

Vertebral element sample

Since the length of the vertebral column is the only direct skeletal indicator of body length for prehistoric animals the inclusion of measurements of these elements, while cumbersome, is important to understanding the overall picture of body size for Northwest Coast dogs. None of the previous studies on Northwest Coast dog material included measurements of vertebral material. As far as is known, this study contains the first comprehensive analysis of dog vertebrae reported from archaeological contexts. Clutton-Brock & Noe-Nygaard (1990) do however report the measurements of several cervical vertebrae of an immature dog recovered from Seamer Carr, England that dates to ca. 9,500 bp. The inclusion of vertebrae in this analysis (and metapodials, which have also seldom been reported by others) increases the possibility of assessing isolated adult dog remains from sites where such material is rare.

The sample sizes for individual vertebral elements varied significantly in this study, with thoracic and caudal vertebrae being poorly represented. Thoracic vertebrae are not robust elements and they were often too severely damaged to measure or to identify to exact position, although they appeared to be present in similar quantities as the other vertebrae. Caudal vertebrae are undoubtedly under-represented in the sample due to their small size, the majority being recovered from complete skeletons. With a cut-off of at least ten specimens as the minimum for statistical analysis of type, only thoracic vertebrae #3, #12 and #13 had a sufficient sample for comparative analysis. Both the cervical and lumbar series had more than adequate numbers of specimens for all elements, as did the sacrum (Tables 8-1 through 8-11). A separate statistical analysis was performed on each element sample.

In some cases, arthritic lipping of the centrum interfered with accurate measurement of the centrum length. Breakage of many of the vertebral processes meant that not all measurements could be taken from all specimens, but there were enough dimensions available for most elements to perform multivariate discriminant analysis. The probabilities of group membership calculated by discriminant function crossvalidation are presented for most specimens in the classification tables. Three specimens (two cervical vertebrae and one sacrum) had significantly low (below 5%) probability values, indicating they belonged to particularly robust individuals.

The measurements taken for vertebrae which were not present in high enough numbers for statistical analysis are presented in Tables 8-12 and 8-13. All of these specimens were associated with other elements that could be classified.

Figures 8-1 through 8-6 show the graphic representation of the relationship between the length measurement and the breadth of the caudal facet of selected samples (cervicals 01, 02, 03; thoracic 13; lumbar 07) and of the length vs. the breadth of the cranial facet of the sacrum.

Table 8-14 is a summary table that lists the combined lengths of several vertebral sections for partial and complete vertebral columns recovered from the same individual. From this table it can be calculated that individuals classified as type 1 had an average cervical length of approximately 150 mm, a thoracic length of 208 mm and a lumbar/sacral length of 191 mm. Individuals classified as type 2 had an average cervical length of approximately 161 mm, a thoracic length of 231 mm and a lumbar/sacral length of 208 mm. The suspected hybrid, specimen 0950, had a cervical length of 151.5 mm, closer to the type 1 average than the type 2.

Vertebrae

Definition of vertebrae measurement codes

<p>GB.....Greatest breadth (VC01) GL.....Greatest length (VC01) LAd.....Length of dorsal arch, at midpoint (VC01) LCDe.....Greatest length of body of axis (VC02), including dens LAPa.....Greatest length of dorsal arch of axis (VC02) SBV.....Least breadth of body of the axis (VC02) PL.....Length of body of vertebra, between the centres of caudal and cranial articular surfaces GLPa.....Greatest length from cranial to caudal articular processes (cervicals only)</p>	<p>BFcr.....Greatest breadth of cranial articular surface (includes facets for ribs in thoracics) BFcd.....Greatest breadth of caudal articular surface (includes facets for ribs in thoracics) HFcr.....Greatest height of cranial articular surface HFcd.....Greatest height of caudal articular surface BPacd.....Greatest breadth across caudal articular process BPacr.....Greatest breadth across cranial articular process (cervical only) H.....Greatest height, perpendicular to basal line of body to highest point of spinous process (in a measuring box)</p>
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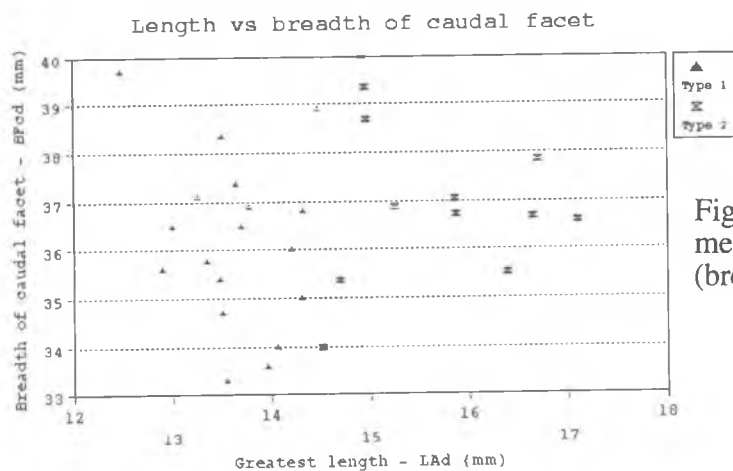


Figure 8-1. Plot of cervical vertebra VC01 measurement LAd (greatest length) vs. BFcd (breadth of the caudal facet).

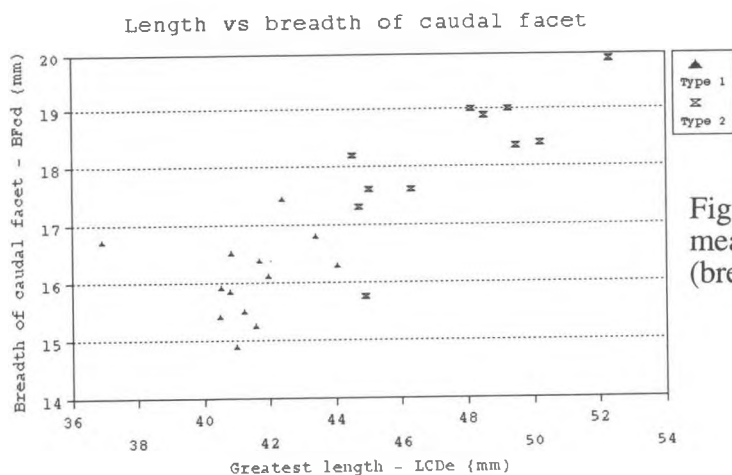


Figure 8-2. Plot of cervical vertebra VC02 measurement LCDe (greatest length) vs. BFcd (breadth of the caudal facet).

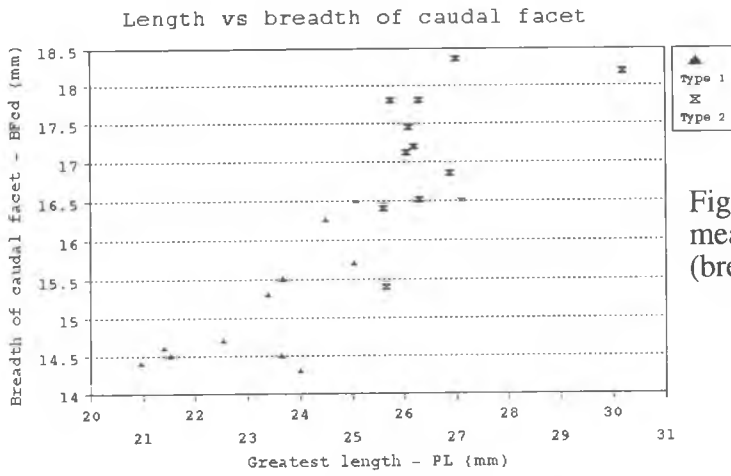


Figure 8-3. Plot of cervical vertebra VC03 measurement PL (greatest length) vs. BFcd (breadth of the caudal facet).

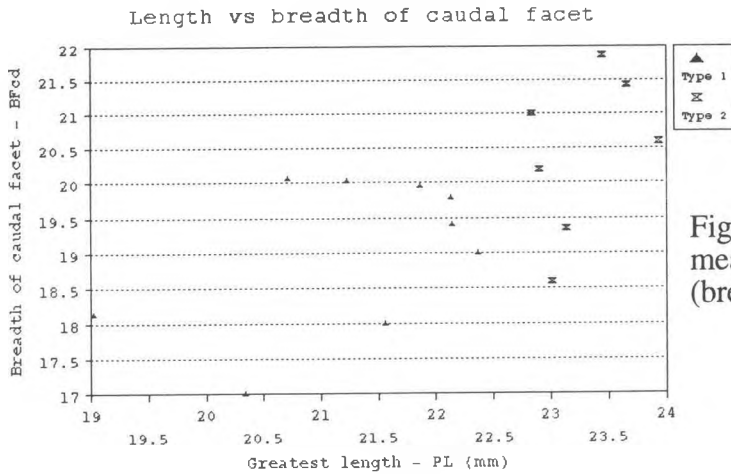


Figure 8-4. Plot of thoracic vertebra VT13 measurement PL (greatest length) vs. BFcd (breadth of the caudal facet).

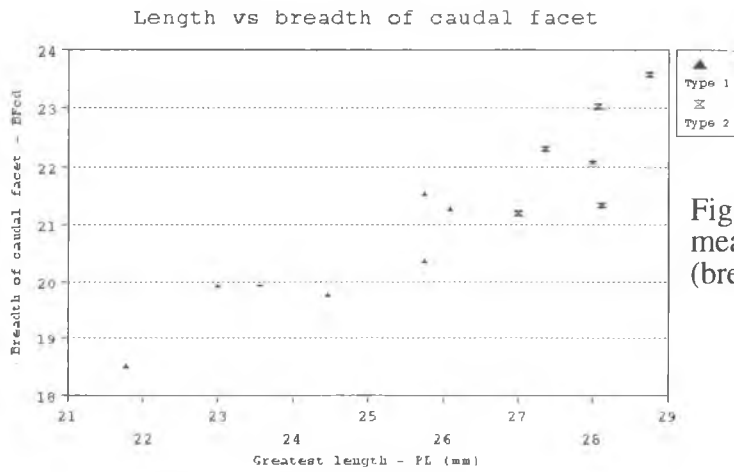


Figure 8-5. Plot of lumbar vertebra VL04 measurement PL (greatest length) vs. BFcd (breadth of the caudal facet).

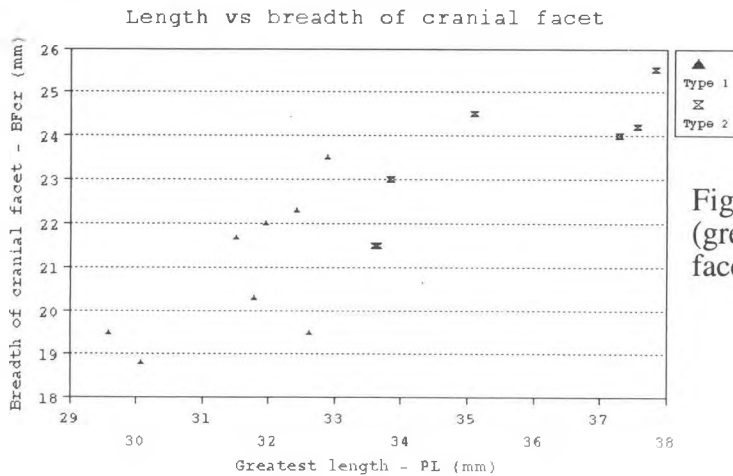


Figure 8-6. Plot of sacrum measurement PL (greatest length) vs. BFcr (breadth of the cranial facet).

Table 8-1. Cervical vertebra 1 (VC01) univariate statistics, division at the mean (LAd) and results of multivariate crossvalidation of type classification.

Specimen	Sex	Type	Measurement codes					** %
			(LAd)	BFcd	BFcr	GL	GB	Probability
3004AA	M	1	12.5	39.7	32.0	38.5	84.1	99.9
0586		1	12.9	35.6	27.5			99.9
0805U	F	1	13.0	36.5	28.9			99.9
2201		1	13.3	37.1	28.7			99.4
0120		1	13.4	35.8		35.3		-
1455		1	13.5	35.4	27.6			99.6
0203A		1	13.5	38.4	30.0			96.2
1471		1	13.5	34.7	29.0			99.9
2606		1	13.6	33.3	27.3			99.9
3000DDD	M	1	13.6	37.4	29.0	36.0	73.9	96.5
2612		1	13.7	36.5	27.7			96.4
0447		1	13.8	36.9				-
0301G	M	1	14.0	33.6	26.8	31.6		99.2
0802R		1	14.1	34.0	26.6	35.1		97.8
2623		1	14.2	36.0	28.0	34.5	73.0	87.5
2046		1	14.3	35.0	28.9	37.5	80.7	95.9
2662		1	14.3	36.8	38.0		82.0	99.8
5024		2	14.5	38.9	31.2			41.1
1409		2	14.5	34.0	26.6			1.1*
2080		2	14.7	35.4	28.0	34.1	74.5	24.5
0200A		2	14.9	40.0				-
3018A	M	2	15.0	39.4	30.5	39.7	79.8	95.4
1229		2	15.0	38.7				-
5014		2	15.3	36.9	28.2			96.6
0360K		2	15.9	37.1				-
1230		2	15.9	36.7	29.0	37.0		99.5
1470		2	16.4	35.5	28.9			99.8
2078		2	16.7	36.7	29.5			99.9
1139A		2	16.7	37.9	29.6	39.9	78.6	100.0
0320		2	17.1	36.6	29.9	35.5		100.0

Statistics	Measurement codes				
	(LAd)	BFcd	BFcr	GL	GB
VC01					
total count	30	30	25	12	8
total mean	14.4	36.5	29.1	36.2	78.3
total std	1.20	1.73	2.26	2.31	3.83
total min	12.5	33.3	26.6	31.6	73.0
total max	17.1	40.0	38.0	39.9	84.1
total CV	8.28	4.74	7.76	6.39	4.90
type 1 count	17	17	15	7	5
type 1 mean	13.6	36.0	29.1	35.5	78.7
type 1 std	0.49	1.619	2.728	2.058	4.472
type 1 min	12.5	33.3	26.6	31.6	73.0
type 1 max	14.3	39.7	38.0	38.5	84.1
type 1 CV	3.61	4.49	9.39	5.80	5.68
type 2 count	13	13	10	5	3
type 2 mean	15.6	37.2	29.1	37.2	77.6
type 2 std	0.88	1.65	1.26	2.27	2.26
type 2 min	14.5	34.0	26.6	34.1	74.5
type 2 max	17.1	40.0	31.2	39.9	79.8
type 2 CV	5.62	4.44	4.32	6.10	2.91

* starred entries are misclassified, at < 5% probability of group membership.

** this is the probability of membership in the "type" group as initially classified, based on multivariate analysis using variables LAd, BFcd, BFcr together.

Table 8-2. Cervical vertebra 2 (VC02) univariate statistics, division at the mean (LCDe) and results of multivariate crossvalidation of type classification.

Specimen	Sex	Type	Measurement codes						** %	
			BFcd	BFcr	LAPa	(LCDe)	H	SBV	BPac	Probability
1233		1	16.7	26.6	38.2	36.9		20.8	23.6	99.9
0630A12		1		26.8		38.0		20.9	24.2	99.9
2056		1	15.4	25.7	41.0	40.5		20.8	23.3	98.9
0615		1	15.9	25.7		40.5	30.0	17.5	26.2	99.9
0301H	M	1	15.9	26.6	45.2	40.8	35.4	19.7	23.6	92.8
2051B		1	16.5	26.9		40.8	34.7		27.9	-
1564		1	14.9	25.2		41.0				-
0318		1	15.5	26.5	44.3	41.2	29.0			-
0353		1	15.3	25.0	45.5	41.6	31.6	18.8	25.7	99.8
0153		1	16.4	27.1	47.2	41.7		19.6	27.5	98.3
1401		1	16.1	25.9	47.4	42.0	31.7	19.9	26.1	99.3
2413A		1	17.4	28.2	43.3	42.4	32.4	20.5	26.6	65.5
2047		1	16.8	27.5	45.9	43.4	34.1	19.5	26.4	56.6
1572		1	16.3	26.3	45.8	44.0	33.2	19.8	27.4	89.1
1232		2	18.2	29.7		44.5		22.2	28.2	83.8
3000CCC	M	2	17.3	29.0	48.9	44.7	34.7	21.7	28.9	36.0
1231		2	15.8	26.3		44.9		18.7	26.4	7.5
2203		2	17.6	27.6		45.0	34.7	21.2	25.8	68.6
0535		2		28.2	44.3	46.0	32.3		25.9	-
0950S		2	17.6	29.2	52.5	46.3	35.4	21.1	27.0	99.0
0201D		2		29.7	49.3	46.4	36.7	21.1	26.9	99.6
2063A		2	19.0	30.9	50.8	48.1	36.0		26.6	-
3004BB	M	2	18.9	31.1	52.0	48.5	40.8	24.0	29.6	99.9
2059		2	19.0	29.7		49.2	38.2	22.5	28.3	99.9
0426		2	18.4	29.8		49.5	38.9		30.4	-
3018B	M	2	18.4	29.7	52.5	50.2	39.6	22.4	29.7	99.9
1425		2	19.9	31.0		52.3		24.6		-

Statistics	VC02	Measurement codes						
		BFcd	BFcr	LAPa	(LCDe)	H	SBV	BPacd
total count		24	27	17	27	19	21	24
total mean		17.0	27.8	46.7	44.1	34.7	20.8	26.8
total std		1.36	1.84	3.89	3.79	3.12	1.67	1.87
total min		14.9	25.0	38.2	36.9	29.0	17.5	23.3
total max		19.9	31.1	52.5	52.3	40.8	24.6	30.4
total CV		8.01	6.61	8.33	8.59	8.98	8.04	6.99
type 1 count		13	14	10	14	9	11	12
type 1 mean		16.1	26.4	44.4	41.0	32.5	19.8	25.7
type 1 std		0.68	0.84	2.71	1.79	2.01	0.96	1.58
type 1 min		14.9	25.0	38.2	36.9	29.0	17.5	23.3
type 1 max		17.4	28.2	47.4	44.0	35.4	20.9	27.9
type 1 CV		4.23	3.17	6.11	4.37	6.18	4.83	6.14
type 2 count		11	13	7	13	10	10	12
type 2 mean		18.2	29.4	50.0	47.4	36.7	22.0	27.8
type 2 std		1.06	1.33	2.71	2.38	2.49	1.57	1.52
type 2 min		15.8	26.3	44.3	44.5	32.3	18.7	25.8
type 2 max		19.9	31.1	52.5	52.3	40.8	24.6	30.4
type 2 CV		5.81	4.52	5.42	5.03	6.77	7.15	5.46

** this is the probability of membership in the "type" group as initially classified, based on multivariate analysis using variables BFcr, LCDe, SBV, BPacd together.

Table 8-3. Cervical vertebra 3 (VC03) univariate statistics, division at the mean (PL) and results of multivariate crossvalidation of type classification.

Specime	Sex	Type	Measurement code					** %		
			BFcd	GLPa	BPac	BPacr (PL)	HFcd	BNCc	Probability	
2258		1	14.4	30.3	28.4	25.7	21.0			99.9
0354		1	14.6		28.6		21.4		10.1	
0508		1	14.5	30.3	28.8		21.5	10.6		99.9
0355		1	14.7	32.4			22.5	13.4	9.7	99.6
1501		1	15.3	32.8	31.2	27.0	23.4	13.2		93.9
1565		1	14.5	31.1		23.2	23.7			97.9
2051A		1	15.5	37.5		26.9	23.7	12.0		86.7
0309A		1	15.5	35.0		24.3	23.7	13.0	9.9	90.9
0614		1	14.3	32.5	29.4	27.1	24.0	11.9	9.7	98.5
2058		1	16.3	38.1	33.2		24.5			21.4
0149		2	15.7	36.1			25.0	12.5		27.6
0950T		2	16.5	39.3		28.1	25.1	12.8		62.6
3000EEE	M	2	16.4	35.9		29.0	25.6			88.8
0587		2	15.4				25.7	12.4	10.7	
0201E		2	17.8	37.8		27.5	25.8	14.6	10.4	99.6
0125		2	17.1				26.0	13.0		
3004CC	M	2	17.5	40.7		30.3	26.1			99.1
3018C	M	2	17.2	39.2		30.1	26.2			98.9
2237D		2	17.8	40.0	32.3		26.3			99.8
0200C		2	16.5	38.7	32.8	29.3	26.3	13.8	11.7	95.0
5010		2	16.9	36.4		28.6	26.9			99.1
2057		2	18.4	38.7	35.4		27.0			100.0
1139C		2	16.5	41.0	34.1	29.2	27.1	14.0		94.8
1550A		2	18.2	44.1	36.3	32.0	30.2	16.0		100.0

Statistics VC03	Measurement code							
	BFcd	GLPa	BPac	BPacr (PL)	HFcd	BNCc		
total count	24	21	11	15	24	14	7	
total mean	16.1	36.6	31.9	27.9	24.9	13.1	10.3	
total std	1.26	3.75	2.67	2.24	2.08	1.25	0.66	
total min	14.3	30.3	28.4	23.2	21.0	10.6	9.7	
total max	18.4	44.1	36.3	32.0	30.2	16.0	11.7	
total CV	7.79	10.25	8.38	8.03	8.36	9.56	6.40	
type 1 count	10	9	6	6	10	6	4	
type 1 mean	15.0	33.3	29.9	25.7	22.9	12.4	9.9	
type 1 std	0.61	2.77	1.73	1.48	1.18	0.97	0.17	
type 1 min	14.3	30.3	28.4	23.2	21.0	10.6	9.7	
type 1 max	16.3	38.1	33.2	27.1	24.5	13.4	10.1	
type 1 CV	4.10	8.30	5.76	5.75	5.15	7.88	1.68	
type 2 count	14	12	5	9	14	8	3	
type 2 mean	17.0	39.0	34.2	29.3	26.4	13.6	10.9	
type 2 std	0.85	2.25	1.50	1.25	1.22	1.15	0.54	
type 2 min	15.4	35.9	32.3	27.5	25.0	12.4	10.4	
type 2 max	18.4	44.1	36.3	32.0	30.2	16.0	11.7	
type 2 CV	5.02	5.78	4.40	4.26	4.64	8.44	4.96	

** this is the probability of membership in the "type" group as initially classified, based on multivariate analysis using variables BFcd, GLPa, PL together.

Vertebrae

Table 8-4. Vertebrae 4 (VC04) & 5 (VC05) univariate statistics, division at the mean (PL) and results of multivariate crossvalidation of type classification.

VC04								VC05									
Specimen	Sex	Type	Measurement code				HFcd	** % Probability	Specimen	Sex	Type	Measurement code				** % Probability	
			BFcd	GLPa	BPacd	BPacr						(PL)	BFcd	BPacr	(PL)		HFcd
2050		1	14.4			30.7	19.6	13.4	99.9	2604C		1	14.0	31.2	18.1	12.3	100.0
1235		1	14.6	33.8		30.1	20.4	12.5	99.9	0201G		1		32.2	18.7		-
1438		1	14.0				21.1	12.0	-	1437		1	13.3	28.7	18.8	12.0	100.0
5012		1	15.0			30.8	21.2	13.8	99.1	1410		1	13.2	30.6	19.6		99.8
0309B		1	14.4	33.1	27.9	28.9	21.2	12.9	99.7	0950W		1	15.0	31.1	19.6	13.5	99.7
1586		1	15.9	35.1		33.3	21.4	14.2	91.6	3000GGG	M	1	14.8	30.5	19.9	14.0	99.9
1527		1	14.3				21.5	14.0	-	0203C		1			20.0		-
0503		1	14.0			30.7	21.8	13.4	98.1	3006A		1	15.2	30.0	20.0	15.0	99.9
0441		1	14.7				22.0	12.2	-	0124		1	15.0	31.4	20.6	15.5	54.2
2661		1	15.2			30.8	22.4		90.9	0444		2	16.3	33.9	20.8	14.5	99.9
1408		1	14.2	33.7		31.4	22.5	12.7	77.6	1139E		2	16.7	33.5	20.9	14.0	99.6
0203B		1	15.3	37.3	27.6	29.4	22.7		87.6	0200E		2	15.2	32.9	21.5	15.0	99.9
0201F		1	16.9	36.5	32.0	32.6	22.9	15.3	19.9	3004EE	M	2	15.8	33.7	21.8	14.5	100.0
0200D		1		40.0	31.9	33.0	22.9	14.5	-	3018E	M	2	15.1	32.2	21.8	15.0	99.7
0950U		1	15.9	37.1		31.7	23.0	15.0	61.1	2063B		2	16.7	31.7	22.8	14.3	99.8
1139D		2	16.1	37.0	32.0	33.2	23.3	14.3	61.2	1550C		2		37.6	25.4		-
2237E		2	17.1			33.6	23.7	15.8	85.8								
5006		2	16.1			33.1	24.0	15.2	86.5								
3000FFF	M	2	15.6			30.4	24.0		35.9								
3018D	M	2	16.3			32.1	24.0	15.2	81.8								
2111		2	16.7	37.2		36.4	24.1	14.7	96.7								
3004DD	M	2	16.8			34.1	24.1	14.0	94.8								
2054		2	17.6	38.9		34.3	24.4	16.9	97.4								
1147		2	16.7	41.0		34.5	24.8	15.7	98.6								
1166		2	18.6	43.1		36.9	25.4	15.5	99.9								
0442		2	16.9			32.9	25.4	15.1	99.2								
1550B		2	17.6			37.7	26.7	15.8	100.0								
2238A		2	17.9			33.5	26.9	14.8	99.9								

Statistics		Measurement code					
VC04		BFcd	GLPa	BPacd	BPacr	(PL)	HFcd
total count		27	13	5	25	28	25
total mean		15.9	37.2	30.3	32.6	23.1	14.4
total std		1.29	2.86	2.08	2.21	1.76	1.23
total min		14.0	33.1	27.6	28.9	19.6	12.0
total max		18.6	43.1	32.0	37.7	26.9	16.9
total CV		8.10	7.69	6.88	6.76	7.63	8.59
type 1 count		14	8		12	15	13
type 1 mean		14.9	35.8		31.1	21.8	13.5
type 1 std		0.82	2.20		1.30	0.96	1.00
type 1 min		14.0	33.1		28.9	19.6	12.0
type 1 max		16.9	40.0		33.3	23.0	15.3
type 1 CV		5.49	6.15		4.18	4.39	7.42
type 2 count		13	5		13	13	12
type 2 mean		16.9	39.4		34.1	24.7	15.2
type 2 std		0.80	2.33		1.92	1.07	0.74
type 2 min		15.6	37.0		30.4	23.3	14.0
type 2 max		18.6	43.1		37.7	26.9	16.9
type 2 CV		4.72	5.90		5.63	4.34	4.85

Statistics		Measurement code			
VC05		BFcd	BPacr	(PL)	HFcd
total count		13	15	16	12
total mean		15.1	32.1	20.64	14.1
total std		1.08	2.03	1.73	1.03
total min		13.2	28.7	18.1	12.0
total max		16.7	37.6	25.4	15.5
total CV		7.17	6.34	8.39	7.30
type 1 count		7	8	9	6
type 1 mean		14.3	30.7	19.5	13.7
type 1 std		0.78	0.99	0.75	1.28
type 1 min		13.2	28.7	18.1	12.0
type 1 max		15.2	32.2	20.6	15.5
type 1 CV		5.41	3.24	3.85	9.36
type 2 count		6	7	7	6
type 2 mean		16.0	33.6	22.1	14.5
type 2 std		0.65	1.78	1.48	0.36
type 2 min		15.1	31.7	20.8	14.0
type 2 max		16.7	37.6	25.4	15.0
type 2 CV		4.07	5.29	6.69	2.51

*** this is the probability of membership in the "type" group as initially classified. based on multivariate analysis using variables BFcd, BPacr, PL together.

Vertebrae

Table 8-5. Cervical vertebrae 6 (VC06) & 7 (VC07) univariate statistics, division at the mean (PL) and results of multivariate crossvalidation of type classification.

VC06							VC07							
Specimen	Sex	Type	BPacr	(PL)	HFcd	** % Probability	Specimen	Sex	Type	BFcd	BPacr	(PL)	HFcd	** % Probability
2064		1	30.5	16.2	12.3	100.0	2204		1	14.7		16.4	10.9	100.0
1436		1	27.0	17.1	10.6	99.9	2604B		1	17.2	30.3	16.8	10.7	99.9
2066		1	29.6	17.7	13.8	98.7	1139G		1	18.0	31.2	17.8	12.0	99.8
0616		1	29.4	17.7	12.9	98.9	3000III	M	1	17.0	29.2	18.1	12.6	99.3
0609		1	30.0	17.8	12.9	97.9	3006C		1	17.9		18.2	12.7	99.9
2413C		1	28.4	17.9	12.3	98.5	0950X		1	17.1	30.5	18.3	12.6	96.4
3000HHH	M	1	30.8	18.4	12.8	62.9	0200G		2	17.6	32.0	18.7	12.8	6.1
3006B		2	29.5	18.9	13.2	3.0*	1159		2	16.7	29.3	18.8	12.6	99.9
0950V		2	31.8	19.2	13.4	92.8	3004GG	M	2	17.8	33.3	19.5	13.1	100.0
1148		2	33.1	19.3	13.0	97.6	3018G	M	2	19.4	30.6	19.7	13.5	96.3
2237F		2	33.8	19.6	14.7	98.9	1149		2	19.5	31.3	20.0	13.5	100.0
1139F		2	32.5	19.8										
0200F		2	33.8	20.1	13.6	99.9								
3004FF	M	2	34.8	20.2	14.0	99.9								
3018F	M	2	32.8	20.8	14.0	100.0								

Statistics	Measurement code			Statistics	Measurement code				
	VC06	BPacr	(PL)		HFcd	VC07	BFcd	BPacr	(PL)
total count	15	15	14	total count	11	9	11	11	
total mean	31.2	18.7	13.1	total mean	17.5	30.8	18.4	12.5	
total std	2.17	1.25	0.97	total std	1.25	1.22	1.07	0.88	
total min	27.0	16.2	10.6	total min	14.7	29.2	16.4	10.7	
total max	34.8	20.8	14.7	total max	19.5	33.3	20.0	13.5	
total CV	6.97	6.70	7.37	total CV	7.12	3.94	5.81	7.03	
type 1 count	7	7	7	type 1 count	6	4	6	6	
type 1 mean	29.4	17.5	12.5	type 1 mean	17.0	30.3	17.6	11.9	
type 1 std	1.21	0.67	0.91	type 1 std	1.09	0.71	0.73	0.81	
type 1 min	27.0	16.2	10.6	type 1 min	14.7	29.2	16.4	10.7	
type 1 max	30.8	18.4	13.8	type 1 max	18.0	31.2	18.3	12.7	
type 1 CV	4.13	3.82	7.28	type 1 CV	6.43	2.36	4.16	6.76	
type 2 count	8	8	7	type 2 count	5	5	5	5	
type 2 mean	32.8	19.7	13.7	type 2 mean	18.2	31.3	19.3	13.1	
type 2 std	1.51	0.58	0.55	type 2 std	1.10	1.36	0.51	0.36	
type 2 min	29.5	18.9	13.0	type 2 min	16.7	29.3	18.7	12.6	
type 2 max	34.8	20.8	14.7	type 2 max	19.5	33.3	20.0	13.5	
type 2 CV	4.60	2.93	4.03	type 2 CV	6.06	4.34	2.66	2.75	

* starred entries are misclassified, at < 5% probability of group membership.

** this is the probability of membership in the "type" group as initially classified, based on multivariate analysis using variables BPacr, PL, HFcd together.

Vertebrae

Table 8-6. Thoracic vertebrae 3 (VT03) & 12 (VT12) univariate statistics, division at the mean (PL) and results of multivariate crossvalidation of type classification.

VT03							VT12						
Specimen	Sex	Type	Measurement codes			** %	Specimen	Sex	Type	Measurement codes			** %
			BFcd	(PL)	HFcd	Probability				BFcd	(PL)	HFcd	Probability
1569		1	20.7	15.1	11.4	100.0	0400HH		1	18.4	17.6	9.3	100.0
0540		1	20.1	15.5	10.7	100.0	0358		1	17.3	18.3	9.7	99.7
0200J		1	21.0	16.0	11.5	99.5	1502		1	18.3	18.3	10.1	99.5
0106		1	20.6	16.1	11.4	99.5	1571		1	17.0	18.8		
2107		2	22.8	16.2	11.4	100.0	1239		1	19.1	18.9	10.0	93.2
1139K		2	22.7	16.3	11.0	100.0	1225C		1	20.0	19.3	10.6	35.6
3018J	M	2	21.5	16.3	11.5	64.7	4048		1	19.6	19.6	10.6	17.4
3004JJ	M	2	22.7	16.5	11.5	100.0	0200S		2	20.3	20.0	10.6	84.1
1160		2	22.6	16.5	11.9	100.0	0123		2	20.5	20.1	11.0	82.6
1169		2	22.2	16.8	11.9	99.9	2043A		2	19.9	20.2	11.1	83.6
							3000SSS	M	2	19.7	20.2	10.6	95.7
							3018S	M	2	20.3	20.6	10.5	98.9
							0573B		2	19.0	20.6	10.7	98.1
							3004SS	M	2	20.9	21.1	10.8	99.9
							1175		2	20.2	21.4	10.7	100.0

Statistics			
VT03	Measurement codes		
	BFcd	(PL)	HFcd
total count	10	10	10
total mean	21.7	16.1	11.4
total std	0.97	0.47	0.34
total min	20.1	15.1	10.7
total max	22.8	16.8	11.9
total CV	4.49	2.90	3.01
type 1 count	4	4	4
type 1 mean	20.6	15.7	11.2
type 1 std	0.31	0.38	0.32
type 1 min	20.1	15.1	10.7
type 1 max	21.0	16.1	11.5
type 1 CV	1.48	2.44	2.84
type 2 count	6	6	6
type 2 mean	22.4	16.4	11.5
type 2 std	0.46	0.20	0.31
type 2 min	21.5	16.2	11.0
type 2 max	22.8	16.8	11.9
type 2 CV	2.04	1.23	2.73

Statistics			
VT12	Measurement codes		
	BFcd	(PL)	HFcd
total count	15	15	14
total mean	19.4	19.6	10.4
total std	1.12	1.08	0.49
total min	17.0	17.6	9.3
total max	20.9	21.4	11.1
total CV	5.77	5.49	4.68
type 1 count	7	7	6
type 1 mean	18.5	18.7	10.0
type 1 std	1.02	0.63	0.48
type 1 min	17.0	17.6	9.3
type 1 max	20.0	19.6	10.6
type 1 CV	5.50	3.40	4.74
type 2 count	8	8	8
type 2 mean	20.1	20.5	10.7
type 2 std	0.53	0.49	0.19
type 2 min	19.0	20.0	10.5
type 2 max	20.9	21.4	11.1
type 2 CV	2.66	2.38	1.80

** this is the probability of membership in the "type" group as initially classified.
based on multivariate analysis using variables BPacr, PL, HFcd together.

Vertebrae

Table 8-7. Thoracic vertebra 13 (VT13) & lumbar vertebra 1 (VL01) univariate statistics, division at the mean (PL) and results of multivariate crossvalidation of type classification.

VT13							VL01						
Specimen	Sex	Type	BFcd	(PL)	HFcd	** % Probability	Specimen	Sex	Type	BFcd	(PL)	HFcd	** % Probability
0400II		1	18.1	19.0	10.0	100.0	0400JJ		1	18.1	20.2	10.5	100.0
0163		1	17.0	20.3	10.0	99.7	3001K	M	1	18.1	21.5	10.3	98.4
1225D		1	20.1	20.7	11.0	97.8	4023		1	18.3	21.6	10.3	98.2
0200T		1	20.0	21.2	12.1	99.9	1491		1	20.0	21.8	11.1	99.4
3006E		1	18.0	21.6	10.9	93.7	1225E		1	20.1	22.0	11.3	99.0
2043B		1	20.0	21.9	11.4	85.6	0570		1	19.8	22.3	11.3	95.5
3018T	M	1	19.8	22.1	11.2	48.3	0200U		1	21.4	22.4	12.9	91.5
3000TTT	M	1	19.4	22.1	10.7	8.6	4003		1	18.8	22.5	11.0	98.4
0573C		2	19.0	22.4	11.0	35.4	2043C		1	19.9	22.7	11.9	74.9
3004TT	M	2	21.0	22.8	11.0	97.8	3000VVV	M	2	19.2	23.0	11.5	41.1
1145A		2	20.2	22.9	11.0	96.8	3018U	M	2	20.5	23.5	11.7	57.1
1151		2	18.6	23.0	10.2	98.9	3004UU	M	2	20.7	23.9	11.6	76.9
1152		2	19.4	23.1	11.1	93.7	1145B		2	19.6	23.9	12.6	87.9
2618		2	21.9	23.5	12.1	94.3	1164A		2	20.8	24.4	11.7	96.2
1237		2	21.4	23.7	12.0	97.8	0511		2	18.4	24.7	11.6	99.9
1170		2	20.6	23.9	11.3	99.9	1178		2	20.9	25.3	12.8	99.9
							0588		2	22.5	26.3	12.3	100.0

Statistics

VT13	BFcd	(PL)	HFcd
total count	16	16	16
total mean	19.6	22.14	11.1
total std	1.25	1.28	0.63
total min	17.0	19.0	10.0
total max	21.9	23.9	12.1
total CV	6.39	5.80	5.69
type 1 count	8	8	8
type 1 mean	19.0	21.1	10.9
type 1 std	1.10	1.00	0.65
type 1 min	17.0	19.0	10.0
type 1 max	20.1	22.1	12.1
type 1 CV	5.77	4.73	5.92
type 2 count	8	8	8
type 2 mean	20.3	23.2	11.2
type 2 std	1.10	0.47	0.57
type 2 min	18.6	22.4	10.2
type 2 max	21.9	23.9	12.1
type 2 CV	5.45	2.02	5.07

Statistics

VL01	BFcd	(PL)	HFcd
total count	17	17	17
total mean	19.8	23.1	11.5
total std	1.22	1.50	0.76
total min	18.1	20.2	10.3
total max	22.5	26.3	12.9
total CV	6.15	6.52	6.60
type 1 count	9	9	9
type 1 mean	19.4	21.9	11.2
type 1 std	1.07	0.72	0.77
type 1 min	18.1	20.2	10.3
type 1 max	21.4	22.7	12.9
type 1 CV	5.53	3.29	6.93
type 2 count	8	8	8
type 2 mean	20.3	24.4	12.0
type 2 std	1.17	0.98	0.47
type 2 min	18.4	23.0	11.5
type 2 max	22.5	26.3	12.8
type 2 CV	5.75	4.02	3.97

** this is the probability of membership in the "type" group as initially classified, based on multivariate analysis using variables BFcd, PL, HFcd together.

Vertebrae

Table 8-8. Lumbar vertebrae 2 (VL02) & 3 (VL03) univariate statistics, division at the mean (PL) and results of multivariate crossvalidation of type classification.

VL02							VL03						
Specimen	Sex	Type	BFcd	(PL)	HFcd	** % Probability	Specimen	Sex	Type	BFcd	(PL)	HFcd	** % Probability
0352		1	17.9	22.3	11.4	100.0	1594A		1	19.8	22.4	11.0	99.8
3001J	M	1	18.3	22.6	11.3	99.9	0400LL		1	18.9	22.5	10.4	99.6
4024		1	18.0	22.6	10.9	99.9	1604		1	18.7	22.7	11.9	99.9
0200V		1	19.6	23.1	10.3	99.4	1411		1	17.4	22.9	10.3	99.1
0400KK		1	19.7	23.2	10.6	98.8	3001I	M	1	18.8	23.6	11.3	94.4
1225F		1	19.9	23.3	12.4	96.8	1225G		1	20.4	24.3	13.2	70.2
1227A		1	19.8	23.9	11.2	93.4	3000UUU	M	1	19.6	24.9	12.2	39.4
0164		1	19.6	24.2	12.0	89.1	0200W		1	21.1	25.0	12.8	13.5
3000ZZZ	M	1	19.0	24.3	12.2	89.8	1177		2	19.2	25.2	12.0	61.2
2043D		1	20.0	24.3	12.6	56.4	0165		2	21.0	25.3	13.0	60.6
3018V	M	2	20.5	24.7	11.9	27.9	2043E		2	20.4	25.5	12.5	82.8
3004VV	M	2	20.4	25.2	12.8	66.4	3018W	M	2	21.2	25.6	12.7	86.2
1164B		2	21.2	25.7	12.2	96.1	3004WW	M	2	20.8	26.1	13.4	91.8
1145C		2	19.7	26.0	12.3	94.4	1155		2	19.0	26.4	12.1	97.8
1144C		2	19.9	27.3	12.8	99.9	1227B		2	20.1	26.7	12.0	99.5
1161		2	19.9	27.6	11.9	100.0	1164C		2	21.5	26.9	12.7	99.7
							1144B		2	20.6	28.1	13.1	100.0

Statistics

Measurement codes

VL02	BFcd	(PL)	HFcd
total count	16	16	16
total mean	19.6	24.4	11.8
total std	0.87	1.56	0.76
total min	17.9	22.3	10.3
total max	21.2	27.6	12.8
total CV	4.45	6.38	6.42
type 1 count	10	10	10
type 1 mean	19.2	23.4	11.5
type 1 std	0.78	0.69	0.76
type 1 min	17.9	22.3	10.3
type 1 max	20.0	24.3	12.6
type 1 CV	4.09	2.97	6.59
type 2 count	6	6	6
type 2 mean	20.3	26.1	12.3
type 2 std	0.50	1.07	0.38
type 2 min	19.7	24.7	11.9
type 2 max	21.2	27.6	12.8
type 2 CV	2.45	4.09	3.08

Statistics

Measurement codes

VL03	BFcd	(PL)	HFcd
total count	17	17	17
total mean	19.9	25.0	12.1
total std	1.10	1.63	0.91
total min	17.4	22.4	10.3
total max	21.5	28.1	13.4
total CV	5.51	6.53	7.51
type 1 count	8	8	8
type 1 mean	19.3	23.5	11.6
type 1 std	1.09	1.00	1.00
type 1 min	17.4	22.4	10.3
type 1 max	21.1	25.0	13.2
type 1 CV	5.64	4.27	8.58
type 2 count	9	9	9
type 2 mean	20.4	26.2	12.6
type 2 std	0.81	0.88	0.48
type 2 min	19.0	25.2	12.0
type 2 max	21.5	28.1	13.4
type 2 CV	3.97	3.36	3.79

** this is the probability of membership in the "type" group as initially classified,
based on multivariate analysis using variables BFcd, PL, HFcd together

Vertebrae

Table 8-9. Lumbar vertebrae 4 (VL04) & 5 (VL05) univariate statistics, division at the mean (PL) and results of multivariate crossvalidation of type classification.

VL04							VL05						
Specimen	Sex	Type	Measurement codes			** %	Specimen	Sex	Type	Measurement codes			** %
			BFcd	(PL)	HFcd	Probability				BFcd	(PL)	HFcd	Probability
0400MM		1	18.5	21.8	10.0	100.0	0400NN		1	17.7	20.7	10.5	100.0
1492		1	19.9	23.0	11.7	99.9	1226A		1	22.5	24.6	12.9	57.8
1594B		1	20.0	23.6	11.9	99.9	3001G	M	1	20.4	24.8	11.0	43.9
3001H	M	1	19.8	24.5	12.0	99.3	5055		1	22.2	25.1	12.5	44.7
3000YYY	M	1	20.3	25.8	12.6	66.8	3006F		1	21.1	25.8		-
2043F		1	21.5	25.8	13.2	56.4	0126		2	22.4	26.1	12.9	92.3
3018X	M	2	21.3	26.1	13.0	25.2	3018Y	M	2	22.1	26.1	12.7	95.2
1227C		2	21.2	27.0	12.0	99.8	3000WWW	M	2	20.7	26.4	12.6	99.9
3004XX	M	2	22.3	27.4	13.7	97.3	2043G		2	22.2	26.4	13.2	99.1
1168		2	22.1	28.0	13.6	99.2	1141		2	23.2	26.8	12.3	31.1
1167		2	23.0	28.1	14.4	98.7	1227D		2	22.5	27.5	11.9	98.5
1144A		2	21.3	28.1	12.6	99.9	1158		2	21.0	27.7	11.2	99.9
1165		2	23.6	28.8	13.9	100.0	3004YY	M	2	23.4	27.8	12.7	99.4

Statistics VL04				Statistics VL05			
	BFcd	(PL)	HFcd		BFcd	(PL)	HFcd
total count	13	13	13	total count	13	13	12
total mean	21.1	26.0	12.7	total mean	21.6	25.82	12.2
total std	1.36	2.12	1.12	total std	1.45	1.79	0.83
total min	18.5	21.8	10.0	total min	17.7	20.7	10.5
total max	23.6	28.8	14.4	total max	23.4	27.8	13.2
total CV	6.45	8.17	8.87	total CV	6.70	6.93	6.80
type 1 count	6	6	6	type 1 count	5	5	4
type 1 mean	20.0	24.1	11.9	type 1 mean	20.8	24.2	11.7
type 1 std	0.89	1.44	0.99	type 1 std	1.70	1.81	1.00
type 1 min	18.5	21.8	10.0	type 1 min	17.7	20.7	10.5
type 1 max	21.5	25.8	13.2	type 1 max	22.5	25.8	12.9
type 1 CV	4.45	6.00	8.32	type 1 CV	8.20	7.48	8.56
type 2 count	7	7	7	type 2 count	8	8	8
type 2 mean	22.1	27.6	13.3	type 2 mean	22.2	26.8	12.4
type 2 std	0.85	0.81	0.76	type 2 std	0.90	0.67	0.59
type 2 min	21.2	26.1	12.0	type 2 min	20.7	26.1	11.2
type 2 max	23.6	28.8	14.4	type 2 max	23.4	27.8	13.2
type 2 CV	3.85	2.94	5.73	type 2 CV	4.04	2.49	4.76

** this is the probability of membership in the "type" group as initially classified, based on multivariate analysis using variables BFcd, PL, HFcd together

Vertebrae

Table 8-10. Lumbar vertebrae 6 (VL06) & 7 (VL07) univariate statistics, division at the mean (PL) and results of multivariate crossvalidation of type classification.

VL06							VL07						
Specimen	Sex	Type	Measurement codes			** % Probability	Specimen	Sex	Type	Measurement codes			** % Probability
			BFcd	(PL)	HFcd					BFcd	(PL)	HFcd	
0400OO		1	20.3	22.4	10.4	100.0	0400PP		1	19.9	18.1	10.5	100.0
3006G		1		23.9		-	3006H		1		19.0		-
3001F	M	1	21.2	24.0	11.1	97.1	1519		1	19.0	19.0	10.5	99.9
1226B		1	23.2	24.0	12.6	62.1	2239		1	20.9	19.1	10.5	99.9
0565A		1	21.1	24.2	11.4	95.4	0536B		1	19.0	19.1	10.3	99.9
0950AA		1	22.5	24.7	12.3	71.3	3001L	M	1	20.0	19.2	11.1	99.8
1596		1	21.2	24.8	12.1	63.3	2414		1	21.8	19.2	10.9	99.9
3018Z	M	2	23.2	25.2	12.6	45.7	0565B		1	19.9	19.4	10.9	99.5
3000AAAA	M	2	22.1	25.4	12.2	38.7	1244		1	20.1	19.7	10.5	98.3
2043H		2	23.6	25.7	13.1	77.1	0950BB		1	21.3	20.0	11.4	95.9
3004ZZ	M	2	25.2	26.9	13.0	99.8	1238		1	22.4	20.0	11.5	97.8
1227E		2	24.3	27.0	11.9	99.8	3018AA	M	2	22.3	20.8	12.0	75.1
1150		2	22.5	27.1	12.5	98.5	3000XXX	M	2	21.6	20.9	11.9	88.0
5000		2	24.0	27.5	12.8	99.9	1173		2	21.3	21.2	12.4	98.4
							0445		2	22.2	21.3	11.6	97.6
							1241		2	25.2	21.9	12.7	98.0
							1227F		2	23.0	22.5	11.1	99.9
							3004AAA	M	2	24.3	22.6	12.2	99.9
							1242		2	25.3	22.8	14.0	100.0
							1226C		2	25.3	22.9	13.9	100.0

Statistics		Measurement codes		
VL06		BFcd	(PL)	HFcd
total count		13	14	13
total mean		22.6	25.197	12.2
total std		1.39	1.44	0.76
total min		20.3	22.4	10.4
total max		25.2	27.5	13.1
total CV		6.14	5.71	6.22
type 1 count	6	7	6	
type 1 mean	21.6	24.0	11.7	
type 1 std	0.95	0.73	0.77	
type 1 min	20.3	22.4	10.4	
type 1 max	23.2	24.8	12.6	
type 1 CV	4.41	3.02	6.60	
type 2 count	7	7	7	
type 2 mean	23.6	26.4	12.6	
type 2 std	1.00	0.86	0.40	
type 2 min	22.1	25.2	11.9	
type 2 max	25.2	27.5	13.1	
type 2 CV	4.24	3.25	3.17	

Statistics		Measurement codes		
VL07		BFcd	(PL)	HFcd
total count		19	20	19
total mean		21.8	20.4	11.6
total std		1.97	1.47	1.07
total min		19.0	18.1	10.3
total max		25.3	22.9	14.0
total CV		9.04	7.18	9.21
type 1 count	10	11	10	
type 1 mean	20.4	19.2	10.8	
type 1 std	1.07	0.52	0.38	
type 1 min	19.0	18.1	10.3	
type 1 max	22.4	20.0	11.5	
type 1 CV	5.23	2.71	3.48	
type 2 count	9	9	9	
type 2 mean	23.4	21.9	12.4	
type 2 std	1.56	0.80	0.92	
type 2 min	21.3	20.8	11.1	
type 2 max	25.3	22.9	14.0	
type 2 CV	6.68	3.67	7.43	

** this is the probability of membership in the "type" group as initially classified, based on multivariate analysis using variables BFcd, PL, HFcd together.

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Table 8-11. Sacrum univariate statistics, division at the mean (PL) and results of multivariate crossvalidation of type classification.

Specimen	Sex	Type	Measurement codes					** %
			BFcr	GB	BPacr	(PL)	HFcr	Probability
0400QQ		1	19.5	41.7	26.8	29.6	9.7	99.9
0536A		1	18.8	41.3	26.3	30.1	9.1	99.7
3001M	M	1	21.7	42.0	26.8	31.5	9.5	99.8
1518		1	20.3	39.5		31.8	9.4	99.6
1226D		1	22.0		30.7	32.0	11.1	-
0950CC		1	22.3	44.3	28.6	32.4	10.3	96.3
1163		1	19.5	52.0	29.7	32.6	9.7	6.0
3000WW	M	1	23.5	47.0	30.1	32.9	10.6	71.4
1240		2	21.5		28.5	33.6	10.7	-
1452		2	21.5	42.0		33.6	10.0	2.0*
1153		2	23.0	50.6	29.1	33.8	11.4	38.7
1227G		2	24.5	53.3	26.9	35.1	10.9	89.2
3018BB	M	2	24.0	45.0	31.4	37.3	10.7	98.6
0116B		2	24.2	48.0	26.4	37.6	11.8	99.9
3004BBB	M	2	25.5	50.3	32.9	37.8	11.6	99.9

Statistics	Measurement codes				
	BFcr	GB	BPacr	(PL)	HFcr
total count	15	13	13	15	15
total mean	22.12	45.92	28.78	33.45	10.45
total std	1.94	4.40	2.03	2.47	0.82
total min	18.8	39.5	26.3	29.6	9.1
total max	25.5	53.3	32.9	37.8	11.8
total CV	8.79	9.59	7.07	7.38	7.82
type 1 count	8	7	7	8	8
type 1 mean	20.95	43.97	28.43	31.60	9.93
type 1 std	1.55	3.96	1.68	1.12	0.63
type 1 min	18.8	39.5	26.3	29.6	9.1
type 1 max	23.5	52.0	30.7	32.9	11.1
type 1 CV	7.39	9.00	5.89	3.53	6.37
type 2 count	7	6	6	7	7
type 2 mean	23.46	48.20	29.20	35.56	11.03
type 2 std	1.41	3.76	2.32	1.81	0.57
type 2 min	21.5	42.0	26.4	33.6	10.0
type 2 max	25.5	53.3	32.9	37.8	11.8
type 2 CV	6.02	7.80	7.95	5.10	5.20

* starred entries are misclassified, at < 5% probability of group membership

** this is the probability of membership in the "type" group as initially classified, based on multivariate analysis using variables BFcr, GB, PL, HFcr together.

Table 8-12. Associated thoracic vertebrae 1 (VT01) & 2 (VT02) selected measurements and basic statistics, total sample.

VT01		Measurement code				
Specimen	Sex	BFcd	BPacd	BPacr	PL	HFcd
3006D		20.3		26.3	17.3	11.2
3000JJJ	M	22.4	18.3	26.3	17.1	11.6
0200H		22.7	22.2		18.9	12.2
0950Y		22.8	24.0	28.4	17.1	11.5
3004HH	M	23.4	21.5	29.1	18.6	12.3
1139H		23.7	20.4	27.6	18.9	11.9
3018H	M	23.8	20.6	28.4	18.4	11.6
total count		7	6	6	7	7
total mean		22.7	21.2	27.7	18.1	11.8
total std		1.1	1.7	1.1	0.8	0.4

VT02		Measurement code		
Specimen	Sex	BFcd	PL	HFcd
0200I		22.9	16.7	11.6
0950Z		23.1	16.0	11.5
1139I		23.3	17.4	11.6
3000KKK	M		16.1	10.9
3004II	M	23.5	17.7	11.5
3018I	M	23.3	17.2	11.8
total count		5	6	6
total mean		23.2	16.8	11.5
total std		0.2	0.6	0.3



Figure 8-7. Examples of vertebra VC02. Upper left: 2413a; upper right: 3018bb; lower left: 125; lower right: 0400qq.

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Table 8-13. Associated thoracic vertebrae 4 through 11 (VT04, VT05, VT06, VT07, VT08, VT09, VT10, VT11) selected measurements and basic statistics, total sample.

VT04		Measurement codes		
Specimen	Sex	BFcd	PL	HFcd
0200K			15.9	11.5
1139J		21.1	16.3	11.3
3004KK	M	22.4	16.7	11.2
3018K	M	20.6	16.2	11.3
total count		3	4	4
total mean		21.4	16.3	11.3
total std		0.8	0.3	0.1

VT08		Measurement codes		
Specimen	Sex	BFcd	PL	HFcd
0200O		20.4	16.5	11.2
0400DD		19.2	14.6	9.3
3000OOO	M	19.0	15.8	10.3
3004OO	M	21.8	17.2	10.9
3018O	M	20.6	17.3	11.2
total count		5	5	5
total mean		20.2	16.3	10.6
total std		1.0	1.0	0.7

VT05		Measurement codes		
Specimen	Sex	BFcd	PL	HFcd
0200L		18.2	16.2	11.6
0400AA		19.4	13.7	9.4
1139L		19.5	17.0	11.4
3000LLL	M	20.5	15.1	10.6
3004LL	M	21.7	16.8	11.3
3018L	M	20.0	16.6	11.4
total count		6	6	6
total mean		19.9	15.9	11.0
total std		1.1	1.2	0.8

VT09		Measurement codes		
Specimen	Sex	BFcd	PL	HFcd
0200P		19.2	15.8	11.2
0400EE		19.2	14.9	9.4
3000PPP	M	20.1	15.9	10.5
3004PP	M	22.7	18.0	11.0
3018P	M	22.0	17.5	11.4
total count		5	5	5
total mean		20.7	16.4	10.7
total std		1.5	1.2	0.7

VT06		Measurement codes		
Specimen	Sex	BFcd	PL	HFcd
0200M			16.0	11.7
0400BB		19.1	13.7	9.5
3000MMM	M	20.5	15.1	10.9
3004MM	M	21.7	16.8	11.4
3018M	M	20.0	16.6	11.4
total count		4	5	5
total mean		20.3	15.6	11.0
total std		1.0	1.1	0.8

VT10		Measurement codes		
Specimen	Sex	BFcd	PL	HFcd
0200Q			16.9	11.4
0400FF		18.7	15.6	9.3
1225D		20.2	17.0	11.0
3000QQQ	M	19.4	17.5	10.9
3004QQ	M	20.4	18.1	11.3
3018Q	M	20.8	18.1	11.0
total count		5	6	6
total mean		19.9	17.2	10.8
total std		0.8	0.9	0.7

VT07		Measurement codes		
Specimen	Sex	BFcd	PL	HFcd
0200N		18.8	15.8	11.3
0400CC		18.3	14.3	9.1
3000NNN	M	19.6	15.6	10.5
3004NN	M	21.6	17.0	11.0
3018N	M	20.6	16.8	11.1
total count		5	5	5
total mean		19.8	15.9	10.6
total std		1.2	1.0	0.8

VT11		Measurement codes		
Specimen	Sex	BFcd	PL	HFcd
0200R		19.0	18.6	10.8
0400GG		17.8	16.7	9.0
0573A		19.2	19.3	11.1
1225B		19.5	18.2	10.6
3000RRR	M	19.2	19.1	10.5
3004RR	M	20.9	19.6	10.6
3018R	M	20.0	19.6	10.4
total count		7	7	7
total mean		19.4	18.7	10.4
total std		0.9	1.0	0.6

Table 8-14. Length (mm) of vertebral sections for associated vertebrae from the same individual, by individual specimen number (VC, cervical; VT, thoracic; VL, lumbar; VS, sacrum; VD, caudal).

Specimen	Element	PL	Specimen	Element	PL	Specimen	Element	PL	Specimen	Element	PL	Specimen	Element	PL	Specimen	Element	PL						
0200	VC02	51.0 *	0201	VC02	46.4	0950	VC02	46.3	1139	VC02	50.0 *	3000	VC02	44.7	3004	VC02	48.5	3018	VC02	50.2			
0200	VC03	26.3	0201	VC03	25.8	0950	VC03	25.1	1139	VC03	27.1	3000	VC03	25.6	3004	VC03	26.1	3018	VC03	26.2			
0200	VC04	22.9	0201	VC04	22.9	0950	VC04	23.0	1139	VC04	23.3	3000	VC04	24.0	3004	VC04	24.1	3018	VC04	24.0			
0200	VC05	21.5	0201	VC05	18.7	0950	VC05	19.6	1139	VC05	20.9	3000	VC05	19.9	3004	VC05	21.8	3018	VC05	21.8			
0200	VC06	20.1	0201	VC06	18.5 *	0950	VC06	19.2	1139	VC06	19.8	3000	VC06	18.4	3004	VC06	20.2	3018	VC06	20.8			
0200	VC07	18.7	0201	VC07	17.0 *	0950	VC07	18.3	1139	VC07	17.8	3000	VC07	18.1	3004	VC07	19.5	3018	VC07	19.7			
	total cervical length	160.5			149.2			151.5			158.8			150.7			160.2			162.7			
0200	VT01	18.9	0400	VT01	15.5 *				3000	VT01	17.1	3004	VT01	18.6	3018	VT01	18.4						
0200	VT02	16.7	0400	VT02	14.5 *				3000	VT02	16.1	3004	VT02	17.7	3018	VT02	17.2						
0200	VT03	16.0	0400	VT03	13.5 *				3000	VT03	15.0 *	3004	VT03	16.5	3018	VT03	16.3						
0200	VT04	15.9	0400	VT04	13.5 *				3000	VT04	15.0 *	3004	VT04	16.7	3018	VT04	16.2						
0200	VT05	16.2	0400	VT05	13.7				3000	VT05	15.1	3004	VT05	16.8	3018	VT05	16.6						
0200	VT06	16.0	0400	VT06	13.7				3000	VT06	15.1	3004	VT06	16.8	3018	VT06	16.6						
0200	VT07	15.8	0400	VT07	14.3				3000	VT07	15.6	3004	VT07	17.0	3018	VT07	16.8						
0200	VT08	16.5	0400	VT08	14.6				3000	VT08	15.8	3004	VT08	17.2	3018	VT08	17.3						
0200	VT09	15.8	0400	VT09	14.9				3000	VT09	15.9	3004	VT09	18.0	3018	VT09	17.5						
0200	VT10	16.9	0400	VT10	15.6				3000	VT10	17.5	3004	VT10	18.1	3018	VT10	18.1						
0200	VT11	18.6	0400	VT11	16.7				3000	VT11	19.1	3004	VT11	19.6	3018	VT11	19.6						
0200	VT12	20.0	0400	VT12	17.6				3000	VT12	20.2	3004	VT12	21.1	3018	VT12	20.6						
0200	VT13	21.2	0400	VT13	19.0				3000	VT13	22.1	3004	VT13	22.8	3018	VT13	22.1						
	total thoracic length	224.2			197.0						219.6			237.0			233.3						
0200	VL01	22.4	0400	VL01	20.2	1227	VL01	22.0 *	2043	VL01	22.7	3000	VL01	23.0	3004	VL01	23.9	3018	VL01	23.5	3001	VL01	21.5
0200	VL02	23.1	0400	VL02	23.2	1227	VL02	23.9	2043	VL02	24.3	3000	VL02	24.3	3004	VL02	25.2	3018	VL02	24.7	3001	VL02	22.6
0200	VL03	25.0	0400	VL03	22.5	1227	VL03	26.7	2043	VL03	25.5	3000	VL03	24.9	3004	VL03	26.1	3018	VL03	25.6	3001	VL03	23.6
0200	VL04	25.0 *	0400	VL04	21.8	1227	VL04	27.0	2043	VL04	25.8	3000	VL04	25.8	3004	VL04	27.4	3018	VL04	26.1	3001	VL04	24.5
0200	VL05	25.0 *	0400	VL05	20.7	1227	VL05	27.5	2043	VL05	26.4	3000	VL05	26.4	3004	VL05	27.8	3018	VL05	26.1	3001	VL05	24.8
0200	VL06	24.0 *	0400	VL06	22.4	1227	VL06	27.0	2043	VL06	25.7	3000	VL06	25.4	3004	VL06	26.9	3018	VL06	25.2	3001	VL06	24.0
0200	VL07	21.0 *	0400	VL07	18.1	1227	VL07	22.5	2043	VL07	21.0	3000	VL07	20.9	3004	VL07	22.6	3018	VL07	20.8	3001	VL07	19.2
0200	VS	32.0 *	0400	VS	29.6	1227	VS	35.1	2043	VS	35.0	3000	VS	32.9	3004	VS	37.8	3018	VS	37.3	3001	VS	31.5
	total lumbar/ sacral length	197.4			178.4			211.6			206.4			203.4			217.6			209.3			191.7
												3000	VD01	10.0	3004	VD01	10.3	3018	VD01	10.4			
												3000	VD02	10.3	3004	VD02	10.7	3018	VD02	10.2			
												3000	VD03	11.6	3004	VD03	11.3	3018	VD03	10.6			
												3000	VD04	12.8 *	3004	VD04	12.5	3018	VD04	11.9			
												3000	VD05	14.0	3004	VD05	14.6	3018	VD05	13.4			
												3000	VD06	16.9	3004	VD06	17.4	3018	VD06	15.8			
	partial tail length (caudal 1-6)													75.5			76.9			72.4			

* these measurements are approximate