+	M- M-	X	X
		P_4	X	/+ M+	/+ /+	/- /-	X	X
		M_1	X	X M+	/+ /+	X	X	/+ /+
		Article	-	-	/+ /+	-	-	X
		M_2	X	X	/+ /+	X	X	/+ /+
	Mandible ratios		X	X	/	X	X	/
Ramus	Distance	*a-d*	-	-	-	-	-	-
		e-e'	-	-	-	-	-	-
	Aboral border of ramus		-	-	-	-	-	-
	Anterior border coronoid process		X	X	//	-	-	-
	Angular process		-	-	-	X	X	/
	Line k		-	-	-	-	-	-
Teeth	Dental formula		X	X	//	X	X	//
	Height crown	P_4	X	/+ /+	/+ /+ *	-	-	-
		M_1	X	/+ /+	/+ /+	-	-	-
	Length tooth	M_1	X	/+ /+	/+ /+	-	-	-
		Article	-	-	/+ /+	-	-	-
		M_2	X	M+ /+	/+ /+	-	-	-
	Breadth tooth	M_1	X	/+ /+	/+ /+	-	-	-
		Article	-	-	/+ /+	-	-	-
		M_2	X	M+ M+	/+ /+	-	-	-
		Article	-	-	/+ /+	-	-	-
	Cusps molars	M_1	X	X	//	-	-	-
		M_2	X	X	//	-	-	-
	Specimen is identified as:		**X**			**X**	**X**	

Table XII.7: Summary of all results of specimen NMR90. Legend, see table XII.1.

	Parameters		Specimen NMR90 *C. lupus*	*C. familiaris*	*Cuon alpinus*
Mandible length	Mandible length	*a-b*	M- /-	X	X /+ *
		c-b	X M-	X	M+ /+ *
	Alveolar length	P_1-M_2	-	-	-
		P_4-M_1-M_2	/- /-	X	/+ /+
		M_1-M_2	M- M-	X	/+ /+
		Article	-	-	X
	Diastema length	C-P_1	-	-	-
		P_2-P_3 / P_3-P_4	-	-	-
	Mental foramina	middle	-	-	-
		posterior	-	-	-
	Incisors		-	-	-
Mandible	Mandible width	*i-i'*	X	X	X
		k-k'	-	-	-
	Mandible height *h-h'*	P_1	-	-	-
		P_2	-	-	-
		P_3	-	-	-
		P_4	-	-	-
		M_1	-	-	-
		M_2	-	-	-
	Mandible ratios		-	-	-
Ramus	Distance	*a-d*	X	X	X *
		e-e'	X	X	X /+ *
	Aboral border of ramus		-	-	-
	Anterior border coronoid process		X	X	//
	Angular process		X	X	/
	Line k		-	-	-
Teeth	Dental formula		//	/	X
	Height crown	P_4	X	X	X *
		M_1	X	X	X *
	Length tooth	M_1	M- /-	X	X M+
		Article	-	-	X
		M_2	-	-	-
	Breadth tooth	M_1	M- /-	X	X
		Article	-	-	X
		M_2	-	-	-
	Cusps molars	M_1	X	X	//
		M_2	-	-	-
	Specimen is identified as:			**X**	

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	Length mandible a-b	Length mandible c-b	Alveolar length P1-M2	Alveolar length P4-M1-M2	Alveolar length M1-M2	Diastema length C-P1	Diastema length P2-P3 & P3-P4	Mental foramina middle	Mental foramina posterior	Incisors	Width mandible i-i'	Width mandible k-k'	Height h-h' M2	Height h-h' M1	Height h-h' P4	Height h-h' P3
Canidae indet.	534	*180-199**	*179-199**	-	-	-	-	-	-	-	-	-	-	33,32	-	-	-
Fossil North Sea	535	*171**	*170**	-	-	39,74	-	-	-	-	-	12,32	-	30,14	29,85	-	-
material	667	144,62*	144,23*	66,14	39,31	28,94	5,78	yes	P1-P2	P2-P3	-	12,34	12,53	25,01	23,21	21,02	19,22
	1683	*199**	*199**	96,06	57,48	41,32	9,20	yes +	P1-P2	P3 posterior	-	16,91	16,24	33,93	36,04	35,32	29,55
	2103	144,62-161*	144,23-160*	73,40	42,54	31,42	6,33	yes +	P2 anterior	-	-	11,06	12,46	26,55	26,35	25,67	23,03
	2104	141,80	143,76	71,43	41,07	29,77	7,20	yes +	P1-P2	P3 anterior	row	11,70	11,82	24,73	24,02	24,61	22,26
	2196	*199**	*199**	94,56	59,30	43,09	7,27	yes +	P2 anterior	P3	-	15,85	17,56	31,89	33,58	32,44	30,00
	2329	*180-199**	*179-199**	88,37	52,68	39,84	7,94	yes +	P1-P2	P2-P3	-	13,07	14,49	30,78	31,45	29,98	26,46
	2620	*199**	*199**	98,25	57,43	43,44	6,50	yes +	P2 anterior	P3 posterior	row	14,90	17,01	-	-	-	29,87
	3219	144,62-*161**	144,23-*160**	72,68	44,61	33,65	7,00	yes +	P2 anterior	P3	row	12,47	14,89	25,61	25,27	24,67	22,32
	3293	*180**	*179**	89,50	54,24	37,15	5,51	yes +	P1-P2	P3 anterior	-	15,40	-	30,43	30,97	29,23	25,40
	NMR89	*160**	*161**	90,00	57,02	43,41	-	yes +	P2 anterior	P3	-	12,80	-	26,70	26,08	19,73	19,91
	NMR90	144,11-144,62*	144,23-146,38*	-	43,10	32,26	-	-	-	-	-	12,37	-	-	-	-	-
Canis l. lupus	3129	*170*	*168*	80,38	50,13	36,96	10,02	-	P1-P2	P3	row	14,28	12,61	31,75	32,30	28,33	25,97
Recent	*lupus*-a	*166*	*168*	79,76	49,00	35,81	6,34	yes	P1-P2	P3	row	13,58	13,41	24,54	25,80	26,71	24,24
	lupus-b	*185*	*187*	85,92	53,34	40,15	8,96	yes	P1-P2	P3 anterior	crowded	15,21	14,03	34,26	31,42	30,64	29,20
	lupus-c	*199*	*199*	97,31	57,49	41,86	8,18	yes +	P1-P2	P3	row	18,22	16,50	31,63	33,48	32,16	28,48
	lupus-d	*171*	*170*	-	50,36	36,80	-	yes +	P1-P2	P3	row	14,61	13,77	29,57	29,35	30,77	27,42
	lupus-e	*167*	*179*	87,68	55,79	39,58	3,85	-	P1-P2	P3 anterior	row	13,86	12,85	26,36	26,66	24,55	23,88
	lupus-f	*161*	*160*	82,86	53,55	39,24	4,98	-	P1-P2	P3 anterior	row	13,52	12,26	25,96	26,11	24,06	23,40
	lupus-g	*180*	*179*	-	51,68	38,09	-	yes +	P2 anterior	P3 anterior	row	16,24	15,56	29,12	32,30	31,40	25,21
	lupus-h	*175*	*175*	85,09	50,03	37,06	6,50	yes +	P2 anterior	P3 anterior	row	15,70	13,86	30,14	29,09	29,30	28,37
	lupus-l	*169*	*169*	82,80	47,23	34,10	7,27	yes +	P1-P2	P3 anterior	row	12,21	11,99	29,77	27,55	25,17	22,60
	lupus-m	145,85	144,42	70,60	43,58	32,29	7,94	yes +	P1-P2	P3 anterior	row	11,45	10,68	23,88	24,13	21,85	20,30
	RMNH43490	*179*	*171*	80,98	50,33	35,88	8,25	yes	P1-P2	P3 anterior	row	13,93	13,27	29,69	29,55	27,55	26,19
	RMNH43491	*177*	*181*	83,29	47,73	34,17	8,22	yes +	P1-P2	P3	row	13,42	12,44	31,69	29,30	28,23	25,28
	RMNH43492	*160*	*161*	82,55	51,65	37,98	3,07	-	P2 anterior	P3 anterior	row	13,21	12,01	25,62	25,30	25,05	23,88

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	Height *h-h'* P2	Height *h-h'* P1	Distance *a-d*	Distance *e-e'*	Coronoid angle (°) *n*	Aboral border ramus	Anterior border coronoid process	Angular process	Line k	Dental formula typical of:	Dental formula (mandibular) formula	missing teeth (diast.)
Canidae indet.	534	-	-	58,18*	71,25*	114	rear	thick	-	-	Canidae	3 1 4 3	n/a
Fossil North Sea	535	-	-	-	-	-	-	-	no crest	-	Canidae	3 1 4 3	n/a
material	667	19,60	20,10	46,17	62,82	100	rear	thin	no crest	-	Canidae	3 1 4 3	n/a
	1683	30,85	28,26	-	-	108	-	thin	-	-	Canidae	3 1 4 3	n/a
	2103	22,71	20,91	43,89	57,25	102	rear	thin	no crest	equal	Canidae	3 1 4 3	n/a
	2104	22,81	22,64	41,51	57,28	105	rear	average	no crest	equal	Canidae	3 1 4 3	n/a
	2196	30,88	28,90	63,98*	86,21*	103	-	-	-	-	Canidae	3 1 4 3	n/a
	2329	26,45	24,72	55,44	72,83	106	rear	thin	no crest	condyle	Canidae	3 1 4 3	n/a
	2620	32,33	29,66	-	-	109	-	thin	-	-	Canidae	3 1 4 3	P1
	3219	22,19	21,39	-	-	-	-	-	-	-	-	-	P1
	3293	26,32	24,93	-	-	108	-	thin	-	-	Canidae	3 1 4 3	n/a
	NMR89	18,64	-	-	-	111	-	-	no crest	-	Canidae	3 1 4 3	n/a
	NMR90	-	-	43,86*	65,31*	105	-	thin	no crest	-	*Cuon*	3 1 4 2	n/a
Canis l. lupus	3129	25,60	26,73	51,15	73,85	106	vertical	thin	no crest	angular	Canidae	3/3 1/1 4/4 2/3	L I1 inf., R I1 sup.
Recent	*lupus*-a	25,80	24,40	49,33	63,12	111	vertical	thin	no crest	condyle	Canidae	3/3 1/1 4/4 2/3	L P4 sup.
	lupus-b	29,05	26,25	59,80	79,91	115	vertical	thin	crest	angular	Canidae	3/3 1/1 4/4 2/3	n/a
	lupus-c	29,50	29,55	63,98	86,21	105	rear	average	no crest	angular	Canidae	3/3 1/1 4/4 2/3	n/a
	lupus-d	27,42	25,29	58,18	71,25	108	vertical	thin	no crest	angular	Canidae	3/3 1/1 4/4 2/3	L&R P1 inf., R P3 sup.
	lupus-e	26,00	24,59	46,73	67,07	106	rear	thin	no crest	condyle	Canidae	3/3 1/1 4/4 2/3	n/a
	lupus-f	25,18	24,63	53,82	72,24	101	vertical	thin	no crest	angular	Canidae	3/3 1/1 4/4 2/3	n/a
	lupus-g	-	24,05	55,02	77,16	105	rear	thin	crest	angular	Canidae	3/3 1/1 4/4 2/3	L P1&P2 inf., R P1 sup., L P1&P2 sup.
	lupus-h	28,98	26,38	57,48	71,83	107	vertical	average	no crest	angular	Canidae	3/3 1/1 4/4 2/3	n/a
	lupus-l	23,11	22,26	54,09	70,68	108	vertical	thin	no crest	angular	Canidae	3/3 1/1 4/4 2/3	n/a
	lupus-m	22,66	21,28	41,52	58,32	107	vertical	average	no crest	angular	Canidae	3/3 1/1 4/4 2/3	R I2 sup.
	RMNH43490	26,11	23,23	52,70	71,98	111	rear	thin	no crest	equal	Canidae	3/3 1/1 4/4 2/3	L P1 inf.
	RMNH43491	26,07	23,10	55,96	70,97	113	rear	average	no crest	condyle	Canidae	3/3 1/1 4/4 2/3	L P1 inf., L&R M2 sup.
	RMNH43492	24,18	21,80	47,36	68,61	109	rear	thin	no crest	equal	Canidae	3/3 1/1 4/4 2/3	R P2 inf.

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	Dental formula / missing teeth (alv.)	M3	Height crown P1	Height crown P4	Height crown M1	Length M1	Length M2	Breadth M1	Breadth M2
Canidae indet.	534	M3	yes	-	-	-	-	12,28	-	9,34
Fossil North Sea	535	M3	yes	-	-	17,78	28,03	12,22	11,79	8,52
material	667	M3, P1, C	yes	-	7,89*	12,62*	20,93	9,58	8,37	6,26
	1683	n/a	yes	-	11,84*	18,12*	30,12	11,80	12,57	9,00
	2103	M3, M2, P1, C	yes	-	9,04	13,21	22,40	-	8,83	-
	2104	M3, P1-I1	yes	-	8,12	-	21,32	9,35	-	6,68
	2196	M3, C	yes	5,92	10,87	17,43*	30,19	12,51	12,09	8,64
	2329	M3, M2, P1	yes	-	10,35*	15,48*	28,87	-	10,45	-
	2620	M3, I1	yes	-	-	-	30,22	14,19	11,49	9,52
	3219	M2, C	-	-	8,64*	14,07*	22,80	-	8,77	-
	3293	n/a	yes	5,41	11,72*	16,84	27,12	12,09	11,08	7,90
	NMR89	L M3-P2	yes	-	-	-	-	-	-	-
	NMR90	R M2	x	-	7,50*	12,13*	21,78	-	8,09	-
Canis l. lupus	3129	n/a	yes	4,82	9,60	15,09	26,21	9,57	10,97	7,83
Recent	*lupus*-a	n/a	yes	4,82	9,32	15,67	26,48	12,23	10,88	8,92
	lupus-b	L I2 inf., L&R P1 inf., R M3 inf.	yes	-	10,87	17,83	28,79	11,90	11,63	8,98
	lupus-c	n/a	yes	5,46	10,17	17,75	29,26	12,05	11,89	8,92
	lupus-d	L I2 inf.	yes	-	-	14,91	26,59	10,36	11,19	7,62
	lupus-e	n/a	yes	5,88	11,05	16,65	28,56	11,68	11,62	9,87
	lupus-f	R I2 sup.	yes	5,48	11,61	15,73	27,40	13,45	11,23	8,93
	lupus-g	All I inf&sup., R C inf., R P1 inf., R M3 inf., L M1-3 inf., L C sup. L P3 sup.	yes	-	-	13,35	28,07	-	11,14	-
	lupus-h	n/a	yes	6,00	9,56	15,66	26,15	11,04	10,49	8,55
	lupus-l	R P1 inf.	yes	4,70	9,93	15,61	24,20	10,68	9,45	8,08
	lupus-m	L M3 inf., L I1-C sup.	yes	3,75	6,96	11,18	21,97	10,90	8,41	7,77
	RMNH43490	n/a	yes	-	7,34	13,33	25,96	11,42	10,25	8,55
	RMNH43491	n/a	yes	4,44	8,91	14,15	24,44	10,62	10,37	8,16
	RMNH43492	n/a	yes	5,96	11,06	17,61	27,25	11,37	10,91	8,75

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	Cusps P1 protoconid	P2 mesial	P2 protoconid	P2 metastylid	P3 mesial	P3 protoconid	P3 metastylid	P3 distal	P4 mesial	P4 protoconid	P4 metastylid	P4 distal
Canidae indet.	534	-	-	-	-	-	-	-	-	-	-	-	-
Fossil North Sea	535	-	-	-	-	-	-	-	-	-	-	-	-
material	667	-	x	yes	yes	x	yes	yes	cingulum	x	yes	yes	metaconulid
	1683	-	x	yes	yes	x	yes	yes	cingulum	x	yes	yes	metaconulid
	2103	-	x	yes	yes	x	yes	yes	cingulum	x	yes	yes	metaconulid
	2104	-	x	yes	-	x	yes	yes	cingulum	x	yes	yes	metaconulid
	2196	flat	x	yes	yes	x	yes	yes	metaconulid	x	yes	yes	metaconulid
	2329	-	x	yes	yes	x	yes	yes	cingulum	x	yes	yes	metaconulid
	2620	-	cingulum	yes	yes	x	yes	yes	cingulum	x	yes	yes	metaconulid
	3219	-	x	yes	x	x	yes	yes	cingulum	x	yes	yes	cingulum
	3293	flat	x	yes	yes	x	yes	yes	cingulum	x	yes	yes	metaconulid
	NMR89	-	-	-	-	-	-	-	-	-	-	-	-
	NMR90	-	-	-	-	-	-	-	-	x	yes	yes	metaconulid
Canis l. lupus	3129	flat	cingulum	yes	yes	parastylid	yes	yes	metaconulid	parastylid	yes	yes	metaconulid
Recent	*lupus*-a	flat	x	yes	x	x	yes	yes	metaconulid	x	yes	yes	metaconulid
	lupus-b	-	x	yes	yes	x	yes	yes	metaconulid	x	yes	yes	metaconulid
	lupus-c	flat	x	yes	yes	x	yes	yes	cingulum	x	yes	yes	metaconulid
	lupus-d	-	cingulum	yes	yes	cingulum	yes	yes	cingulum	x	yes	yes	metaconulid
	lupus-e	flat	parastylid	yes	yes	parastylid	yes	yes	metaconulid	cingulum	yes	yes	metaconulid
	lupus-f	flat	cingulum	yes	yes	cingulum	yes	yes	metaconulid	x	yes	yes	metaconulid
	lupus-g	-	x	yes	x	-	-	-	-	-	-	-	-
	lupus-h	flat	x	yes	x	x	yes	yes	metaconulid	cingulum	yes	yes	metaconulid
	lupus-l	flat	x	yes	yes	x	yes	yes	metaconulid	x	yes	yes	metaconulid
	lupus-m	flat	-	-	-	-	-	-	-	x	yes	yes	metaconulid
	RMNH43490	flat	x	yes	yes	cingulum	yes	yes	cingulum	cingulum	yes	yes	metaconulid
	RMNH43491	flat	x	yes	yes	cingulum	yes	yes	metaconulid	cingulum	yes	yes	metaconulid
	RMNH43492	flat	x	yes	yes	x	yes	yes	metaconulid	cingulum	yes	yes	metaconulid

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	M1 trigonid: protoconid	M1 trigonid: paraconid	M1 trigonid: metaconid	M1 talonid: hypoconid	M1 talonid: entoconid	M2 trigonid: protoconid	M2 trigonid: metaconid	M2 talonid: hypoconid	M2 talonid: entoconid
Canidae indet.	534	-	-	-	-	-	yes	yes	yes	edge
Fossil North Sea	535	yes	yes	yes	yes	yes	yes	yes	yes	edge
material	667	yes	yes	yes	yes	yes	yes	yes	yes	edge
	1683	yes	yes	yes	yes	yes	yes	yes	yes	edge
	2103	yes	yes	yes	yes	yes	-	-	-	-
	2104	yes	yes	-	yes	yes	yes	yes	yes	edge
	2196	yes	yes	yes	yes	yes	centered	-	centered	-
	2329	yes	yes	yes	yes	yes	-	-	-	-
	2620	yes	yes	yes	yes	yes	yes	yes	yes	edge
	3219	yes	yes	yes	yes	yes	-	-	-	-
	3293	yes	yes	yes	yes	yes	yes	yes	yes	edge
	NMR89	-	-	-	-	-	-	-	-	-
	NMR90	yes	yes	yes*	yes*	yes*	-	-	-	-
Canis l. lupus	3129	yes	yes	yes	yes	yes	yes	yes	yes	edge
Recent	*lupus*-a	yes	yes	yes	yes	yes	yes	yes	yes	edge
	lupus-b	yes	yes	yes	yes	yes	yes	yes	yes	edge
	lupus-c	yes	yes	yes	yes	yes	yes	yes	yes	edge
	lupus-d	yes	yes	yes	yes	yes	yes	yes	yes	edge
	lupus-e	yes	yes	yes	yes	yes	yes	yes	yes	edge
	lupus-f	yes	yes	yes	yes	yes	yes	yes	yes	edge
	lupus-g	yes	yes	yes	yes	yes	yes	yes	yes	edge
	lupus-h	yes	yes	yes	yes	yes	yes	yes	yes	edge
	lupus-l	yes	yes	yes	yes	yes	yes	yes	yes	edge
	lupus-m	yes	yes	yes	yes	yes	yes	yes	yes	yes
	RMNH43490	yes	yes	yes	yes	yes	yes	yes	yes	edge
	RMNH43491	yes	yes	yes	yes	yes	yes	yes	-	-
	RMNH43492	yes	yes	yes	yes	yes	yes	yes	yes	edge

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	Material description: Date	Ingekomen	Legit	Donated by
Canidae indet.	534				
Fossil North Sea	535				
material	667				
	1683				
	2103				
	2104				
	2196				
	2329				
	2620				
	3219				
	3293				
	NMR89				
	NMR90				
Canis l. lupus	3129		08-07-1937	Diergaarde Rotterdam	
Recent	*lupus*-a				Troost
	lupus-b				
	lupus-c				Rasch
	lupus-d	10-1836			Hénagerie de M. van Aken
	lupus-e	1858			Museum van Petersburg
	lupus-f	1851			Natura Artis Magistra
	lupus-g				
	lupus-h	15-02-1870			Natura Artis Magistra Amsterdam
	lupus-l		05-1893		W. Korthals Jr.
	lupus-m		31-08-1906		
	RMNH43490				Don: H.v.Grouw 2007
	RMNH43491				Don: H.v.Grouw 2007
	RMNH43492				Don: H.v.Grouw 2007

Appendix XIII: Complete original dataset

Canidae material	reg. no.	Length mandible *a-b*	*c-b*	Alveolar length P1-M2	P4-M1-M2	M1-M2	Diastema length C-P1	P2-P3 & P3-P4	Mental foramina middle	posterior	Incisors	Width mandible *i-i'*	*k-k'*	Height *h-h'* M2	M1	P4	P3
Canis l. lupus	445834	-	-	88,32	56,47	39,84	6,34	yes	P2 anterior	P3 posterior	-	14,82	16,40	31,82	34,43	28,51	29,90
Fossil	NMR86	-	-	94,43	57,45	40,91	6,52	yes	P2 anterior	P3 posterior	-	16,35	16,47	37,19	36,20	32,13	28,46
	NMR87	-	-	95,69	57,96	40,27	5,59	yes +	P2 anterior	P3	-	17,06	16,95	34,13	36,53	35,65	31,72
	NMR88	-	-	97,10	56,81	41,65	5,94	yes +	P2 anterior	P3	-	14,60	17,80	36,69	38,17	34,80	32,89
n		**14**	**14**	**16**	**18**	**18**	**16**	**14**	**18**	**18**	**14**	**18**	**18**	**18**	**18**	**18**	**18**
x		**172**	**172**	**85,92**	**52,25**	**37,92**	**6,75**					**14,57**	**14,05**	**30,21**	**30,43**	**28,71**	**26,52**
SD		**12,6**	**13,0**	**7,29**	**4,13**	**2,75**	**1,85**					**1,69**	**2,06**	**3,91**	**4,18**	**3,77**	**3,30**
MIN		**146**	**144**	**70,60**	**43,58**	**32,29**	**3,07**					**11,45**	**10,68**	**23,88**	**24,13**	**21,85**	**20,30**
MAX		**199**	**199**	**97,31**	**57,96**	**41,86**	**10,0**					**18,22**	**17,80**	**37,19**	**38,17**	**35,65**	**32,89**
SR MIN		**145**	**143**	**70,42**	**43,40**	**32,11**	**2,89**					**11,31**	**10,04**	**23,60**	**23,85**	**21,57**	**20,02**
SR MAX		**200**	**200**	**97,49**	**58,14**	**44,70**	**10,2**					**18,36**	**18,44**	**37,47**	**38,45**	**35,93**	**33,17**
PR MIN		**147**	**146**	**71,34**	**44,00**	**32,42**	**3,05**					**11,18**	**9,92**	**22,39**	**22,06**	**21,17**	**19,93**
PR MAX		**197**	**198**	**100,5**	**60,51**	**43,43**	**10,4**					**17,96**	**18,17**	**38,03**	**38,79**	**36,26**	**33,11**
Canis l. familiaris	7028	*172*	*177*	83,50	49,51	35,41	8,61	yes +	P1-P2	P3	row	13,05	10,94	26,36	28,05	28,00	25,55
Recent	12547	103,30	103,72	52,85	32,12	24,27	4,05	yes	P1-P2	P2-P3	row	7,78	8,40	17,09	17,04	16,82	14,88
	12548	127,12	128,69	63,41	37,92	27,60	6,93	yes	P1-P2	P3 anterior	row	10,73	12,72	20,47	20,94	20,67	18,79
	17755	110,64	111,76	56,37	34,43	25,13	3,77	yes	P1-P2	P3 anterior	row	9,04	10,67	19,20	16,87	15,81	14,76
	17758	108,83	111,49	57,08	36,44	28,18	4,01	yes	P2 anterior	P3	row	9,13	10,33	17,95	17,35	16,30	15,26
	17792	120,60	122,74	62,60	39,68	29,33	3,46	yes	P2 anterior	P3 anterior	row	9,53	9,95	18,74	16,70	15,72	14,55
	17793	122,99	123,02	70,25	46,06	30,24	5,29	yes	P2	P3 anterior	row	9,83	11,03	18,20	19,33	18,20	16,80
	18049	114,32	115,47	60,41	37,59	27,80	6,41	yes	P2 anterior	P3	row	9,82	9,52	20,20	19,95	17,68	15,91
	18050	115,52	117,89	58,65	36,59	27,54	5,00	yes +	P1-P2	P3 anterior	row	10,82	10,30	18,72	17,51	17,13	15,89
	18051	144,62	144,23	69,67	41,52	31,08	6,40	yes +	P1-P2	P3 anterior	row	11,70	10,43	22,74	23,20	22,40	19,80
	18052	105,40	106,29	55,26	32,56	24,52	3,71	yes	P1-P2	P3	row	8,22	7,62	16,53	16,30	16,10	14,24
	18065	112,86	115,92	58,26	36,07	27,61	4,90	yes	P1-P2	P3 anterior	row	9,24	10,12	19,77	18,92	17,31	16,24
	21960	106,65	107,59	56,26	35,79	27,21	3,72	yes	P2 anterior	P3	row	8,79	10,25	18,03	16,82	16,47	15,74
	33824	*161*	*160*	75,46	45,24	32,94	9,51	yes +	P2 anterior	P3 anterior	row	12,27	11,93	27,74	28,12	27,00	24,39

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	Height *h-h'* P2	Height *h-h'* P1	Distance *a-d*	Distance *e-e'*	Coronoid angle (°) *n*	Aboral border ramus	Anterior border coronoid process	Angular process	Line k	Dental formula typical of:	Dental formula (mandibular) formula	missing teeth (diast.)
Canis l. lupus	445834	29,60	28,25	-	-	106	-	average	-	-	Canidae	3 1 4 3	n/a
Fossil	NMR86	29,10	29,87	-	-	110	-	average	no crest	-	Canidae	3 1 4 3	n/a
	NMR87	32,23	29,70	-	-	112	-	average	no crest	-	Canidae	3 1 4 3	n/a
	NMR88	31,84	29,20	-	-	104	-	average	no crest	-	Canidae	3 1 4 3	n/a
n		**17**	**18**	**14**	**14**	**18**	**14**	**18**	**17**	**14**	**18**	**18**	**n/a**
x		**27,20**	**25,59**	**53,37**	**71,66**	**108**							
SD		**2,82**	**2,82**	**5,86**	**6,78**	**3,51**							
MIN		**22,66**	**21,28**	**41,52**	**58,32**	**101**							
MAX		**32,23**	**29,87**	**63,98**	**86,21**	**115**							
SR MIN		**22,38**	**21,00**	**40,32**	**56,49**	**98**							
SR MAX		**32,51**	**30,15**	**65,18**	**88,04**	**118**							
PR MIN		**21,56**	**19,95**	**41,65**	**58,09**	**101**							
PR MAX		**32,84**	**31,22**	**65,09**	**85,22**	**115**							
Canis l. familiaris	7028	25,31	23,39	51,62	71,25	106	rear	average	no crest	condyle	Canidae	3/3 1/1 4/4 2/3	R P1 inf., L&R I1 inf.
Recent	12547	14,56	13,96	33,88	43,34	102	rear	thin	no crest	angular	Canidae	3/3 1/1 (4/5)/4 2/3	n/a
	12548	19,79	20,05	37,53	53,91	95	vertical	thin	no crest	condyle	Canidae	3/3 1/1 4/4 2/3	n/a
	17755	15,97	15,64	34,34	45,72	104	rear	thin	no crest	equal	Canidae	3/3 1/1 4/4 2/3	n/a
	17758	16,21	16,14	31,70	47,41	105	rear	thin	no crest	condyle	Canidae	3/3 1/1 4/4 2/3	R I1 sup., R P1 sup.
	17792	16,11	16,24	37,63	51,14	106	rear	average	no crest	condyle	Canidae	3/3 1/1 4/4 2/3	n/a
	17793	17,64	17,40	37,91	51,15	103	rear	thin	no crest	angular	Canidae	3/3 1/1 4/4 2/3	n/a
	18049	16,47	15,87	38,74	54,01	100	rear	thin	no crest	equal	Canidae	3/3 1/1 4/4 2/3	R&L P1 inf.
	18050	15,31	16,12	36,13	53,82	102	rear	average	no crest	condyle	Canidae	3/3 1/1 4/4 2/3	n/a
	18051	20,64	18,58	43,56	60,01	97	rear	thin	no crest	equal	Canidae	3/3 1/1 4/4 2/3	n/a
	18052	13,72	13,50	33,33	43,79	100	front	thin	no crest	equal	Canidae	3/3 (2/1)/1 4/4 2/3	n/a
	18065	16,44	16,70	33,26	48,70	98	rear	thin	no crest	condyle	Canidae	3/3 1/1 4/4 2/3	n/a
	21960	16,41	16,11	-	-	103	-	thin	no crest	equal	Canidae	3/3 1/1 4/4 2/3	n/a
	33824	24,59	23,55	51,18	66,72	100	vertical	thin	no crest	angular	Canidae	3/3 1/1 4/4 2/3	n/a

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	missing teeth (alv.)	M3	Height crown P1	Height crown P4	Height crown M1	Length M1	Length M2	Breadth M1	Breadth M2
Canis l. lupus	445834	M3, all I	yes	6,68	-	15,45	28,52	11,38	10,79	8,59
Fossil	NMR86	L M3, P1-I1	yes	-	11,79	17,87	30,65	12,39	12,28	9,52
	NMR87	L M3, C-I1	yes	-	-	-	30,00	10,92	11,59	8,67
	NMR88	R M3, P1-I1	yes	-	-	17,56	29,00	12,00	11,92	9,02
n		**n/a**	**18**	**11**	**13**	**17**	**18**	**17**	**18**	**17**
x				**5,27**	**9,86**	**15,61**	**27,19**	**11,4**	**10,9**	**8,63**
SD				**0,85**	**1,50**	**1,88**	**2,20**	**0,91**	**0,93**	**0,60**
MIN				**3,75**	**6,96**	**11,18**	**21,97**	**9,57**	**8,41**	**7,62**
MAX				**6,68**	**11,8**	**17,87**	**30,65**	**13,5**	**12,3**	**9,87**
SR MIN				**3,61**	**6,82**	**11,04**	**21,13**	**8,73**	**8,19**	**7,40**
SR MAX				**6,82**	**11,9**	**18,01**	**31,49**	**14,3**	**12,5**	**10,1**
PR MIN				**3,58**	**6,87**	**11,86**	**22,79**	**9,60**	**9,08**	**7,43**
PR MAX				**6,97**	**12,9**	**19,37**	**31,60**	**13,2**	**12,8**	**9,84**
Canis l. familiaris	7028	n/a	yes	4,34	8,96	12,71	25,28	10,33	9,63	7,59
Recent	12547	n/a	yes	3,65	6,04	10,42	16,73	7,46	6,28	5,30
	12548	n/a	yes	4,26	7,89	11,87	20,16	8,54	7,75	6,17
	17755	L&R P4 inf.	yes	3,97	-	10,98	17,86	8,00	7,20	5,87
	17758	L P2 inf.	yes	4,17	7,52	11,27	20,07	8,80	7,80	6,46
	17792	n/a	yes	4,29	7,73	11,35	20,57	9,11	7,17	6,75
	17793	n/a	yes	3,78	7,25	11,41	20,56	10,01	7,61	6,79
	18049	n/a	yes	-	7,54	11,44	19,41	8,85	7,13	5,76
	18050	R I1 sup.	yes	3,74	7,02	11,65	20,24	7,79	7,74	6,11
	18051	n/a	yes	6,94	7,46	11,83	21,83	9,27	8,58	6,67
	18052	n/a	yes	3,19	6,32	9,66	17,70	6,39	6,42	5,34
	18065	n/a	yes	3,82	7,06	11,61	19,13	7,83	6,71	5,28
	21960	L P1 inf., L M3 inf., R P1 sup.	yes	-	6,23	10,11	19,36	8,33	6,94	5,96
	33824	R P2 sup., L P1&P2 sup., R P2 sup.	yes	4,71	8,82	13,55	24,66	9,74	9,88	7,50

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	Cusps P1 protoconid	P2 mesial	P2 protoconid	P2 metastylid	P3 mesial	P3 protoconid	P3 metastylid	P3 distal	P4 mesial	P4 protoconid	P4 metastylid	P4 distal
Canis l. lupus	445834	flat	x	yes	yes	x	yes	yes	cingulum	-	-	-	-
Fossil	NMR86	-	x	yes	x	x	yes	yes	cingulum	parastylid	yes	yes	metaconulid
	NMR87	-	x	yes	yes	x	yes	yes	cingulum	x	yes	yes	cingulum
	NMR88	-	x	yes	yes	x	yes	yes	cingulum	x	yes	yes	metaconulid
n		**12**	**17**	**17**	**16**	**16**	**16**	**16**	**16**	**16**	**16**	**16**	**16**
x													
SD													
MIN													
MAX													
SR MIN													
SR MAX													
PR MIN													
PR MAX													
Canis l. familiaris	7028	flat	x	yes	yes	cingulum	yes	yes	metaconulid	cingulum	yes	yes	metaconulid
Recent	12547	pointy	x	yes	x	x	yes	yes	metaconulid	x	yes	yes	metaconulid
	12548	pointy	parastylid	yes	yes	cingulum	yes	yes	metaconulid	cingulum	yes	yes	metaconulid
	17755	pointy	x	yes	yes	x	yes	yes	metaconulid	-	-	-	-
	17758	pointy	x	yes	x	x	yes	yes	cingulum	x	yes	yes	metaconulid
	17792	pointy	x	yes	x	cingulum	yes	yes	metaconulid	cingulum	yes	yes	metaconulid
	17793	pointy	x	yes	x	x	yes	yes	metaconulid	x	yes	yes	metaconulid
	18049	-	x	yes	yes	x	yes	yes	metaconulid	cingulum	yes	yes	metaconulid
	18050	pointy	x	yes	x	cingulum	yes	yes	metaconulid	cingulum	yes	yes	metaconulid
	18051	flat	cingulum	yes	yes	cingulum	yes	yes	cingulum	cingulum	yes	yes	metaconulid
	18052	pointy	x	yes	x	x	yes	yes	metaconulid	cingulum	yes	yes	metaconulid
	18065	pointy	x	yes	yes	cingulum	yes	yes	metaconulid	x	yes	yes	metaconulid
	21960	-	cingulum	yes	yes	x	yes	yes	cingulum	x	yes	yes	metaconulid
	33824	flat	x	yes	yes	x	yes	yes	metaconulid	x	yes	yes	metaconulid

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	M1 trigonid: protoconid	M1 trigonid: paraconid	M1 trigonid: metaconid	M1 talonid: hypoconid	M1 talonid: entoconid	M2 trigonid: protoconid	M2 trigonid: metaconid	M2 talonid: hypoconid	M2 talonid: entoconid
Canis l. lupus	445834	yes	yes	yes	yes	yes	yes	yes	yes	edge
Fossil	NMR86	yes	yes	yes	yes	yes	yes	yes	yes	edge
	NMR87	yes	yes	yes	yes	yes	yes	yes	yes	edge
	NMR88	yes	yes	yes	yes	yes	yes	yes	yes	edge
n		**18**	**18**	**18**	**18**	**18**	**18**	**18**	**17**	**17**
x										
SD										
MIN										
MAX										
SR MIN										
SR MAX										
PR MIN										
PR MAX										
Canis l. familiaris	7028	yes	yes	yes	yes	yes	yes	yes	yes	edge
Recent	12547	yes	yes	yes	yes	yes	yes	yes	yes	edge
	12548	yes	yes	yes	yes	yes	yes	yes	yes	edge
	17755	yes	yes	yes	yes	yes	yes	yes	yes	edge
	17758	yes	yes	yes	yes	yes	yes	yes	yes	edge
	17792	yes	yes	yes	yes	yes	yes	yes	yes	edge
	17793	yes	yes	yes	yes	yes	yes	yes	yes	edge
	18049	yes	yes	yes	yes	yes	yes	yes	yes	edge
	18050	yes	yes	yes	yes	yes	yes	yes	yes	edge
	18051	yes	yes	yes	yes	yes	yes	yes	yes	edge
	18052	yes	yes	yes	yes	yes	yes	yes	yes	edge
	18065	yes	yes	yes	yes	yes	yes	yes	yes	edge
	21960	yes	yes	yes	yes	yes	yes	yes	yes	edge
	33824	yes	yes	yes	yes	yes	yes	yes	yes	edge

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	Material description: Date	Ingekomen	Legit	Donated by
Canis l. lupus	445834				
Fossil	NMR86				
	NMR87				
	NMR88				
n					
x					
SD					
MIN					
MAX					
SR MIN					
SR MAX					
PR MIN					
PR MAX					

Canis l. familiaris	7028	16-02-1946		N.A. Commandeur (vet)	
Recent	12547	01-05-1958		P.H. Van Doesburg jr	
	12548	26-01-1963		Suriname Exc. 1962-1963 A.M. Husson and P. Staffeleu. (verz.no. 335).	
	17755	26-01-1963		Suriname Exc. 1962-1963 A.M. Husson and P. Staffeleu. (verz.no. 342).	
	17758	26-01-1963			
	17792	26-01-1963		Suriname Exc. 1962-1963 A.M. Husson and P. Staffeleu. (verz.no. 317).	
	17793	24-12-1962		Suriname Exc. 1962-1963 A.M. Husson and P. Staffeleu. (verz.no. 84).	
	18049	07-03-1963		Suriname Exc. 1962-1963 A.M. Husson and P. Staffeleu. (verz.no. 384).	
	18050	04-01-1963		Suriname Exc. 1962-1963 A.M. Husson and P. Staffeleu. (verz.no. 198).	
	18051	04-01-1963		Suriname Exc. 1962-1963 A.M. Husson and P. Staffeleu. (verz.no. 199).	
	18052	18-01-1963		Suriname Exc. 1962-1963 A.M. Husson and P. Staffeleu. (verz.no. 164).	
	18065	26-01-1963		Suriname Exc. 1962-1963 A.M. Husson and P. Staffeleu. (verz.no. 337).	
	21960	23-04-1971		N.W.Sur.Exp. 1971, P. Staffeleu (verz.no. 251)	
	33824			H.J.V. Sody	

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	Length mandible		Alveolar length			Diastema length		Mental foramina		Incisors	Width mandible		Height *h-h'*			
		a-b	*c-b*	P1-M2	P4-M1-M2	M1-M2	C-P1	P2-P3 & P3-P4	middle	posterior		*i-i'*	*k-k'*	M2	M1	P4	P3
Canis l. familiaris	34601	144,11	146,38	68,58	40,35	28,99	7,55	yes +	P1-P2	P3	row	11,18	9,95	24,18	24,41	23,70	20,55
Recent	34605	121,00	121,97	62,71	36,60	25,99	5,89	yes +	P1-P2	P2-P3	row	9,92	9,30	18,82	21,11	22,25	21,75
	34608	134,22	136,06	66,56	38,81	28,87	6,18	yes +	P2 anterior	P3 anterior	row	10,17	9,92	21,22	20,38	18,09	17,21
	34614	105,69	109,21	56,91	37,27	26,27	2,56	x	P1-P2	P3 anterior	row	7,94	9,10	16,09	16,67	16,11	14,70
	34617	130,77	134,87	66,36	39,37	28,30	5,21	yes +	P2 posterior	P3	row	8,57	7,90	20,13	19,42	19,57	18,19
	34618	141,20	146,64	72,42	43,08	32,68	6,73	yes +	P2 anterior	P3 posterior	row	10,06	9,90	22,45	23,70	24,37	21,01
Fossil	29780	148,77	151,08	71,66	41,49	29,45	8,51	yes +	P1-P2	P2-P3	row	13,08	12,79	24,30	26,22	24,97	22,73
	30457	143,34	146,84	74,94	42,97	30,11	-	yes +	P2 anterior	P3	row	11,40	12,90	22,59	22,63	22,34	20,96
	30807	146,71	146,74	72,13	43,45	30,83	5,71	yes	P1-P2	P3 anterior	row	15,48	13,26	27,04	26,72	24,11	21,33
	30818	*159*	*159*	75,48	43,35	30,61	6,25	yes +	P2 anterior	P3 anterior	row	14,67	14,49	27,20	28,28	26,74	23,32
	30828	*159*	*157*	75,49	43,34	31,79	5,93	yes +	P1-P2	P3 anterior	row	14,05	14,59	27,49	27,70	25,97	22,15
	30841	137,81	136,34	69,03	42,79	31,45	4,86	x	P2 anterior	P3 anterior	row	11,83	13,31	23,46	22,84	21,50	19,20
	30900	151,88	150,38	74,70	45,40	34,56	6,06	yes	P1-P2	P3 anterior	crowded	13,65	14,83	28,18	26,20	23,74	21,54
	32044	126,03	124,56	64,60	39,54	28,64	3,98	yes	P1-P2	P3 anterior	crowded	10,53	12,41	18,88	19,41	18,74	18,08
	32050	146,23	148,07	73,74	42,19	30,30	6,33	yes +	P1-P2	P3 anterior	crowded	13,17	13,67	26,44	27,51	25,37	22,84
	35036	129,36	129,97	66,42	39,56	28,94	5,01	yes +	P1-P2	P2-P3	row	10,82	11,44	20,95	21,11	18,93	18,52
	69408	134,95	134,46	67,74	43,22	31,99	4,61	x	P2 anterior	P3 anterior	row	11,18	12,95	23,89	20,77	19,87	19,32
	74489	*159*	*160*	75,82	45,43	33,92	5,28	yes	P1-P2	P3 anterior	row	14,20	13,95	30,73	28,55	25,78	23,52
	74506	154,38	150,82	73,73	44,08	30,57	4,80	yes +	P1-P2	P3 anterior	crowded	12,82	14,20	21,95	23,59	22,59	21,64
	93211	153,77	*157*	78,34	46,55	33,11	6,01	yes +	P2 anterior	P3 anterior	row	13,94	15,19	24,92	25,70	25,27	25,43
	97302	145,20	142,70	67,99	41,03	28,32	6,15	yes +	P1-P2	P3 anterior	crowded	12,38	12,80	23,57	23,79	21,13	20,14
	117724	131,65	134,44	69,95	40,57	30,13	4,46	yes	P2 anterior	P3	-	11,81	13,20	24,86	21,68	20,96	19,44
	117731	-	-	79,48	46,22	34,58	6,88	yes +	P1-P2	P3 posterior	-	14,55	15,66	33,15	32,56	27,98	24,51
	123156	124,95	125,14	62,62	38,17	27,99	6,65	yes	P1-P2	-	row	10,81	11,56	22,64	20,96	20,44	18,84
	123547	*158*	*159*	75,27	45,85	33,44	7,59	yes +	P1-P2	-	row	13,75	15,29	28,82	28,03	26,58	23,01
	124605	132,59	135,90	65,53	40,32	29,32	5,60	yes	P1-P2	P3 posterior	crowded	11,05	11,74	21,82	22,32	22,69	21,35
	154234	138,73	143,44	70,28	43,93	32,76	5,55	yes	P1-P2	P3	row	11,42	13,75	21,53	21,93	22,83	21,55
	154355	*158*	*163*	77,83	46,79	33,64	4,65	yes	P1-P2	P2-P3	-	14,46	16,54	27,01	28,24	28,00	24,33

Appendix XIII: Complete original dataset

Canidae material	reg. no.	Height *h-h'* P2	Height *h-h'* P1	Distance *a-d*	Distance *e-e'*	Coronoid angle (°) *n*	Aboral border ramus	Anterior border coronoid process	Angular process	Line k	Dental formula typical of:	(mandibular) formula	missing teeth (diast.)
Canis l. familiaris	34601	20,56	20,67	43,86	65,31	106	rear	thin	no crest	condyle	Canidae	3/3 1/1 4/4 2/3	R P2 inf., R M2 inf.
Recent	34605	16,65	17,76	31,54	45,28	111	rear	thin	no crest	condyle	Canidae	3/3 1/1 4/4 2/3	n/a
	34608	17,18	18,40	37,42	53,37	108	vertical	thick	no crest	equal	Canidae	3/3 1/1 4/4 2/3	n/a
	34614	16,13	15,68	30,44	41,38	103	vertical	thin	crest	condyle	Canidae	3/3 1/1 4/4 2/3	n/a
	34617	18,44	17,39	37,42	48,58	107	rear	thin	no crest	condyle	Canidae	3/3 1/1 4/4 2/3	n/a
	34618	20,70	19,68	39,85	51,42	109	rear	average	no crest	condyle	Canidae	3/3 1/1 4/4 2/3	n/a
Fossil	29780	22,68	22,34	44,90	55,40	106	vertical	average	no crest	-	Canidae	3 1 4 3	n/a
	30457	22,18	22,44	42,94	57,67	110	rear	average	no crest	condyle	Canidae	3 1 4 3	P1
	30807	22,25	22,04	42,20	60,15	101	rear	thin	no crest	equal	Canidae	3 1 4 3	n/a
	30818	21,54	22,59	48,40	64,82	100	vertical	thick	no crest	angular	Canidae	3 1 4 3	n/a
	30828	22,07	22,64	47,77	66,30	101	vertical	thick	no crest	angular	Canidae	3 1 4 3	n/a
	30841	19,79	20,53	38,64	55,72	98	rear	thin	no crest	angular	Canidae	3 1 4 3	n/a
	30900	21,50	22,77	46,35	62,63	102	vertical	thin	no crest	angular	Canidae	3 1 4 3	n/a
	32044	18,91	19,70	37,10	51,07	97	vertical	average	no crest	angular	*Cuon*	3 1 4 2	M3
	32050	24,72	24,01	43,25	57,51	107	rear	average	no crest	-	Canidae	3 1 4 3	n/a
	35036	17,92	17,71	43,45	52,41	103	rear	thin	no crest	equal	Canidae	3 1 4 3	n/a
	69408	19,90	19,63	44,62	60,07	103	rear	average	no crest	equal	Canidae	3 1 4 3	n/a
	74489	23,30	24,18	46,33	64,52	102	rear	thin	no crest	condyle	Canidae	3 1 4 3	n/a
	74506	21,80	21,94	-	-	96	rear	thin	no crest	angular	*Cuon*	3 1 4 2	M3
	93211	26,53	25,47	45,79	61,73	102	vertical	thin	no crest	condyle	Canidae	3 1 4 3	n/a
	97302	21,21	20,50	42,34	61,31	101	rear	average	no crest	angular	Canidae	3 1 4 3	n/a
	117724	20,47	19,91	40,76	57,48	100	vertical	thin	no crest	-	Canidae	3 1 4 3	n/a
	117731	24,57	24,91	-	-	94	vertical	thin	no crest	angular	Canidae	3 1 4 3	n/a
	123156	18,13	18,44	34,25	51,10	108	rear	thin	no crest	angular	Canidae	3 1 4 3	n/a
	123547	24,46	23,70	48,36	66,33	106	rear	thin	no crest	angular	Canidae	3 1 4 3	n/a
	124605	20,77	20,62	39,45	52,72	108	rear	thin	no crest	condyle	Canidae	3 1 4 3	n/a
	154234	21,54	21,52	41,59	55,52	105	vertical	average	no crest	-	Canidae	3 1 4 3	n/a
	154355	25,12	25,01	46,74	60,79	110	rear	thick	no crest	condyle	Canidae	3 1 4 3	n/a

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	missing teeth (alv.)	M3	Height crown			Length		Breadth	
				P1	P4	M1	M1	M2	M1	M2
Canis l. familiaris	34601	L P2 inf., R P1 sup.	yes	4,22	7,62	10,75	19,90	9,55	8,05	6,76
Recent	34605	L P4 inf., L&R M3 inf.	yes	4,12	5,52	10,54	19,13	7,47	7,30	5,90
	34608	L&R I1 inf, L M3 inf.	yes	4,00	7,96	11,33	19,70	9,16	7,35	6,70
	34614	L M3 inf., R P1&P2 inf&sup., L P1 sup.	yes	4,50	6,81	10,40	18,98	8,89	7,32	6,40
	34617	n/a	yes	4,75	7,45	11,57	20,02	9,10	7,82	6,69
	34618	L M3 inf.	yes	4,82	8,24	12,58	22,88	10,01	8,93	7,20
Fossil	29780	M3, P1-I1	yes	-	-	-	20,92	9,22	8,23	6,45
	30457	M3&M2, C-I1	yes	-	8,22	11,12	20,82	-	8,82	-
	30807	M3, P4&P3, P1-I1	yes	-	-	11,55	22,04	8,59	8,35	6,55
	30818	P3-I1	yes	-	8,58	12,50	22,29	9,55	8,65	7,02
	30828	M3, P1-I1	yes	-	7,77	12,87	22,05	9,25	9,22	6,95
	30841	M3, P3-I1	yes	-	-	-	22,80	9,50	9,26	6,61
	30900	M3, M2, P1-I1	yes	-	8,76	13,24	24,34	-	9,91	-
	32044	M2, P1-I1	x	-	8,24	11,92	21,14	-	8,59	-
	32050	M3, P1-I1	yes	-	7,75	12,15	22,52	9,09	7,93	6,18
	35036	M3, P1-I1	yes	-	7,52	11,42	20,43	8,70	8,57	6,64
	69408	M3, M1-P1, all I	yes	-	-	-	-	9,25	-	6,61
	74489	M3, M1-i1	yes	-	-	-	-	11,33	-	7,75
	74506	M2-P4, P2-I1	x	-	-	-	-	-	-	-
	93211	M3, P3-I1	yes	-	9,83	13,99	25,08	10,12	9,83	7,51
	97302	M3, P1-I1	yes	-	-	-	21,64	8,55	8,23	6,83
	117724	M3, P1, all I	yes	-	8,23	11,73	21,79	9,18	8,33	6,47
	117731	M3, C-I1	yes	-	-	-	24,84	9,40	9,36	7,04
	123156	all M, P1-3, all I	yes	-	8,49	-	-	-	-	-
	123547	M3&M2, P3, I3	yes	4,65	-	13,19	22,90	-	9,76	-
	124605	M3, P1, all I	yes	-	-	-	20,13	9,73	7,86	6,43
	154234	M3, I3, 1	yes	3,99	8,49	12,31	23,51	10,81	9,10	7,05
	154355	P3-I1	yes	-	-	-	24,02	10,40	10,11	7,82

Appendix XIII: Complete original dataset

Canidae material	reg. no.	Cusps P1 protoconid	P2 mesial	P2 protoconid	P2 metastylid	P3 mesial	P3 protoconid	P3 metastylid	P3 distal	P4 mesial	P4 protoconid	P4 metastylid	P4 distal
Canis l. familiaris	34601	flat	-	-	-	x	yes	yes	metaconulid	x	yes	yes	metaconulid
Recent	34605	pointy	x	yes	x	x	yes	yes	cingulum	parastylid	yes	yes	metaconulid
	34608	pointy	x	yes	yes	cingulum	yes	yes	cingulum	parastylid	yes	yes	metaconulid
	34614	pointy	x	yes	yes	x	yes	yes	cingulum	x	yes	yes	metaconulid
	34617	pointy	x	yes	yes	cingulum	yes	yes	metaconulid	parastylid	yes	yes	metaconulid
	34618	flat	x	yes	yes	x	yes	yes	metaconulid	parastylid	yes	yes	metaconulid
Fossil	29780	-	x	yes	yes	x	yes	yes	metaconulid	cingulum	yes	yes	cingulum
	30457	-	cingulum	yes	yes	x	yes	yes	metaconulid	x	yes	yes	metaconulid
	30807	-	x	yes	yes	-	-	-	-	-	-	-	-
	30818	-	-	-	-	-	-	-	-	x	yes	yes	metaconulid
	30828	-	x	yes	yes	x	yes	yes	metaconulid	x	yes	yes	metaconulid
	30841	-	-	-	-	-	-	-	-	parastylid	yes	yes	cingulum
	30900	-	x	yes	yes	x	yes	yes	metaconulid	x	yes	yes	metaconulid
	32044	-	x	yes	yes	x	yes	yes	cingulum	x	yes	yes	metaconulid
	32050	-	parastylid	yes	yes	parastylid	yes	yes	cingulum	parastylid	yes	yes	metaconulid
	35036	-	cingulum	yes	yes	cingulum	yes	yes	cingulum	cingulum	yes	yes	metaconulid
	69408	-	-	-	-	-	-	-	-	-	-	-	-
	74489	-	-	-	-	-	-	-	-	-	-	-	-
	74506	-	-	-	-	x	yes	yes	cingulum	-	-	-	-
	93211	-	cingulum	yes	yes	cingulum	yes	yes	cingulum	x	yes	yes	metaconulid
	97302	-	x	yes	x	x	yes	yes	cingulum	x	yes	yes	metaconulid
	117724	-	parastylid	yes	yes	cingulum	yes	yes	cingulum	parastylid	yes	yes	metaconulid
	117731	flat	cingulum	yes	yes	x	yes	yes	metaconulid	parastylid	yes	yes	metaconulid
	123156	-	-	-	-	-	-	-	-	x	yes	yes	cingulum
	123547	flat	x	yes	yes	-	-	-	-	x	yes	yes	cingulum
	124605	-	cingulum	yes	x	cingulum	yes	yes	cingulum	cingulum	yes	yes	metaconulid
	154234	flat	cingulum	yes	yes	x	yes	yes	cingulum	x	yes	yes	metaconulid
	154355	-	-	-	-	-	-	-	-	x	yes	yes	metaconulid

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	M1 trigonid: protoconid	M1 trigonid: paraconid	M1 trigonid: metaconid	M1 talonid: hypoconid	M1 talonid: entoconid	M2 trigonid: protoconid	M2 trigonid: metaconid	M2 talonid: hypoconid	M2 talonid: entoconid
Canis l. familiaris	34601	yes	yes	yes	yes	yes	yes	yes	yes	edge
Recent	34605	yes	yes	yes	yes	yes	yes	yes	yes	edge
	34608	yes	yes	yes	yes	yes	yes	yes	yes	edge
	34614	yes	yes	yes	yes	yes	yes	yes	yes	edge
	34617	yes	yes	yes	yes	yes	yes	yes	yes	edge
	34618	yes	yes	yes	yes	yes	yes	yes	yes	edge
Fossil	29780	yes	yes	yes	yes	yes	yes	yes	yes	edge
	30457	yes	yes	yes	yes	yes	-	-	-	-
	30807	yes	yes	yes	yes	yes	yes	yes	yes	edge
	30818	yes	yes	yes	yes	yes	yes	yes	yes	edge
	30828	yes	yes	yes	yes	yes	yes	yes	yes	yes
	30841	yes	yes	yes	yes	yes	yes	yes	yes	edge
	30900	yes	yes	yes	yes	yes	-	-	-	-
	32044	yes	yes	yes	yes	yes	-	-	-	-
	32050	yes	yes	yes	yes	yes	yes	yes	yes	edge
	35036	yes	yes	yes	yes	yes	yes	yes	yes	edge
	69408	-	-	-	-	-	yes	yes	yes	edge
	74489	-	-	-	-	-	yes	yes	yes	yes
	74506	-	-	-	-	-	-	-	-	-
	93211	yes	yes	yes	yes	yes	yes	yes	yes	edge
	97302	yes	yes	yes	yes	yes	yes	yes	yes	edge
	117724	yes	yes	yes	yes	yes	yes	yes	yes	edge
	117731	yes	yes	yes	yes	yes	yes	yes	yes	edge
	123156	-	-	-	-	-	-	-	-	-
	123547	yes	yes	yes	yes	yes	-	-	-	-
	124605	yes	yes	yes	yes	yes	yes	yes	yes	edge
	154234	yes	yes	yes	yes	yes	yes	yes	yes	edge
	154355	yes	yes	yes	yes	yes	yes	yes	yes	edge

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	Material description: Date	Ingekomen	Legit	Donated by
Canis l. familiaris	34601	1935		J. Westendorp	
Recent	34605	1935		Dhr. Kok, Schiedam d.b.v. J. Westendorp	
	34608	1935		J. Westendorp	
	34614	1935		J. Westendorp	
	34617	1935		J. Westendorp	
	34618	1935		J. Westendorp	
Fossil	29780				
	30457				
	30807				
	30818				
	30828				
	30841				
	30900				
	32044				
	32050				
	35036				
	69408				R.O.B., 13-05-1953
	74489				R.O.B., 15-12-1954
	74506				R.O.B., 15-12-1954
	93211				Tolhuis, J., 30-6-1958
	97302				Rijksmuseum van Natuurlijke Historie 18-10-1960
	117724				Douwes, W.B., 14-1-1963
	117731				Douwes, W.B., 14-1-1963
	123156				Rijks geologische dienst 9-2-1965
	123547				Zool. Museum Amsterdam 7-4-1965
	124605				Theunissen, H. 14-10-1965
	154234				Butter, J. 13-3-1970
	154355				Butter, J., 13-3-1970

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	Length mandible		Alveolar length			Diastema length		Mental foramina		Incisors	Width mandible		Height *h-h'*			
		a-b	*c-b*	P1-M2	P4-M1-M2	M1-M2	C-P1	P2-P3 & P3-P4	middle	posterior		*i-i'*	*k-k'*	M2	M1	P4	P3
n		**41**	**41**	**42**	**42**	**42**	**41**	**42**	**42**	**40**	**39**	**42**	**42**	**42**	**42**	**42**	**42**
x		**135**	**137**	**68,01**	**41,03**	**29,91**	**5,63**					**11,4**	**11,9**	**22,76**	**22,61**	**21,58**	**19,76**
SD		**18,5**	**18,4**	**7,59**	**4,09**	**2,80**	**1,48**					**2,06**	**2,24**	**4,06**	**4,22**	**3,87**	**3,31**
MIN		**103**	**104**	**52,85**	**32,12**	**24,27**	**2,56**					**7,78**	**7,62**	**16,09**	**16,30**	**15,72**	**14,24**
MAX		**172**	**177**	**83,50**	**49,51**	**35,41**	**9,51**					**15,5**	**16,5**	**33,15**	**32,56**	**28,00**	**25,55**
SR MIN		**102**	**103**	**52,67**	**31,94**	**24,09**	**2,38**					**7,64**	**6,98**	**15,81**	**16,02**	**15,44**	**13,96**
SR MAX		**173**	**178**	**83,68**	**49,69**	**38,25**	**9,69**					**15,6**	**17,2**	**33,43**	**32,84**	**28,28**	**25,83**
PR MIN		**98,2**	**99,6**	**52,82**	**32,85**	**24,30**	**2,67**					**7,29**	**7,44**	**14,63**	**14,17**	**13,83**	**13,14**
PR MAX		**172**	**173**	**83,19**	**49,21**	**35,52**	**8,59**					**15,5**	**16,4**	**30,89**	**31,05**	**29,33**	**26,38**
Cuon alpinus	945	142,17	139,32	68,65	42,37	31,37	3,90	yes	P2	P3 posterior	crowded	14,35	12,20	25,10	23,74	27,41	26,75
Recent	1546	127,70	125,95	60,99	38,68	28,65	2,77	x	P2 anterior	P3 posterior	crowded	11,22	12,70	22,80	22,77	20,58	19,29
	1694	133,91	131,65	62,24	38,18	28,83	4,77	x	P2	P3 posterior	crowded	11,79	11,00	21,17	21,33	18,29	19,01
	2680	124,39	124,57	60,82	38,14	29,00	4,17	yes	P2	P3	crowded	10,41	10,57	21,68	21,41	19,30	18,31
	2681	133,04	131,79	64,04	40,48	29,34	2,58	x	P2	P3 posterior	crowded	10,88	11,20	22,64	21,56	20,45	19,58
	4681	128,91	128,65	62,17	38,66	27,89	3,59	yes	P2	P3 posterior	crowded	11,06	11,43	22,06	21,99	19,91	18,59
	4682	132,37	131,22	63,57	38,27	28,59	2,46	yes	P2	P4	crowded	10,92	11,21	23,11	21,87	19,15	18,61
	4683	122,64	120,85	58,40	37,54	27,35	2,83	x	P2 anterior	P3 anterior	crowded	10,81	10,95	21,18	19,68	18,05	17,68
	15751	125,33	122,42	59,77	36,65	26,37	2,80	yes	P2	P3 posterior	crowded	10,55	10,84	22,48	20,47	18,23	17,30
	20551	109,23	107,20	51,32	32,64	23,51	4,76	x	P2 anterior	P3 posterior	-	10,33	10,41	21,70	19,58	15,35	14,70
	33819	128,26	123,87	62,08	38,44	28,51	2,18	x	P2	P4	crowded	10,94	11,50	21,80	19,26	18,10	16,25
	33820	127,82	124,42	61,62	38,33	27,97	1,83	yes	P2 anterior	P3 posterior	crowded	10,75	11,75	21,61	19,83	18,72	18,54
	33821	119,69	116,05	56,48	36,33	27,89	2,24	x	P2 anterior	P3 posterior	crowded	10,57	10,85	21,87	20,40	18,84	17,23
	33822	129,02	126,86	61,25	37,82	27,67	1,98	yes	P2	P3 posterior	crowded	11,24	12,13	23,43	20,47	18,15	17,33
	33823	132,03	129,80	62,65	37,97	28,17	3,07	yes	P2 anterior	P3	crowded	11,35	12,88	22,54	21,25	19,66	19,58
	33841	129,35	126,96	61,51	39,01	28,94	2,53	yes	P2 posterior	P3 posterior	crowded	11,03	12,30	22,94	21,88	19,82	18,38
	1694-java	129,63	126,44	59,28	40,07	29,45	x	x	P2	P3 posterior	crowded	10,91	11,35	21,74	21,34	19,75	18,60
	Cuon#1	130,97	128,27	62,40	40,63	29,90	2,38	x	P2 anterior	P3 posterior	crowded	12,10	12,17	23,08	21,10	18,14	17,81
	Cuon#2	122,59	121,34	59,43	36,66	27,12	3,49	yes	P2	P3 posterior	crowded	10,84	11,18	22,82	20,34	18,51	17,33
	Cuon-a-java	129,19	128,01	62,29	37,98	27,72	2,76	yes	P2 anterior	P3 posterior	row	11,60	11,39	21,66	21,32	19,91	18,24
	Cuon-a-sib	148,34	142,95	68,28	42,67	30,48	3,30	x	P2 anterior	P3 anterior	row	12,20	11,74	24,03	24,04	22,62	20,27

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	Height *h-h'* P2	Height *h-h'* P1	Distance *a-d*	Distance *e-e'*	Coronoid angle (°) *n*	Aboral border ramus	Anterior border coronoid process	Angular process	Line k	Dental formula typical of:	Dental formula (mandibular) formula	missing teeth (diast.)
n		**42**	**42**	**39**	**39**	**42**	**41**	**42**	**42**	**38**	**42**	**42**	**n/a**
x		**20,00**	**19,89**	**40,68**	**55,68**	**103**							
SD		**3,32**	**3,24**	**5,62**	**7,37**	**4,2**							
MIN		**13,72**	**13,50**	**30,44**	**41,38**	**94**							
MAX		**26,53**	**25,47**	**51,62**	**71,25**	**111**							
SR MIN		**13,44**	**13,22**	**29,24**	**39,55**	**91**							
SR MAX		**26,81**	**25,75**	**52,82**	**73,08**	**114**							
PR MIN		**13,36**	**13,42**	**29,44**	**40,94**	**94**							
PR MAX		**26,65**	**26,36**	**51,92**	**70,42**	**111**							
Cuon alpinus	945	24,61	19,74	48,14	61,74	105	vertical	average	crest	angular	Cuon	3/3 1/1 4/4 2/2	n/a
Recent	1546	19,58	19,81	41,23	57,61	104	front	thick	crest	angular	Cuon	3/3 1/1 4/4 2/2	n/a
	1694	19,54	19,93	41,22	58,02	106	vertical	thick	crest	angular	Cuon	3/3 1/1 4/4 2/2	n/a
	2680	19,87	19,52	39,04	51,85	107	vertical	thick	crest	angular	Cuon	3/3 1/1 4/4 2/2	n/a
	2681	21,07	18,42	39,88	55,13	107	vertical	thick	crest	angular	Cuon	3/3 1/1 4/4 2/2	n/a
	4681	20,39	19,80	40,15	56,37	110	vertical	thick	crest	angular	Cuon	3/3 1/1 4/4 2/2	n/a
	4682	20,15	19,64	41,22	57,09	111	vertical	average	crest	angular	Cuon	3/3 1/1 4/4 2/2	n/a
	4683	18,77	18,22	39,06	51,61	106	front	thick	crest	angular	Cuon	3/3 1/1 4/4 2/2	n/a
	15751	18,64	18,12	39,65	51,68	109	vertical	average	crest	angular	Cuon	3/3 1/1 4/4 2/2	n/a
	20551	13,77	14,58	32,77	46,66	108	vertical	thick	crest	angular	Cuon	3/3 1/1 4/4 (1-2)/2	n/a
	33819	16,88	17,57	41,94	52,74	108	rear	average	crest	angular	Cuon	3/3 1/1 4/4 2/2	R P1 inf.
	33820	19,50	19,05	40,76	54,84	106	vertical	average	crest	angular	Cuon	3/3 1/1 4/4 2/2	n/a
	33821	18,40	19,24	38,40	52,10	106	vertical	thick	crest	angular	Cuon	3/3 1/1 4/4 2/2	n/a
	33822	19,20	20,06	41,92	57,94	105	vertical	thick	crest	angular	Cuon	3/3 1/1 4/4 2/2	n/a
	33823	20,49	21,78	43,19	57,37	102	front	thick	crest	angular	Cuon	3/3 1/1 4/4 2/2	n/a
	33841	19,79	20,03	39,45	53,72	108	vertical	average	crest	angular	Cuon	3/3 1/1 4/4 2/2	n/a
	1694-java	19,56	-	41,00	54,06	102	vertical	average	no crest	angular	Cuon	3/3 1/1 4/4 2/2	L&R P1 inf.
	Cuon#1	19,92	19,33	42,56	55,64	105	vertical	average	crest	angular	Cuon	3/3 1/1 4/4 2/2	n/a
	Cuon#2	18,87	18,92	39,16	54,27	105	vertical	average	crest	angular	Cuon	3/3 1/1 4/4 2/2	n/a
	Cuon-a-java	19,43	19,23	40,78	57,70	106	vertical	thick	crest	angular	Cuon	3/3 1/1 4/4 2/2	n/a
	Cuon-a-sib	20,88	20,33	44,64	65,47	105	vertical	average	crest	angular	Cuon	3/3 1/1 4/4 2/2	n/a

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	missing teeth (alv.)	M3	Height crown P1	P4	M1	Length M1	M2	Breadth M1	M2
n		**n/a**	**42**	**20**	**30**	**32**	**38**	**36**	**38**	**36**
x				**4,30**	**7,71**	**11,7**	**21,25**	**9,09**	**8,26**	**6,59**
SD				**0,75**	**0,94**	**1,01**	**2,13**	**0,99**	**1,04**	**0,64**
MIN				**3,19**	**5,52**	**9,66**	**16,73**	**6,39**	**6,28**	**5,28**
MAX				**6,94**	**9,83**	**14,0**	**25,28**	**11,3**	**10,1**	**7,82**
SR MIN				**3,05**	**5,38**	**9,52**	**15,89**	**5,55**	**6,06**	**5,06**
SR MAX				**7,08**	**9,97**	**14,1**	**26,12**	**12,2**	**10,3**	**8,04**
PR MIN				**2,80**	**5,84**	**9,70**	**16,98**	**7,11**	**6,18**	**5,30**
PR MAX				**5,79**	**9,58**	**13,7**	**25,52**	**11,1**	**10,3**	**7,87**
Cuon alpinus	945	L I3 inf., L P1 inf., R I1&I2 inf., R P1 inf., R I3-I1 sup., L I2 sup., both M2 sup.	x	-	9,00	13,84	22,10	9,13	8,64	5,60
Recent	1546	all I inf., all P1-P2 inf., all M2 inf., all I sup., all P1-P3 sup, all M2 sup.	x	-	7,89	11,63	21,21	-	7,88	-
	1694	L P1 inf.	x	5,58	7,29	11,71	21,54	6,82	8,14	6,37
	2680	n/a	x	4,66	7,71	12,27	20,84	7,20	7,53	6,15
	2681	all I inf.	x	5,54	8,83	13,13	20,88	8,29	7,52	6,22
	4681	all I&M2 inf., all R I sup., L I1-2 sup., L P2 sup.	x	5,64	9,07	11,85	20,32	7,85	7,23	5,79
	4682	n/a	x	5,66	8,58	12,03	20,44	7,14	7,31	5,82
	4683	n/a	x	5,33	8,55	12,08	20,11	6,80	7,19	5,86
	15751	L I1 inf., L P1-2 inf.	x	4,84	8,12	11,63	19,32	6,65	6,82	5,39
	20551	L&R I1 inf., L P1&P2 inf.	x	4,87	7,57	12,00	18,84	4,64	7,09	4,71
	33819	all I inf., R P3-2 inf., all I&C sup., R P1-2 sup., L P1 sup., L P3 sup.	x	6,26	8,02	11,99	20,43	7,37	7,34	5,68
	33820	R P3 inf., R I1 sup.	x	5,48	8,47	12,79	19,66	7,29	7,40	6,23
	33821	R I1-2 sup., L I1-3 sup., RP2 sup., L P1 sup.	x	5,48	7,38	11,69	20,64	6,77	7,30	5,56
	33822	R P3 inf.	x	5,72	8,25	12,87	20,18	6,83	7,53	5,73
	33823	R I1 sup., L I1-2 sup.	x	4,10	8,44	11,75	19,93	6,30	7,85	6,02
	33841	L I1-2 inf., R P1 inf., R I1-3 sup.	x	5,20	8,31	12,26	21,12	6,53	7,39	6,15
	1694-java	n/a	x	-	8,98	13,28	21,38	7,39	7,88	6,02
	Cuon#1	n/a	x	5,80	8,90	13,55	21,60	7,53	8,07	6,27
	Cuon#2	n/a	x	5,05	8,68	12,25	19,92	6,95	7,16	5,55
	Cuon-a-java	R I2 inf.	x	4,56	8,36	12,14	20,45	6,92	7,88	6,12
	Cuon-a-sib	n/a	x	6,24	8,83	12,38	22,03	7,97	7,96	6,33

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	Cusps P1 protoconid	P2 mesial	P2 protoconid	P2 metastylid	P3 mesial	P3 protoconid	P3 metastylid	P3 distal	P4 mesial	P4 protoconid	P4 metastylid	P4 distal
n		**21**	**34**	**34**	**34**	**34**	**34**	**34**	**34**	**37**	**37**	**37**	**37**
x													
SD													
MIN													
MAX													
SR MIN													
SR MAX													
PR MIN													
PR MAX													
Cuon alpinus	945	-	x	yes	x	no	yes	yes	cingulum	parastylid	yes	yes	metaconulid
Recent	1546	-	-	-	-	-	-	-	-	parastylid	yes	yes	metaconulid
	1694	pointy	cingulum	yes	yes	x	yes	yes	x	parastylid	yes	yes	metaconulid
	2680	pointy	x	yes	x	cingulum	yes	yes	x	parastylid	yes	yes	metaconulid
	2681	pointy	cingulum	yes	x	cingulum	yes	yes	cingulum	parastylid	yes	yes	metaconulid
	4681	pointy	x	yes	x	cingulum	yes	yes	x	parastylid	yes	yes	metaconulid
	4682	pointy	cingulum	yes	x	cingulum	yes	yes	cingulum	parastylid	yes	yes	metaconulid
	4683	pointy	x	yes	yes	cingulum	yes	yes	cingulum	parastylid	yes	yes	metaconulid
	15751	pointy	x	yes	yes	x	yes	yes	cingulum	cingulum	yes	yes	metaconulid
	20551	pointy	x	yes	x	x	yes	yes	cingulum	x	yes	yes	metaconulid
	33819	pointy	x	yes	yes	cingulum	yes	yes	x	parastylid	yes	yes	metaconulid
	33820	pointy	x	yes	x	x	yes	yes	cingulum	parastylid	yes	yes	metaconulid
	33821	pointy	x	yes	x	x	yes	yes	metaconulid	parastylid	yes	yes	metaconulid
	33822	pointy	cingulum	yes	yes	x	yes	yes	cingulum	cingulum	yes	yes	metaconulid
	33823	pointy	x	yes	yes	cingulum	yes	yes	cingulum	x	yes	yes	metaconulid
	33841	pointy	x	yes	x	x	yes	yes	cingulum	parastylid	yes	yes	metaconulid
	1694-java	-	cingulum	yes	yes	cingulum	yes	yes	cingulum	parastylid	yes	yes	metaconulid
	Cuon#1	pointy	cingulum	yes	yes	cingulum	yes	yes	x	parastylid	yes	yes	metaconulid
	Cuon#2	pointy	cingulum	yes	x	cingulum	yes	yes	cingulum	parastylid	yes	yes	metaconulid
	Cuon-a-java	pointy	x	yes	x	x	yes	yes	metaconulid	cingulum	yes	yes	metaconulid
	Cuon-a-sib	pointy	x	yes	x	cingulum	yes	yes	cingulum	parastylid	yes	yes	metaconulid

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	M1 trigonid: protoconid	trigonid: paraconid	trigonid: metaconid	talonid: hypoconid	talonid: entoconid	M2 trigonid: protoconid	trigonid: metaconid	talonid: hypoconid	talonid: entoconid
n		**38**	**38**	**38**	**38**	**38**	**36**	**36**	**36**	**36**
x										
SD										
MIN										
MAX										
SR MIN										
SR MAX										
PR MIN										
PR MAX										
Cuon alpinus	945	yes	yes	yes weak	yes	x	centered	no	flat	no
Recent	1546	yes	yes	x	yes	x	-	-	-	-
	1694	yes	yes	x	yes	x	centered	no	yes	no
	2680	yes	yes	yes	yes	x	centered	yes	flat	edge
	2681	yes	yes	yes	yes	edge	centered	no	flat	no
	4681	yes	yes	x	yes	x	centered	no	flat	no
	4682	yes	yes	x	yes	x	centered	no	flat	no
	4683	yes	yes	yes weak	yes	x	centered	no	flat	no
	15751	yes	yes	x	yes	x	centered	no	flat	no
	20551	yes	yes	yes weak	yes	x	centered	no	flat	no
	33819	yes	yes	x	yes	x	centered	no	yes	no
	33820	yes	yes	x	yes	x	centered	yes	flat	no
	33821	yes	yes	x	yes	x	centered	no	flat	no
	33822	yes	yes	x	yes	x	centered	no	flat	no
	33823	yes	yes	x	yes	x	centered	no	flat	no
	33841	yes	yes	x	yes	x	yes	no	flat	no
	1694-java	yes	yes	x	yes	x	centered	weak	flat	edge
	Cuon#1	yes	yes	x	yes	x	centered	no	flat	no
	Cuon#2	yes	yes	x	yes	x	centered	no	flat	no
	Cuon-a-java	yes	yes	x	yes	x	yes	yes	flat	no
	Cuon-a-sib	yes	yes	yes	yes	x	centered	no	flat	no

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	Material description: Date	Ingekomen	Legit	Donated by
n					
x					
SD					
MIN					
MAX					
SR MIN					
SR MAX					
PR MIN					
PR MAX					
Cuon alpinus	945	21-10-1919		Diergaarde Blijdorp, Rotterdam	
Recent	1546		02-12-1926		
	1694				
	2680	1933	13-05-1937		W.C.v.Heurn
	2681	1925	13-05-1937		Shr. W.C.v.Heurn
	4681		29-08-1941		
	4682		29-08-1941		Dubois
	4683	1890-1900	29-08-1941	E. Dubois	
	15751			Coll. Bartels	
	20551	14-01-1969		Diergaarde Blijdorp, Rotterdam	
	33819	1926		H.J.V. Sody (#1)	
	33820	15-09-1927		H.J.V. Sody (#2)	
	33821	03-1928		H.J.V. Sody (#3)	
	33822	15-09-1927		H.J.V. Sody (#4)	
	33823			H.J.V. Sody (#7)	
	33841	03-1933		H.J.V. Sody (#8)	
	1694-java		23-08-1928	Dierg. Rotterdam	
	Cuon#1				
	Cuon#2				
	Cuon-a-java	1866		van Lidth de Jeude	
	Cuon-a-sib		1837		Musee de St. Petersbourg

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	Length mandible		Alveolar length			Diastema length		Mental foramina		Incisors	Width mandible		Height *h-h'*			
		a-b	*c-b*	P1-M2	P4-M1-M2	M1-M2	C-P1	P2-P3 & P3-P4	middle	posterior		*i-i'*	*k-k'*	M2	M1	P4	P3
Cuon alpinus	*Cuon*-b	123,98	120,37	60,15	35,97	27,05	1,79	yes	P2 anterior	P3	crowded	10,46	11,43	20,22	20,31	18,69	17,47
Recent	*Cuon*-e	127,35	125,92	59,05	37,65	27,35	2,60	x	P2	P3	crowded	11,57	11,25	21,95	20,87	19,04	17,70
	Cuon-f	127,78	127,04	63,50	40,08	29,53	2,93	x	P2	P3 posterior	crowded	10,99	11,03	21,69	21,05	20,34	19,27
	Cuon-g	130,65	128,65	-	37,25	27,69	6,73	yes +	P2 posterior	P3 posterior	crowded	11,48	11,27	22,27	21,37	18,89	18,63
	Cuon-h	118,28	118,82	58,03	35,92	26,43	3,17	yes	P2	P3	crowded	9,44	9,47	19,34	19,44	17,46	16,32
	Cuon-j	134,03	130,63	65,74	38,78	28,40	x	yes	P2	P3	crowded	11,31	11,76	23,22	21,38	19,86	16,75
n		**27**	**27**	**26**	**27**	**27**	**27**	**27**	**27**	**27**	**26**	**27**	**27**	**27**	**27**	**27**	**27**
x		**128,47**	**126,30**	**61,37**	**38,27**	**28,19**	**3,10**					**11,2**	**11,4**	**22,23**	**21,11**	**19,38**	**18,35**
SD		**7,27**	**6,86**	**3,49**	**2,04**	**1,50**	**1,10**					**0,86**	**0,72**	**1,14**	**1,17**	**2,07**	**2,06**
MIN		**109,23**	**107,20**	**51,32**	**32,64**	**23,51**	**1,79**					**9,44**	**9,47**	**19,34**	**19,26**	**15,35**	**14,70**
MAX		**148,34**	**142,95**	**68,65**	**42,67**	**31,37**	**6,73**					**14,4**	**12,9**	**25,10**	**24,04**	**27,41**	**26,75**
SR MIN		**108,25**	**106,22**	**51,14**	**32,46**	**23,33**	**1,61**					**9,30**	**8,83**	**19,06**	**18,98**	**15,07**	**14,42**
SR MAX		**149,32**	**143,93**	**68,83**	**42,85**	**31,55**	**6,91**					**14,5**	**13,5**	**25,38**	**24,32**	**27,69**	**27,03**
PR MIN		**113,92**	**112,58**	**54,39**	**34,19**	**25,20**	**0,89**					**9,43**	**9,96**	**19,95**	**18,77**	**15,25**	**14,23**
PR MAX		**143,01**	**140,01**	**68,36**	**42,34**	**31,19**	**5,31**					**12,9**	**12,8**	**24,51**	**23,45**	**23,51**	**22,48**

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	Height *h-h'* P2	Height *h-h'* P1	Distance *a-d*	Distance *e-e'*	Coronoid angle (°) *n*	Aboral border ramus	Anterior border coronoid process	Angular process	Line k	Dental formula typical of:	Dental formula (mandibular) formula	missing teeth (diast.)
Cuon alpinus	*Cuon*-b	18,58	17,18	37,57	53,24	110	rear	thick	crest	angular	Cuon	3/3 1/1 4/4 2/2	L P1 inf.
Recent	*Cuon*-e	19,37	19,57	39,79	55,77	106	vertical	average	crest	angular	Cuon	3/3 1/1 4/4 2/2	n/a
	Cuon-f	20,55	20,47	42,01	53,76	103	front	average	crest	angular	Cuon	3/3 1/1 4/4 2/2	n/a
	Cuon-g	18,44	17,62	40,15	55,25	105	vertical	average	crest	angular	Cuon	3/3 1/1 4/4 2/2	L&R P1 inf.
	Cuon-h	16,63	17,08	38,45	52,05	105	front	average	crest	angular	Cuon	3/3 1/1 4/4 2/2	n/a
	Cuon-j	18,97	18,16	43,90	56,97	104	vertical	thick	crest	angular	Cuon	3/3 1/1 4/4 2/2	L&R P1 inf.
n		**27**	**26**	**27**	**27**	**27**	**27**	**27**	**27**	**27**	**27**	**27**	**n/a**
x		**19,33**	**18,98**	**40,67**	**55,21**	**106**							
SD		**1,82**	**1,42**	**2,72**	**3,59**	**2,29**							
MIN		**13,77**	**14,58**	**32,77**	**46,66**	**102**							
MAX		**24,61**	**21,78**	**48,14**	**65,47**	**111**							
SR MIN		**13,49**	**14,30**	**31,57**	**44,83**	**99**							
SR MAX		**24,89**	**22,06**	**49,34**	**67,30**	**114**							
PR MIN		**15,68**	**16,13**	**35,23**	**48,04**	**102**							
PR MAX		**22,98**	**21,82**	**46,10**	**62,38**	**111**							

Appendix XIII: Complete original dataset

Canidae material	reg. no.	missing teeth (alv.)	M3	Height crown P1	P4	M1	Length M1	M2	Breadth M1	M2
Cuon alpinus	*Cuon*-b	all I inf., R C inf., R P1 inf., L&R M2 sup., R P1-P3 sup., R I3 sup., R I1 sup., all L I sup., L C sup., I	x	-	8,13	11,45	19,64	6,39	6,98	5,33
Recent	*Cuon*-e	all I sup.	x	6,04	7,47	11,82	19,62	6,94	6,77	5,59
	Cuon-f	n/a	x	5,71	8,83	12,54	21,61	7,18	7,84	6,16
	Cuon-g	R I2 inf.	x	6,22	7,90	12,02	20,36	6,53	7,54	5,71
	Cuon-h	n/a	x	6,35	7,59	10,85	18,70	6,45	6,81	5,75
	Cuon-j	L P3 inf.	x	-	8,81	11,85	20,30	7,11	7,55	5,96
n		**n/a**	**27**	**22**	**27**	**27**	**27**	**26**	**27**	**26**
x				**5,47**	**8,29**	**12,21**	**20,49**	**7,04**	**7,50**	**5,85**
SD				**0,60**	**0,55**	**0,67**	**0,90**	**0,80**	**0,45**	**0,38**
MIN				**4,10**	**7,29**	**10,85**	**18,70**	**4,64**	**6,77**	**4,71**
MAX				**6,35**	**9,07**	**13,84**	**22,10**	**9,13**	**8,64**	**6,37**
SR MIN				**3,96**	**7,15**	**10,71**	**17,86**	**3,80**	**6,55**	**4,49**
SR MAX				**6,49**	**9,21**	**13,98**	**22,94**	**9,97**	**8,86**	**6,59**
PR MIN				**4,27**	**7,20**	**10,86**	**18,69**	**5,43**	**6,61**	**5,10**
PR MAX				**6,67**	**9,39**	**13,56**	**22,28**	**8,64**	**8,40**	**6,60**

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	Cusps P1 protoconid	P2 mesial	P2 protoconid	P2 metastylid	P3 mesial	P3 protoconid	P3 metastylid	P3 distal	P4 mesial	P4 protoconid	P4 metastylid	P4 distal
Cuon alpinus	*Cuon*-b	-	x	yes	x	cingulum	yes	yes	cingulum	cingulum	yes	yes	metaconulid
Recent	*Cuon*-e	pointy	x	yes	x	x	yes	yes	x	parastylid	yes	yes	metaconulid
	Cuon-f	pointy	x	yes	x	cingulum	yes	yes	cingulum	parastylid	yes	yes	metaconulid
	Cuon-g	-	x	yes	x	cingulum	yes	yes	cingulum	parastylid	yes	yes	metaconulid
	Cuon-h	pointy	x	yes	x	cingulum	yes	yes	metaconulid	parastylid	yes	yes	metaconulid
	Cuon-j	-	x	yes	x	cingulum	yes	yes	cingulum	cingulum	yes	yes	metaconulid
n		**21**	**26**	**26**	**26**	**26**	**26**	**26**	**26**	**27**	**27**	**27**	**27**
x													
SD													
MIN													
MAX													
SR MIN													
SR MAX													
PR MIN													
PR MAX													

Appendix XIII: Complete original dataset

Canidae material	reg. no.	M1 trigonid: protoconid	M1 trigonid: paraconid	M1 trigonid: metaconid	M1 talonid: hypoconid	M1 talonid: entoconid	M2 trigonid: protoconid	M2 trigonid: metaconid	M2 talonid: hypoconid	M2 talonid: entoconid
Cuon alpinus	*Cuon*-b	yes	yes	x	yes	x	centered	no	flat	no
Recent	*Cuon*-e	yes	yes	yes	yes	edge	yes	yes	flat	no
	Cuon-f	yes	yes	yes weak	yes	edge	centered	no	flat	no
	Cuon-g	yes	yes	yes	yes	edge	centered	no	flat	no
	Cuon-h	yes	yes	x	yes	x	yes	no	flat	no
	Cuon-j	yes	yes	x	yes	x	centered	no	flat	no
n		**27**	**27**	**27**	**27**	**27**	**26**	**26**	**26**	**26**
x										
SD										
MIN										
MAX										
SR MIN										
SR MAX										
PR MIN										
PR MAX										

Appendix XIII: Complete original dataset

Canidae material	Parameters / reg. no.	Material description: Date	Ingekomen	Legit	Donated by
Cuon alpinus	*Cuon*-b			Blume	
Recent	*Cuon*-e				Kuhl en Van Hasselt
	Cuon-f				
	Cuon-g				Kuhl en Van Hasselt
	Cuon-h				De la Société des Naturalistes a Java
	Cuon-j	07-1888		van den Bossche	
n					
x					
SD					
MIN					
MAX					
SR MIN					
SR MAX					
PR MIN					
PR MAX					

Appendix XIII: Complete original dataset

Legend (see also appendices III, IV and VI)	
Canidae material	the 13 fossil North Sea specimens (Canidae indet.) and the three comparative (sub)species, including indication which specimens are fossil and which recent;
Reg. no.	registration number and category number (a-m), the two red dog specimens are the interesting dogs from 4.4.1.1;
Statistics:	
n	sample size: the amount of specimens that was measured for that comparative (sub)species for that specific parameter (see also box VI.1);
x	sample mean: the mean value for that comparative (sub)species for that specific parameter (see also box VI.1);
SD	standard deviation: the amount of variation in that comparative (sub)species for that specific parameter (STDEV, box VI.1);
MIN and MAX	minimum and maximum: the smallest respectively largest value that was measured on a specimen of that comparative (sub)species for that specific parameter;
SR MIN and MAX	sample range MIN and MAX indicate the entire range of values for that specific parameter that was encountered in the samples of the comparative material including the effect of the measuring error (2.2.3);
PR MIN and MAX	population range MIN and MAX indicate the range of values for that specific parameter in which 95% of all specimens of the entire natural populations of the comparative material lies (2.2.4);
Parameters	the 21 parameters that were measured on all 100 Canidae specimens. For a detailed description of the parameters and the different options that were recorded for the parameters, see appendix IV. All parameters are in mm except the coronoid angle, which is in °. Parameters are ordered per section (box 2.1);
italic text	indicates that specimens were measured with the analogue caliper (2.2.2);
*	indicates that the value is an estimate and not the orginal value of the specimen for that parameter (2.2.2);
n/a	not applicable;
L and R	left and right (missing teeth);
-	this parameter could not be measured for this specimen due to erosion, no information avaialble;
x	this feature is not present in this specimen for this parameter;
Material description	Remaining information (if present) of all specimens that was not included in appendix II (2.1).