Quantitative Taphonomy of a Triassic reptile: *Tanytrachelos ahynis* from the Cow Branch Formation, Dan River Basin, Solite Quarry, Virginia

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ABSTRACT

The Virginia Solite Quarry assemblage of *Tanytrachelos ahynis*, with its exceptionally abundant and uniquely preserved specimens, offers an opportunity to quantify multiple aspects of vertebrate taphonomy. The presence or absence of 128 skeletal elements (i.e., bones) as well as the presence or absence of 136 skeletal variables (i.e., morphometric dimensions) were recorded for 100 specimens collected from two distinct layers within the quarry (lake cycles 2 and 16). Anatomical specimen completeness (or the percent of bones/variables present in a specimen) is low (the median specimen preserves 14.5% of bones and 11.8% of measured variables) in spite of protection from high energy currents, predators, and scavengers afforded by anoxic bottom waters. Specimen size, as approximated by femur length, does not significantly impact specimen completeness. Also, post-exhumation weathering, duration of exposure before burial, and morphotype groupings do not appear to have significantly affected anatomical specimen completeness or articulation. Presence or absence of the enigmatic heterotopic bones represents a true biological signal as indicated by the lack of significant difference in anatomical specimen completeness between the two morphotypes as well as qualitative taphonomic evidence. When anatomical specimen completeness has been corrected for post-depositional faulting, lake cycles 2 and 16 differ from one another significantly in terms of articulation and anatomical completeness of specimens. Specimens with soft-bodied preservation are significantly more articulated, but not significantly more complete, than specimens without preserved soft tissues. Preservation frequency of bones/variables (or the percent of specimens in which a bone/variable is present) varies greatly, but is generally low (an average skeletal element is present in 19% of specimens and an average variable can be measured in 12% of specimens), with significant preferential removal of smaller skeletal elements. Hind limbs, specifically femora, are most commonly preserved. Low anatomical specimen completeness and positive correlation between bone size and frequency of preservation both indicate specimen disturbance by minor hydraulic currents. These taphonomic patterns suggest a moderate-depth depositional environment (slightly shallower than previously proposed).

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

Despite intense and diverse research in vertebrate taphonomy, little work has been done to assess morphological fidelity and anatomical completeness of the vertebrate fossil record (Behrensmeyer et al., 2000). Until this point, studies which count the occurrences of specific bones were concerned with reconstructing relative abundance patterns for various taxa (e.g., Klein, 1980; Behrensmeyer and Boaz, 1980; and Badgley, 1986) or identifying the likely agents of accumulation (e.g., Brain, 1980; Behrensmeyer and Boaz, 1980). In contrast, this study aims to quantify anatomical and morphological completeness of a fossil vertebrate species using the small aquatic tetrapod *Tanytrachelos ahynis*. By targeting a fossil collection derived from a locality characterized by exceptional preservation, specifically the Virginia Solite Quarry fossil *Lagerstätten* (Olsen and Johansson, 1994), this study attempts to assess anatomical fidelity of the vertebrate fossil record representing a highly favorable preservational setting.

The quantitative taphonomic data should offer insights into the environmental context of these fossiliferous deposits, both through critical examination of numerically significant differences in anatomical specimen completeness (percent of bones/variables present in each specimen) as well as by contrasting articulation patterns among specimens from different lake cycles and stratigraphic horizons (i.e., comparative taphonomy *sensu* Brett and Baird, 1989). Better understanding of the depositional circumstances that led to preservation of articulated *Tanytrachelos* remains will potentially aid in the discovery of *Tanytrachelos* specimens in other Newark Supergroup basins, and may improve our general understanding of taphonomic contexts, which lead to preservation of vertebrate remains with fossilized soft tissues.

Quantitative taphonomic analysis may also be employed to gain biological insights. Specifically, the *Tanytrachelos* population contains two distinct morphotypes indicated by the presence or absence of paired bones of unknown affinity (referred to here as "heterotopic" bones) associated with the proximal caudal region, specifically caudal vertebrae four and five. The presence/absence of heterotopic bones could be indicative of a true biological signal (a sexually dimorphic population, developmental polymorphs, or two separate species) or a taphonomic artifact caused by post-mortem loss of the heterotopic bones. Quantitative evaluation of presence of heterotopic bones in the context of presence of other skeletal elements can provide a rigorous test of this taphonomic artifact hypothesis.

Finally, the phylogenetic relationships within the Protorosauria (a large Triassic clade of reptiles to which *Tanytrachelos* belongs) are poorly resolved due to numerous incompletely known and inadequately described taxa. The current description of *Tanytrachelos* is inadequate for use in most systematic analyses. In addition, the possible presence of two species with the genus *Tanytrachelos* makes systematic diagnosis problematic. The analysis of anatomical specimen completeness and preservation frequency of skeletal elements should help us to assess how common reasonably complete specimens are, and how complete the most complete fossil specimens can be expected to be. Similarly, the study should provide quantitative guidelines regarding representation of specific skeletal elements. These numerical assessments will be helpful in designing realistic protocols for morphometric studies used for systematic purposes and other paleontological goals.

METHODS

Study Area

The Cow Branch Formation of the Dan River Basin (part of the Newark Supergroup) is characterized by cyclic rift basin lake deposits of late Triassic (Carnian) age. The upper member of the Cow Branch Formation is exposed at the Virginia Solite Quarry, situated on the Virginia-North Carolina border near Eden, North Carolina (Fig. 1A). The Solite Quarry deposits have yielded an amazing number of the small aquatic tetrapod *Tanytrachelos ahynis* as well as insects, plants, fish, and dinosaur trackways (Fraser et al., 1996). The 30 plus transgressive rift-basin lake cycles, exposed in two quarries, are interpreted to represent a record of Milancovitch forcing (Olsen, 1986). Of the 17 cycles within the abandoned quarry (Fig. 1B), three lake cycles (cycles 2, 3, and 16 specifically) have been the dominant source of macrofossils (Fig. 1C). The blackest, most organic-rich, finest grained, micro-laminated shales have yielded numerous articulated *Tanytrachelos* specimens. Ninety six of the 100 specimens analyzed in this study came from lake cycle 2 or 16. The other four specimens came from lake cycle 3 (2 specimens), stratigraphically unidentifiable spoils (1 specimen), and the Newark basin, North Bergen, NJ (1 non-Solite specimen for comparison). Lake cycle 2 is broken down into ten, centimeter-scale horizons referred to by number. Horizon 1 marks the stratigraphic top of lake cycle 2 and the lowermost horizon 10 is synonymous with the "insect layer". The "insect layer" is famous for its complete insects, representing at least seven different orders, preserved as 2-D silvery impressions. *Tanytrachelos* specimens from within the "insect layer" display soft-bodied preservation in the form of muscle blocks, tendons, and skin impressions. For a more complete description of the study area, refer to Fraser et al. (1996).

Specimen Selection

Specimens were selected for their clear representation of identifiable skeletal elements, specifically multiple limb elements. Completely articulated specimens, partially articulated specimens, and even disarticulated specimens that included clusters of multiple bones clearly representing a single individual were included provided the skeletal elements were easily identified and only elements from a single individual were present. No hydraulically accumulated bone assemblages or transported, individual skeletal elements were analyzed. This sampling scheme is geared towards deriving the most optimistic estimate of the anatomical incompleteness as the inclusion of fragments or isolated elements would further lower all numerical estimates reported below. Degree of disarticulation was broken down into three distinct states: 0=completely articulated specimens, 0.5=partially articulated specimens, with either strings of articulated vertebrae and disarticulated limbs or articulated limbs separated from the body, and 1=completely disarticulated specimens which may contain all or some skeletal elements in a disarticulated state closely associated to each other, and likely preserved in *situ*. Diagnosis of degree of articulation was made independent of numerical estimates of anatomical specimen completeness (or percent of bones/variables present).

The presence or absence of 128 bones was counted for each specimen, including the skull, all twelve cervical vertebra, the first eleven caudal vertebra, the two heterotopic bones, as well as femur, fibula, tibia, humerus, radius, ulna, metacarpals, astragalus, metatarsals, and all phalanges of the manus and pes for both left and right sides. Cranial

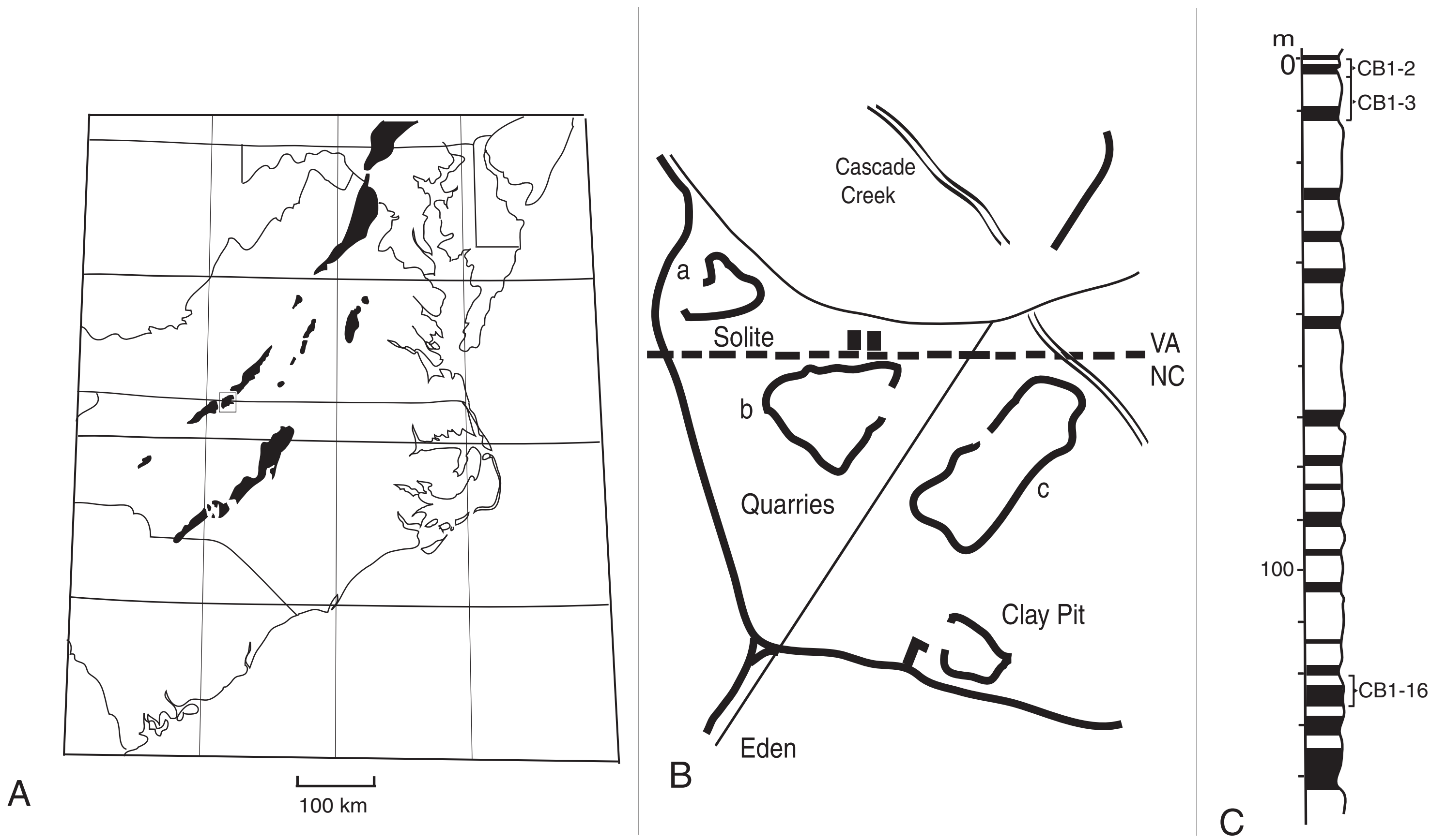


FIGURE 1 - A) The location of the Dan River Basin on the Virginia-North Carolina border. Box indicates study area. B) Map of Solite Quarry (modified from Fraser and Grimaldi, 2003), b indicates abandoned quarry from which all specimens were collected. C) Simplified stratigraphic column from Solite quarry highlighting fossiliferous lake cycles CB1-2, CB1-3 and CB1-16 (modified from Olsen et al., 1978).

elements were rarely preserved and, therefore, counted as one single fused element. Any partially complete bones were counted as present. In addition, simple length and width measurements of bones were recorded (i.e., morphometric variables) (Fig. 2). Skeletal element variables for which an accurate measurement of length could not be obtained were considered absent while those that were measurable were considered present. This protocol excludes those variables that were technically present but could not be reliably measured (i.e., variables are effectively absent as they would add no useful information to either a morphological or systematic analysis). Many bones have multiple measurements and are therefore, represented in the analyses of morphometric variables when only partially complete. All skeletal elements were measured to the nearest 0.1 mm using a digital caliper under a low magnification dissecting microscope. Two variables (length of cervical vertebral succession and length of thoracic vertebral succession) measure packages of multiple vertebrae (see Figure 2). All other variables measure linear dimensions of individual bones.

Due to the faulted nature of the Solite deposits (Ackerman et al., 2003), a correction factor was calculated for faulted slabs to more accurately evaluate the biostratinomy of this assemblage. In many cases, specimen slabs are faulted with anterior and posterior ends of the specimen laterally offset. Often the lateral offset can be traced along the fault-line to find the corresponding partial specimen. In cases where lateral offset is traced to a missing volume of rock, and the corresponding partial specimen can not be found, percent completeness was corrected by substitution of the original denominator (128 possible bones) with the total number of elements possible from the fault-unaffected portion of the skeleton. For example, a posterior-end specimen missing the most distal phalanges of the pes contains 53 bones. The original anatomical completeness calculation yields a value of 41.4%, or (53/128)*100=41.4%. But a fault through the thoracic cavity removed any anterior bones that may have been preserved. Counting only bones posterior from the fault (femur, fibula, tibia, astragalus, metatarsals, and phalanges of the pes for both right and left sides, heterotopic bones, and the first eleven caudal vertebrae) resulted in a total of 67 possible posterior bones. The fault-corrected anatomical completeness then yields a value of 79.1%, or (53/67)*100=79.1%. Quantitative analyses were performed both with and without the correction factor for loss of anatomical elements due to faulting.

Each specimen was also categorized using ten grouping variables, including one trichotomous and nine dichotomous categorical schemes. The full list of grouping variables and their definitions are provided in Table 1. Lake cycle diagnosis was determined by stratigraphic position. Morphotype, weathering, and soft-bodied preservation were diagnosed as presence or absence characters. The duration of carcass exposure before burial was approximated by body position, with a rigor mortis position interpreted to represent longer duration of exposure and passive body position interpreted to represent shorter duration of exposure. Rigor mortis specimens were diagnosed as those with necks severely curved back towards the body where limbs were not posed in such a way that could be explained by movement of the body through current or wave action.

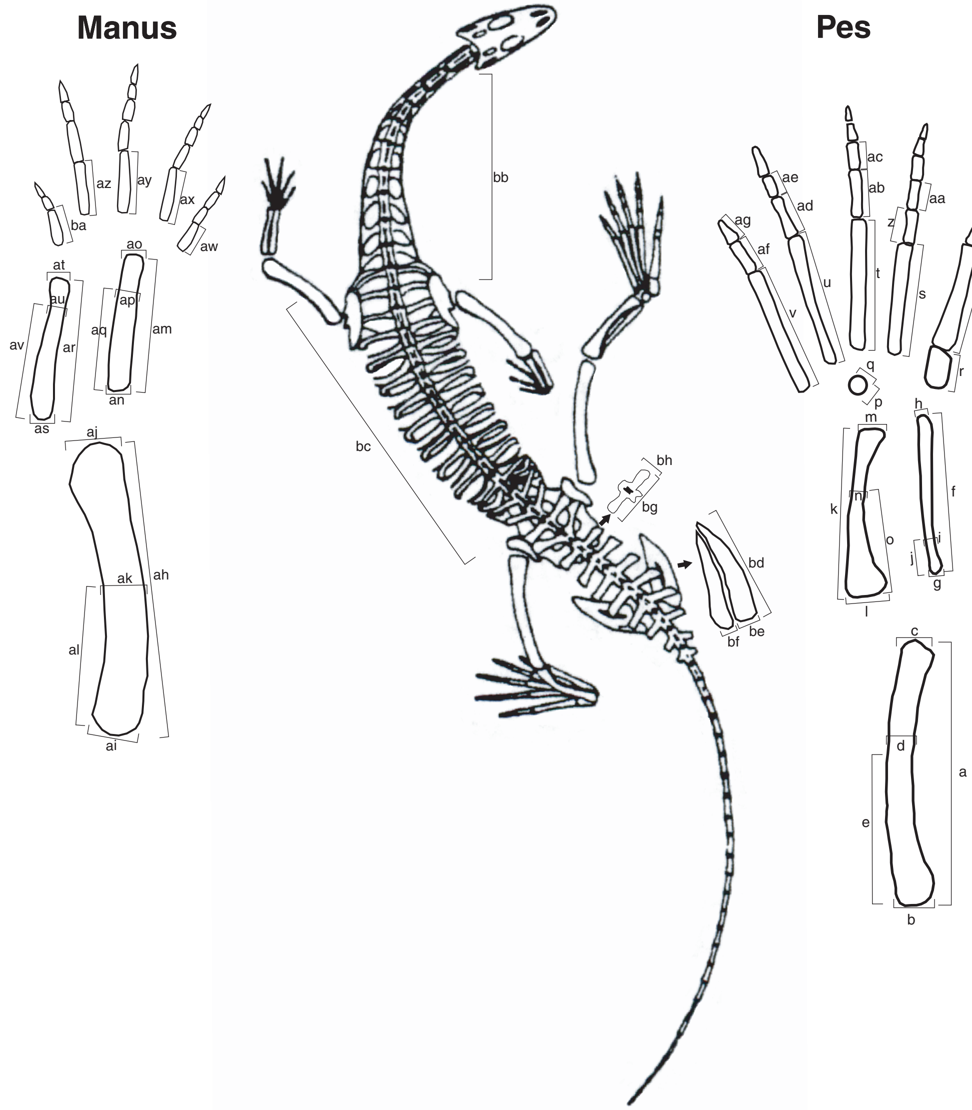


FIGURE 2 - A summary of measurements plotted on the reconstruction of Tanytrachelos modified from Olsen et al. (1978). All measurements repeated on left and right sides where applicable a) femur length, b) proximal width of femur, c) distal width of femur, d) minimum width of femur, e) distance of minimum width from proximal end, f) length of fibula, g) proximal width of fibula, h) distal width of fibula, i) minimum width of fibula, j) distance of minimum width from proximal end, k) length of tibia, l) proximal width of tibia, m) distal width of tibia, n) minimum width of tibia, o) distance of minimum width from proximal end, p) height of astragalus, q) width of astragalus, r) length of reduced fifth metatarsal, s) length of fourth metatarsal, t) length of third metatarsal, u) length of second metatarsal, v) length of first metatarsal, w) length of elongate first phalanx of the fifth digit of the pes, x) length of second phalanx on the fifth digit of the pes, y) length of third phalanx on the fifth digit of the pes, z) length of first phalanx of the fourth digit of the pes, aa) length of second phalanx of the fourth digit of the pes, ab) length of first phalanx on the third digit of the pes, ac) length of the second phalanx on the third digit of the pes, ad) length of the first phalanx on the second digit of the pes, ae) length of the second phalanx on the second digit of the pes, af) length of the first phalanx of the first digit of the pes, ag) length of the second phalanx on the first digit on the pes, ah) length of humerus, ai) proximal width of humerus, aj) distal width of humerus, ak) minimum width of humerus, al) distance of minimum width from proximal end, am) length of ulna, an) proximal width of ulna, ao) distal width of ulna, ap) minimum width of ulna, aq) distance of minimum width from proximal end, ar) length of radius, as) proximal width of radius, at) distal width of radius, au) minimum width of radius, av) distance of minimum width from proximal end, aw) length of fifth metacarpal, ax) length of fourth metacarpal, ay) length of third metacarpal, az) length of second metacarpal, ba) length of first metacarpal, bb) neck length from base of skull to posterior end of twelfth cervical vertebra, bc) length of thoracic cavity from anterior end of first thoracic vertebrae to posterior end of last vertebrae before fused sacrum, bd) length of heterotopic bone, be) width of wider heterotopic bone element, bf) width of smaller heterotopic bone element, bg) caudal vertebral process width, repeated for first eleven caudal vertebrae, bh) caudal vertebral centrum length, repeated for first eleven caudal vertebrae.

TABLE 1- Categorical, or grouping, variables as diagnosed for each specimen.

Categorical Variable	Character Diagnosis
Lake Cycle (Stratigraphic Horizon)	Lake Cycle 2 vs. Lake Cycle 16
Horizon (within Lake Cycle 2)	Layers 1-10 w/ 10 signifying the insect layer
Soft Bodied Preservation	Present vs. Absent
Weathering	Present vs. Absent
Bone Material	Present vs. Absent
Bone Condition	Whole (3-dimensional) vs. Split
Morphotype	Heterotopic Bones Present vs. Absent
Body Orientation	Dorsal vs. Ventral
Body Position	Rigor Position vs. Passive Position
Articulation	Completely Disarticulated Elements vs. Articulated Vertebral Column with disarticulated limbs or Articulated Limbs disarticulated as a single unit from axial skeleton vs. Completely Articulated Specimens (diagnosed independent of completeness, simply articulation of those elements that are present)

Statistical Tests and Software

A combination of procedures provided by Statistical Analytical Software (SAS) and custom-designed codes written in SAS-Interactive Matrix Language (SAS-IML) was used to sum up number of observations for: (1) bone preservation frequency (percent of specimens in which a given bone was found), (2) measured variable preservation frequency (percent of specimens for which a given measurement was possible), and (3) anatomical specimen completeness (percent of bones present or variables measured within a given specimen). SAS-IML was also used to examine the number of specimens containing two bones simultaneously for an exhaustive list of every possible pair of bones. The preservation frequencies of bone pairs were then grouped by lead bone, or first bone, in order to remove all repeated pairs or doubles (e.g., left femur and right femur versus right femur and left femur) and analyze unique bone combinations only. This analysis was repeated for measured variable pairs. Mean skeletal element size was computed for each bone by summing all measured values for total length of that bone and dividing by number of occurrences in the database. This estimate of average size was paired with both the preservation frequency of that bone and the average preservation frequency of all measured variables from that bone. Average size could not be computed for skeletal elements which were counted but never measured.

Due to the skewed nature of all distributions, Wilcoxon test with normal approximation (a non-parametric test of differences in median) was used to statistically evaluate questions about central tendency of samples and groups of samples. Fisher's Exact test was employed to test for significant difference in the frequency of specimens among disarticulation states grouped by categorical variables (2 by 2 and 2 by 3 homogeneity tables). Significance of correlations between anatomical specimen completeness and specimen size, as well as between bone preservation frequency and average bone size, were assessed using Pearson and Spearman Rank correlation coefficients. In all cases alpha=0.05 was assumed for statistical decisions.

RESULTS

The following results are reported in terms of two types of metrics. The first metric, "anatomical specimen completeness", provides a per-specimen measure of completeness and is defined as either: (1) the percent of bones present within a given specimen (number of bones present divided by 128 possible bones examined in this study, multiplied by 100), or (2) the percent of variables measured within a given specimen (number of variables for which measurements were obtained divided by 136 possible measured variables examined in this study, multiplied by 100). The converse metric, "preservation frequency of skeletal elements", provides a pre-bone (or per variables) measure of preservation and is defined as either: (1) the percent of specimens in which a bone occurred (total number of times a bone was observed divided by total number of specimens, multiplied by 100), or (2) percent of specimens in which a morphometric dimension (variable) was measured (total number of times a variable was measured divided by total number of specimens, multiplied by 100). These two metrics of preservation frequency are hereafter referred to as "preservation frequency of bones" and "preservation frequency of variables", respectively.

Bone Analyses

Median anatomical specimen completeness is only 14.5% of bones (Fig. 3). Interestingly, one percent of specimens had no recognizable bones present (Fig. 3A). This specimen was completely disarticulated and seemed to have identifiable bones in hand specimen which proved unidentifiable under the dissecting microscope (e.g., the bone could not be identified as a radius or an ulna, a first caudal vertebrae or a third caudal vertebrae, etc.). Only 12% of specimens contained more than half of bones. A cumulative decay curve of anatomical specimen completeness, expressed again in terms of percent of bones present, shows that the top 25% of specimens in terms of completeness contain more than 30% of bones (Fig. 3B), but these are not necessarily overlapping sets of the same bones in each specimen. Less than 15% of specimens preserve 50% of more of the bones targeted in this study. When preservation frequency of bones is examined in a pairwise fashion, so that the presence of each combination is only counted if a given specimen has both bones constituting the pair, the number of specimens containing specific bone combinations drops off extremely quickly (Fig. 4). Ten two-bone combinations were never found co-occurring in a single specimen (Fig. 4A). Only 110 out of a possible 8,128 (1.4%) unique two-bone combinations occur in more than 30% of specimens (Fig. 4B).

As summarized in Table 2, specimens do not vary significantly in their anatomical specimen completeness when grouped by lake cycle, morphotype, soft-bodied preservation, or extent of specimen weathering. When grouped by their degree of disarticulation, specimens showed significant differences in median anatomical specimen completeness when articulated specimens were compared to either “slightly disarticulated” or “completely disarticulated” ones (Table 2). However, totally disarticulated specimens did not differ significantly from slightly disarticulated ones. For this reason, slightly and completely disarticulated specimens were combined for subsequent analyses.

The fault-corrected anatomical specimen completeness data show similar trends to those listed above. Morphotype, weathering, soft-bodied preservation, and body position groupings persist in showing no significant difference in median anatomical specimen completeness (Table 3). However, there is a significant difference in median anatomical specimen completeness between specimens from lake cycle 2 and lake cycle 16 (Table 3), which was not seen in previous tests.

Specimens with soft-bodied preservation were significantly more articulated than specimens without soft-bodied preservation and lake cycle 2 had significantly more articulated specimens and fewer disarticulated specimens than lake cycle 16, though this pattern did not persist after the removal of the “insect layer” specimens from the overall lake cycle 2 analysis (Table 4). No other grouping variables showed significant results in terms of different specimen frequencies among disarticulation states.

Preservation frequency of bones is also low in this assemblage. The median bone (Fig. 5A,B) is present in 19% of specimens. Figure 5A shows that 21% of bones were present in 5-10% of specimens. Only 10% of bones were present in more than half of specimens (Fig. 5B). When separated into anatomical subgroups, the hind limb bones (Fig. 5C,D) are most commonly preserved: they are present in at least 40% of specimens (median=46.5%). Fore limb bones (Fig. 5E, F; median=26%) and the bones of the axial skeleton, including skull, cervical and caudal vertebrae, and heterotopic bones (Fig. 5G,

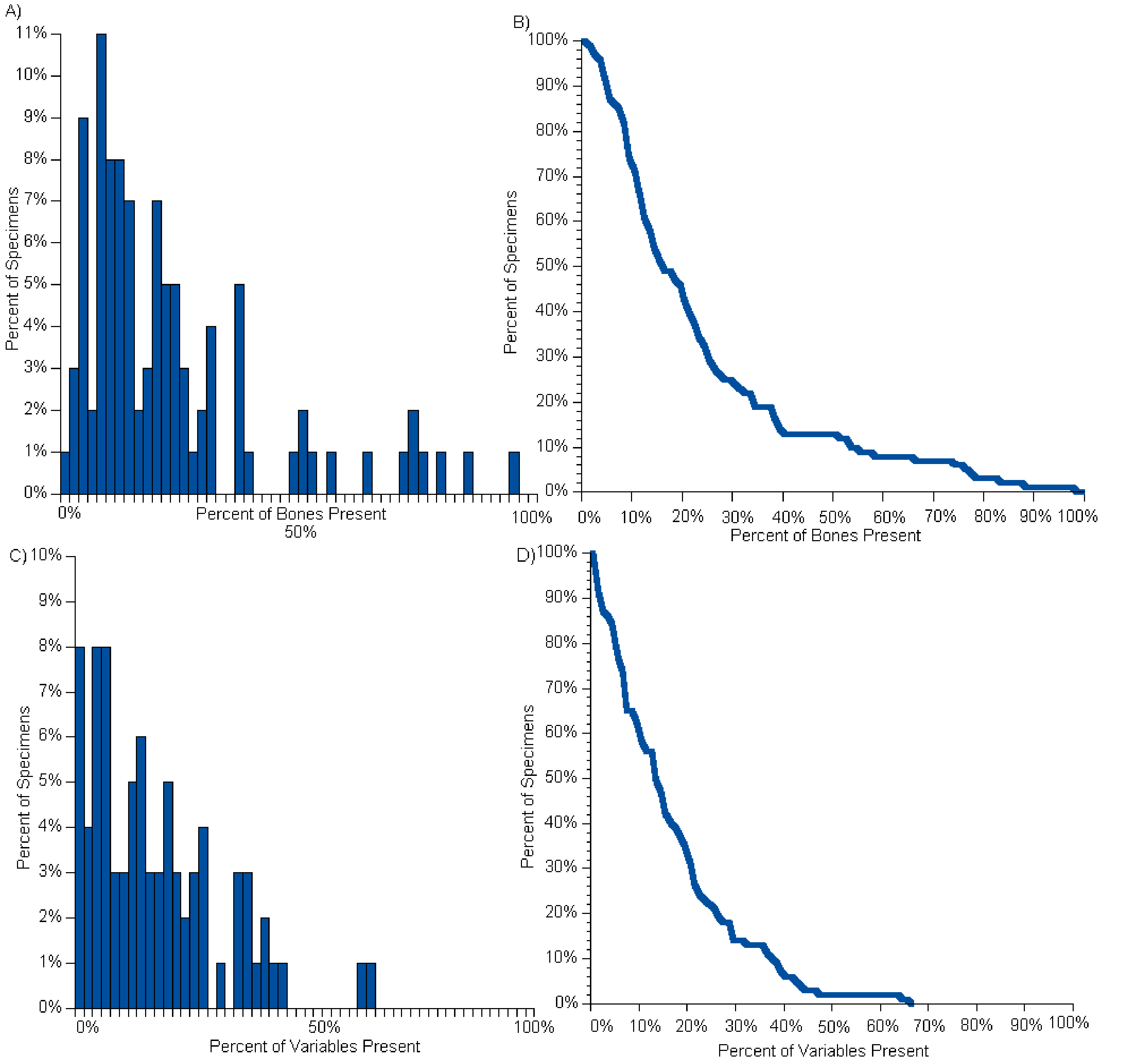


FIGURE 3 - A) Distribution of anatomical specimen completeness, or percent of bones present in each specimen. Note that 1% of specimens had no recognizable bones present. B) Cumulative decay curve by percent of bones present in each specimen. Only 12% percent of bones occur in more than half of specimens. C) Distribution of anatomical specimen completeness, or percent of variables measured in each specimen. Eight percent of specimens have no measurable variables. D) Cumulative decay curve for anatomical specimen completeness by percent of variables measured. Only 2% of specimens contain measurements for more than half of measured variables.

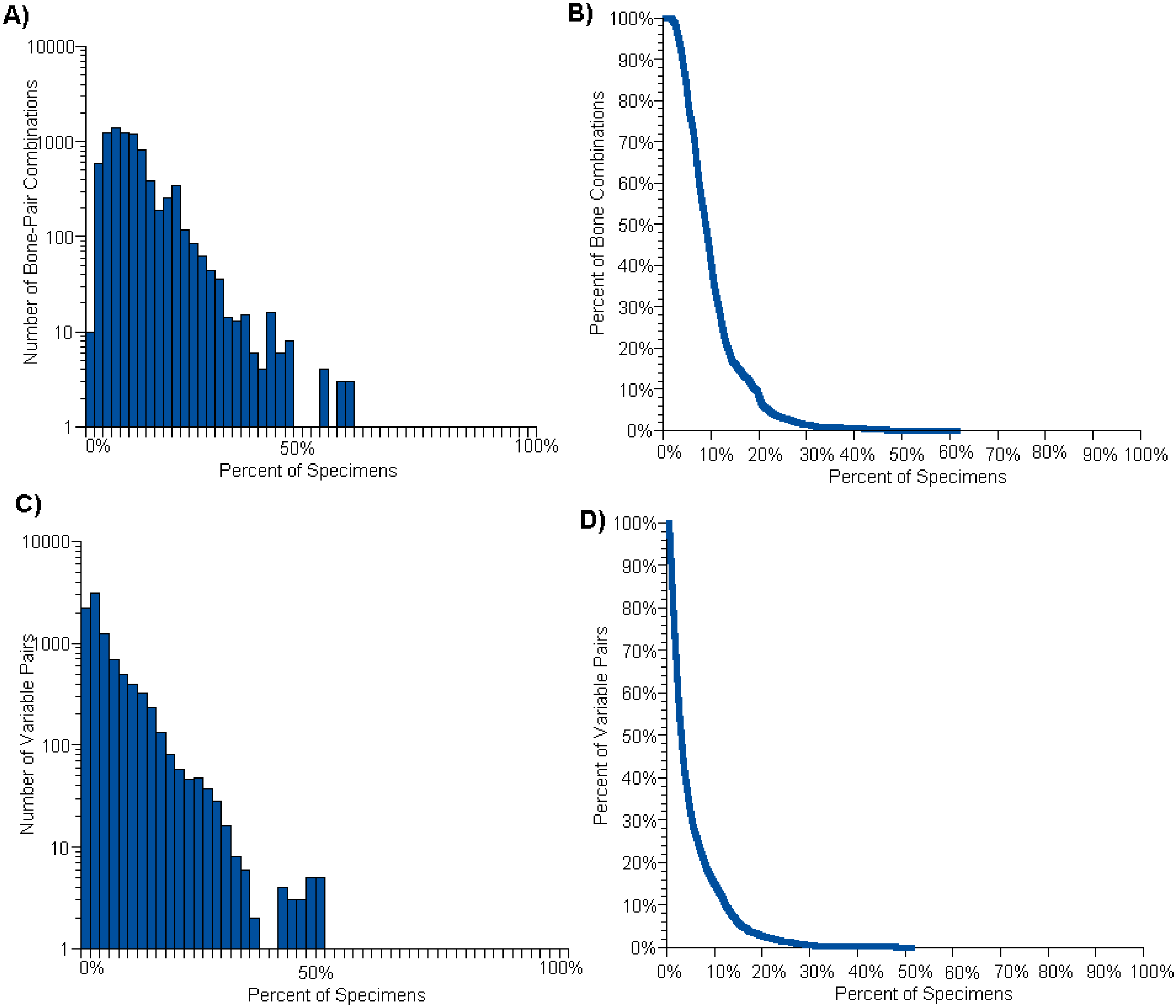


FIGURE 4 - A) Distribution of preservation frequencies of two-bone combinations (for 8,128 unique bone combinations) in percent of specimens. Ten two-bone combinations were never found co-occurring in a single specimen. B) Cumulative decay curve of percent of bone combinations which were present in a minimum percent of specimens. Only 110 out of a possible 8,128 (1.4%) unique two-bone combinations occur in more than 30% of specimens. C) Distribution of preservation frequencies of measured variable pairs (for 9,180 unique measured variable combinations) in percent of specimens. Over 1,100 measured variable pairs were never found co-occurring. D) Cumulative decay curve of percent of measured variables pairs which were measured in a minimum percent of specimens. Only 5% of measured variable pairs co-occurred in at least 15% of specimens.

TABLE 2- Results from Wilcoxon tests for difference in median anatomical specimen completeness (or percent of bones present in each specimen) by categorical variables. * Only test result which was inconsistent between percent of bones present (shown here) and percent of variables measured. Specimens with soft-bodied preservation were significantly more complete than specimens without soft tissues in terms of percent of variables measured (n=99; Z=2.52; alpha=0.05; P=0.01 two-tailed Wilcoxon test with normal approximation).

Grouping Variable	**Median**	**N**	**Z**	**P (two-sided w/ normal approximation)**
Lake Cycle (2 vs 16)	2=25.5, 16=17	2=46, 16=48	1.18	0.24
Morphotype (Pres. vs Absent)	P=28, A=24	P=29, A=29	-0.61	0.54
Weathering (Pres. vs Absent)	P=17, A=20	P=7, A=92	-0.36	0.72
Soft-Bodied Preservation (Present vs Absent)	P=18, A=21	P=13, A=86	0.09	0.93*
Body Position (Rigor vs Passive)	R=30.5, P=26.5	R=20, P=18	-1.17	0.24
Disarticulation Coefficient				
Complete versus Slightly Disarticulated	Complete=25, Slightly Dis.=11	Complete=60, Slightly Dis.=25	-2.95	0.003
Complete versus Totally Disarticulated	Complete=25, Totally Dis.=12	Complete=60, Totally Dis.=13	-2.96	0.003
Slightly Disarticulated versus Totally Disart.	Slightly Dis.=11, Totally Dis.=12	Slightly Dis.=25, Totally Dis.=13	-1.08	0.28

TABLE 3- Results from Wilcoxon tests for difference in median anatomical specimen completeness (or percent of bones present within each specimen) by categorical variables from fault-corrected data. *Significant result different from all previous tests. + Non-significant result consistent with original test on median percent of bones present but different from same test preformed on median percent of variables measured.

Grouping Variable	Median	N	Z	P (two-sided w/ normal approximation)
Lake Cycle (2 vs 16)	2=22.7, 16=14.9	2=41, 16=48	1.96	0.05*
Morphotype (Pres. vs Absent)	P=27.7, A=19.5	P=26, A=29	0.62	0.53
Weathering (Pres. vs Absent)	P=13.3, A=18.8	P=7, A=87	-0.58	0.56
Soft-Bodied Preservation (Present vs Absent)	P=22.6, A=18.0	P=8, A=85	1.13	0.26+
Body Position (Rigor vs Passive)	R=25.8, P=22.7	R=19, P=18	-1.19	0.24

TABLE 4- Summary statistics for Fisher's exact test of difference in frequency of specimens within disarticulated versus articulated character states.

Grouping Variable	**N** (total sample size)	**P** (two-sided probability)
Morphotype	56	1.00
Soft-bodied Preservation	96	0.01
Weathering	96	0.65
Lake Cycle (2 versus 16)	93	0.01
Lake Cycle (non-insect 2 versus 16)	79	0.07
Body Position (Rigor versus Passive)	38	1.00

H; median=36.5%), are moderately common. The bones of the distal skeleton, including astragalus, metatarsals, metacarpals, and phalanges of the manus and pes are rare (Fig. 5 I, J; median=13%). Hind limbs, and specifically femora, are extremely abundant in the specimens studied.

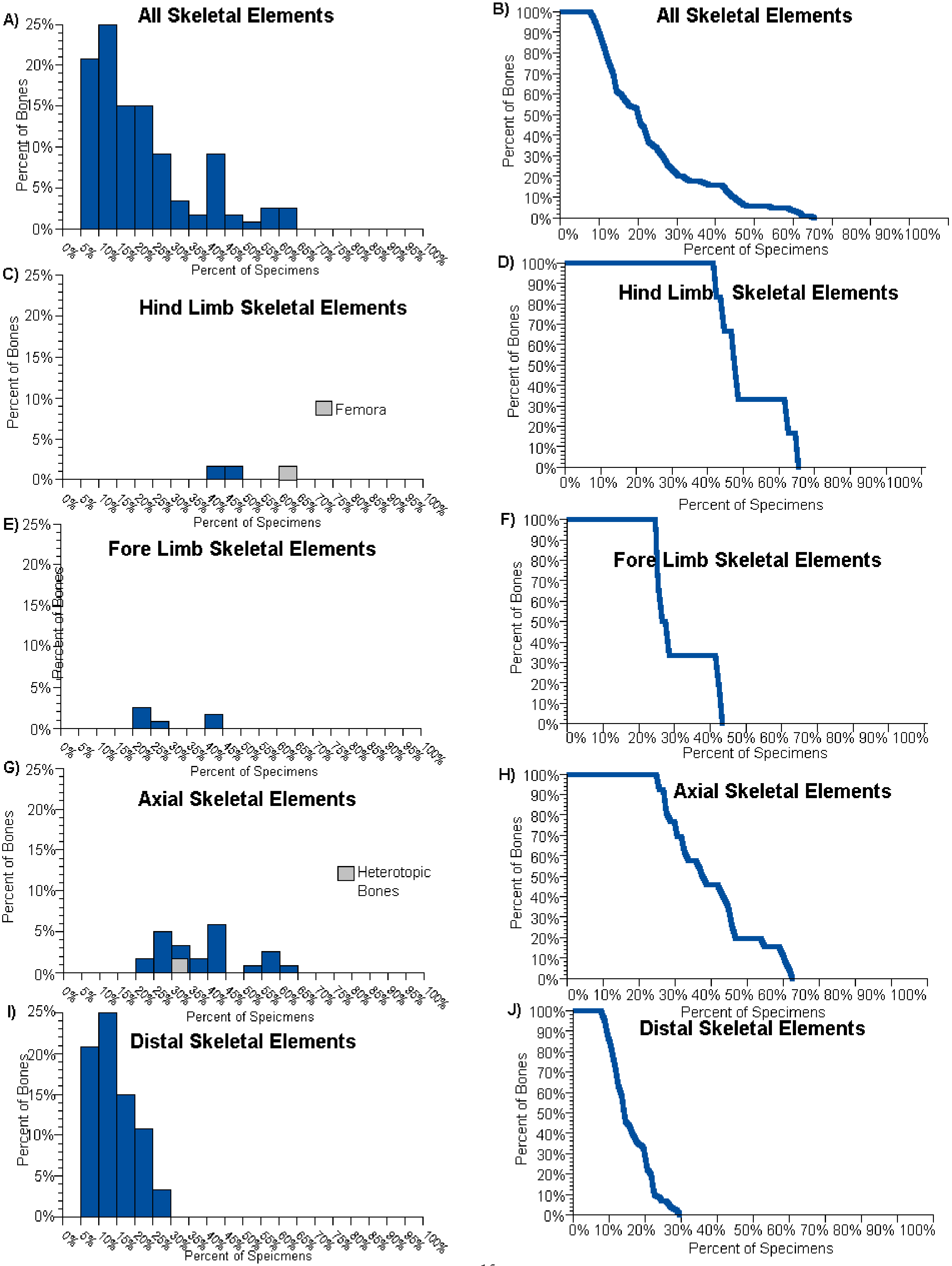
There is no significant correlation between a specimen's body size and its anatomical completeness, whether expressed as percent of bones present (r^2=0.04, p=0.08) (Fig. 6A) or percent of variables measured (r^2=0.01, p=0.55) (Fig. 6B). There is, however, a significant correlation between preservation frequency of a given bone relative to its size (r^2=0.09, p=0.01; Fig. 7A) as well as between the preservation frequency of variables (averaged for all variables from a given bone) and the relative size of that bone (r^2=0.40, p=0.0001; Fig. 7B).

Measured Variable Analyses

Anatomical specimen completeness, when expressed as percent of measurable variables, shows a similar trend to anatomical specimen completeness when expressed as percent of bones present, with the median specimen containing 11.8% of measured variables (Fig. 3 C,D). The first column in Figure 3C shows that 8% of specimens contained no measurable variables; variables were absent or too degraded to accurately measure under the dissecting microscope. Only 2% of specimens contain measurements for more than half of measured variables (Fig. 3D). Over 1,110 measured variables pairs never co-occurred in a single specimen (Fig. 4C). Only 40 of a possible 9,180 (0.4%) unique measured variable pairs occur in more than 30% of specimens (Fig. 4D). There is a significant difference in median anatomical specimen completeness (expressed as percent of measurable variables) for specimens with soft-bodied preservation versus those without soft-bodied preservation (Table 2). All other categorical variables show consistent trends to those for anatomical specimen completeness expressed as bone presence in percent of specimens.

Total preservation frequency of measured variables shows that 35% of measured variables are found in less than 5% of specimens (median=12%) (Fig. 8A). The group includes measured variables such as vertebral process widths for more posterior caudal vertebrae 8-11, which were included in the database for posterity but never actually found in measurable condition. Only 4% of variables could be measured in at least half of specimens (Fig. 8B). Preservation frequency anatomical subgroups are the same as those above. Hind limb measured variables (Fig. 8C, D) show relatively high median preservation frequency of 30% specimens. Fore limb measured variables (Fig. 8E, F) display relatively lower median preservation frequency of 17.5% specimens. Axial skeleton measured variables (Fig. 8G, H) show much lower median preservation frequency of 5.5% specimens. Distal measured variables (Fig. 8I, J) show the lowest median preservation frequency of 3% specimens. Measured variable preservation frequency is lower in all cases than bone preservation frequency, but substantially so in the case of the axial skeleton, the median value of which dropped from bone presence in 36.5% of specimens to variable measurement in 5.5% of specimens, and the distal skeleton, the median value of which dropped from bone presence in 13% of specimens to variable measurement in 3% of specimens.

FIGURE 5 - Preservation frequency of bones among specimens, or percent of bones which were present in percent of specimens. Left Column: Distribution of bone preservation frequencies A) all skeletal elements, 21% of bones were present in 5-10% of specimens (median=19%), C) hind limb bones including femur, tibia, and fibula (median=46.5%), E) fore limb bones including humerus, radius, and ulna (median=26%), G) axial skeleton bones including cervical vertebrae (12 total), heterotopic bones, and caudal vertebrae 1-11 (median=36.5%), and I) distal skeleton bones including astragalus, metatarsals, metacarpals, and phalanges of the pes and manus (median=13%). Right Column: Cumulative decay curves of percent of bones which were present in at least a given percent of specimens for B) all bones, only 10% of bones were present in more than half of specimens, D) hind limb bones, F) fore limb bones, H) axial skeleton bones, and J) distal skeleton bones.


A)
All Skeletal Elements
Percent of Bones
25%
20%
15%
10%
5%
0%
0% 5% 10% 15% 20% 25% 30% 35% 40% 45% 50% 55% 60% 65% 70% 75% 80% 85% 90% 95% 100%
Percent of Specimens
B)
All Skeletal Elements
Percent of Bones
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Percent of Specimens
C)
Hind Limb Skeletal Elements
Femora
Percent of Bones
Percent of Specimens
D)
Hind Limb Skeletal Elements
Percent of Bones
Percent of Specimens
E)
Fore Limb Skeletal Elements
Percent of Bones
Percent of Specimens
F)
Fore Limb Skeletal Elements
Percent of Bones
Percent of Specimens
G)
Axial Skeletal Elements
Heterotopic
Bones
Percent of Bones
Percent of Speicmens
H)
Axial Skeletal Elements
Percent of Bones
Percent of Speicmens
I)
Distal Skeletal Elements
Percent of Bones
Percent of Speicmens
J)
Distal Skeletal Elements
Percent of Bones
Percent of Specimens

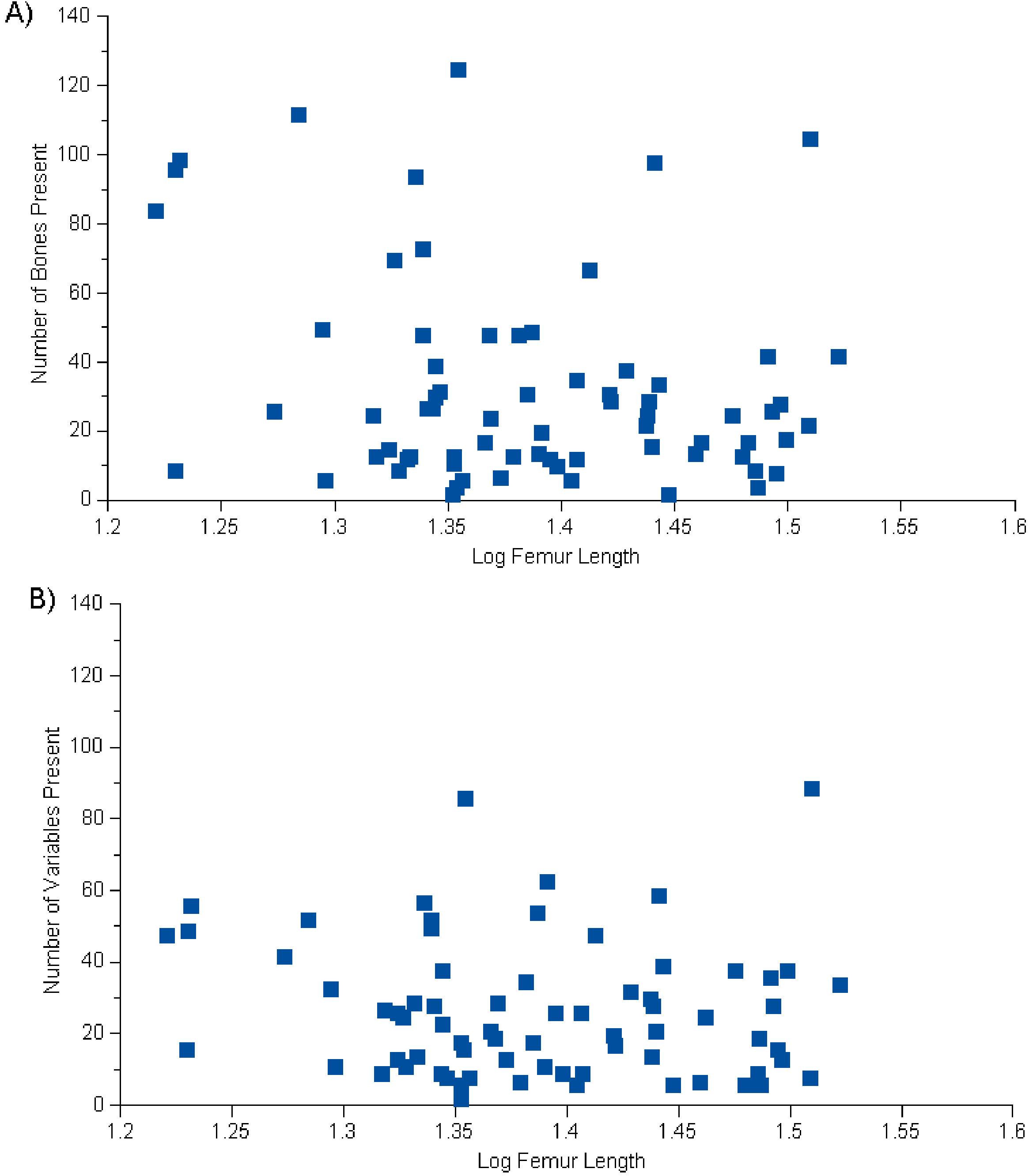


FIGURE 6 - A) Anatomical specimen completeness (percent of bones present) by specimen size as approximated by log femur length. B) Anatomical specimen completeness (percent of variables measured) by specimen size as approximated by log femur length.

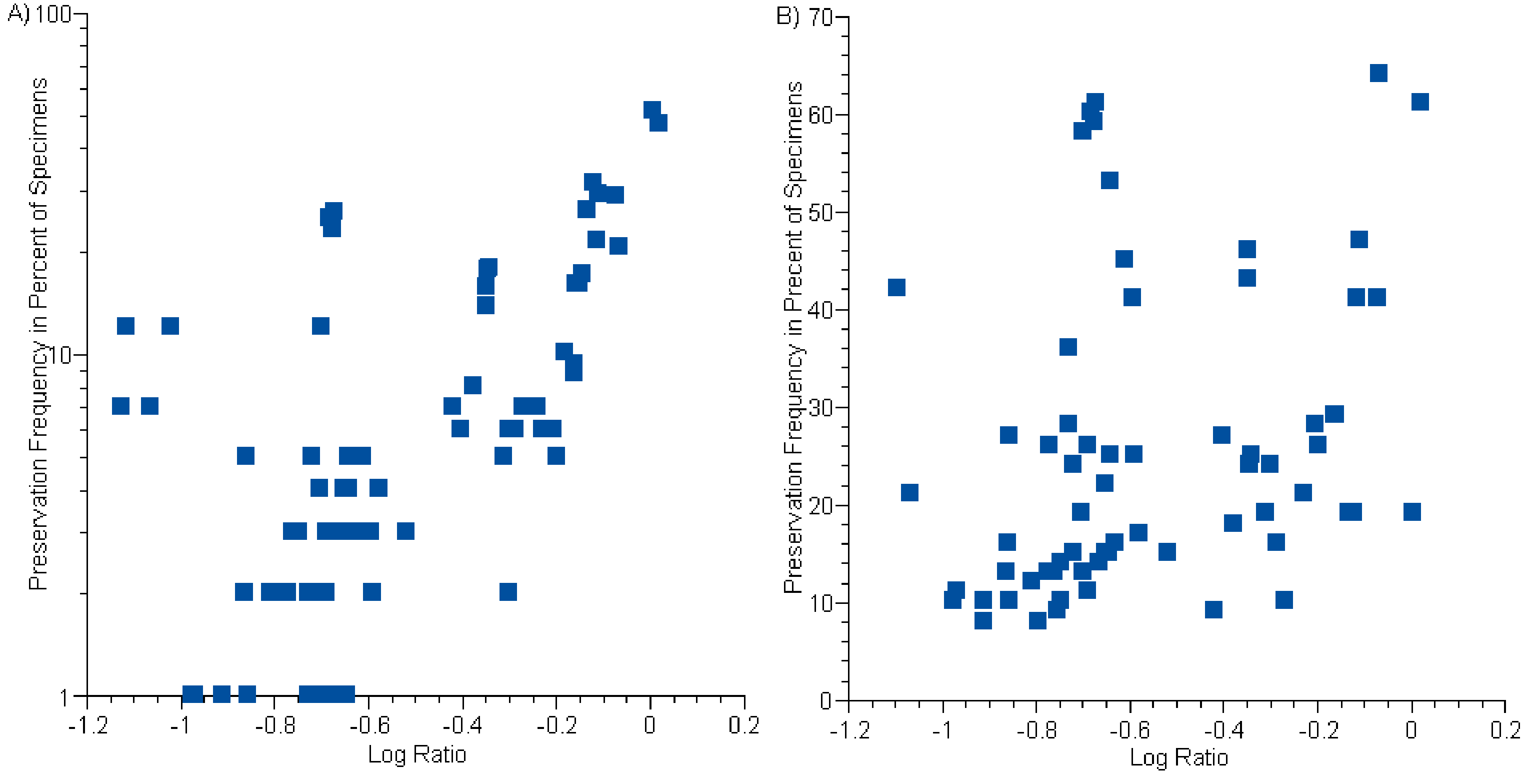
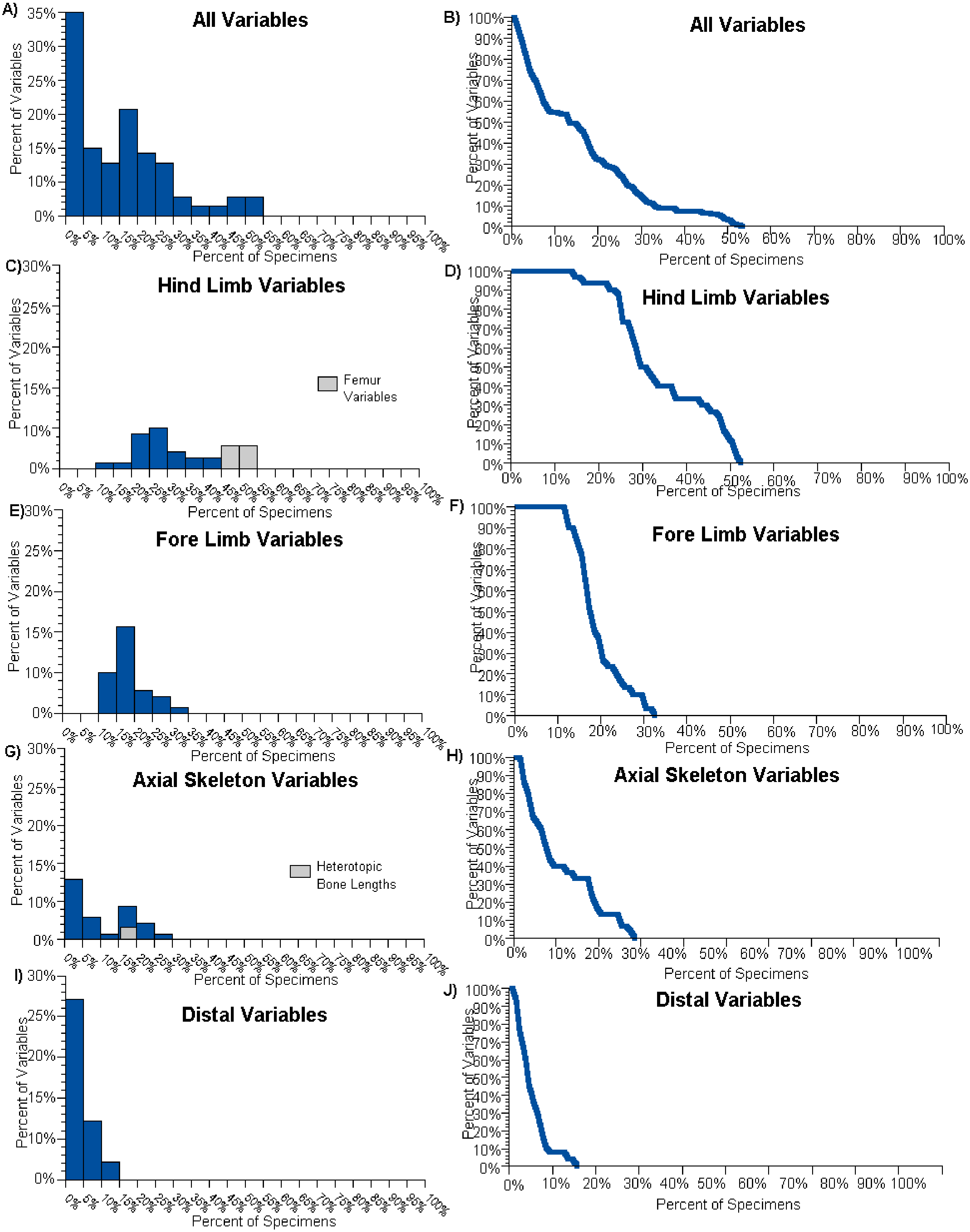


FIGURE 7 - Size dependent distribution of bone preservation frequencies. A) Percent of specimens in which bone was present by relative bone size (ratio mean length of bone: mean femur length). B) Distribution of average preservation frequency in percent of specimens for all measured variables on a given bone by relative bone size (log ratio mean length of bone on which measured variables occurred: mean femur length).

FIGURE 8 - Preservation frequency of variables among specimens, or percent of variables which could be measured in percent of specimens. Left Column: Distribution of variable preservation frequencies within percent of specimens for A) all measured variables, ~5% of all variables were not measured in any specimens (vertebral process widths of distal caudal vertebrae 8-11) and only 4% of variables were measured in 51% or more of specimens (median=12%), C) hind limb measured variables including those from the femur, tibia, and fibula (median=30%), E) fore limb measured variables including those from the humerus, radius, and ulna (median=17.5%), G) axial skeleton measured variables including neck length, body length, heterotopic bones, and caudal vertebrae 1-11 (centrum length and process width) (median=5.5%), and I) distal skeleton measured variables including the astragalus, metatarsals, metacarpals, and phalanges of the pes (median=3%). Right Column: Cumulative decay curves of percent of variables which were measured in at least a given percent of specimens for B) all measured variables, 4% of variables were measured in at least 50% of specimens, D) hind limb measured variables, F) fore limb measured variables, H) axial skeleton measured variables, and J) distal skeleton measured variables.


A)
All Variables
Percent of Variables
Percent of Specimens
B)
All Variables
Percent of Variables
Percent of Specimens
C)
Hind Limb Variables
Femur Variables
Percent of Variables
Percent of Specimens
D)
Hind Limb Variables
Percent of Variables
Percent of Specimens
E)
Fore Limb Variables
Percent of Variables
Percent of Specimens
F)
Fore Limb Variables
Percent of Variables
Percent of Specimens
G)
Axial Skeleton Variables
Heterotopic Bone Lengths
Percent of Variables
Percent of Specimens
H)
Axial Skeleton Variables
Percent of Variables
Percent of Specimens
I)
Distal Variables
Percent of Variables
Percent of Specimens
J)
Distal Variables
Percent of Variables
Percent of Specimens

DISCUSSION

Considering that all specimens came from a fossil *Lagerstätten* interpreted to represent an anoxic environment free from predators and bioturbation (Fraser et al., 1996), anatomical specimen completeness and degree of articulation are startlingly low. Hydraulic factors are most likely responsible for low specimen completeness. Once soft tissues start to decay, tiny and distal bones, like those most commonly missing from this assemblage, are easily removed by minor flow disturbances (Brand et al., 2003). One would expect hydraulic removal of skeletal elements to leave a distinct pattern of size dependent preservation frequency. There is a strong, significant correlation between size of a bone and the percent of specimens in which variables from that bone can be measured. A weaker, though still significant, correlation exists between size of a bone and the percent of specimens in the assemblage having that bone preserved. The correlation between bone size and preservation frequency of measured variables is likely magnified because smaller variables are more difficult to accurately measure in addition to requiring lower flow velocities to remove. The correlation between bone size and preservation frequency of bones may be weaker than expected because the difference in size between "large" and "small" bones in this case is relatively minor in terms of hydraulic equivalents and, therefore, skeletal elements are unlikely to have been differentially affected by gentle waves. However, there is no evidence of bone dissolution on larger bones (i.e., pitting) that would suggest these smaller bones were removed through dissolution.

In light of this information, we propose a slightly revised depositional environment model in which the *Tanytrachelos*-bearing units are not as deep as previously assumed. The traditional interpretation of the depositional environment of Solite Quarry sediments has been that of a deep, stratified lake with an organic-rich and anoxic hypolimnon (Olsen and Johansson, 1994; Fraser et al., 1996). The presence of a poisonous hypolimnon has been suggested to further explain the presence of soft-tissue preservation within the "insect layer" (Fraser et al., 1996). Interpretations stating that the *Tanytrachelos*-bearing units correspond to the deepest water units (e.g. Olsen and Johansson, 1994) have recently been called into question by geochemical data from similar deposits elsewhere within the Newark Supergroup (Niemitz and Cox, 1996). In this revised interpretation, the lake is connected to outside reservoirs which supply aerated water to the lake's epilimnon when the lake is at its deepest. As the lake shallows, it becomes restricted as all association with other water sources are cut off. Lake stratification is no longer maintained, or is reduced to an extremely thin epilimnon, due to mixing by winds and/or lack of outside water input into the epilimnon. This moderate depth environment corresponds to the *Tanytrachelos*-bearing units in which *Tanytrachelos* specimens are "about three times as common as all fish together" (Olsen et al., 1978). The latter were more likely to live in a deeper water environment or were adversely affected by the hypolimnon environment. Furthermore, it is hard to explain a method by which numerous complete insects, like those present in the "insect layer", could fall down a deep, and partly oxygenated, water column without losing wings, legs, or being eaten completely.

There appears to be some subtle environmental differences between lake cycle 2 and lake cycle 16, given the significant differences in articulation and median anatomical specimen completeness (fault-corrected results). These preservational differences could be due to slight changes in depth, energy regime, or soft-tissue preserving conditions. This trend was only revealed after the faulted-slab specimens were corrected in terms of percent of bones present, demonstrating that correcting for post-burial taphonomic biases can be crucial when using comparative taphonomy to infer depositional environment. It is fortunate that a taphonomic bias such as fault-displaced specimens was easily accounted for, unlike other potential forms of bias like post-exhumation weathering which would have been difficult to constrain numerically in an objective manner.

Obviously the “insect layer” portion of lake cycle 2 formed in unique conditions favorable to soft-tissue preservation. Even though the rate of bacterial decay is slower in anoxic settings such as this one, the difference is not likely to be significant on a geologic time scale (Allison and Briggs, 1991), especially in a lake environment characterized by very slow sedimentation rates. Specimens with soft-tissues preserved are significantly more articulated but not significantly more complete except in the case of measured variables. This could be due to the under-representation of distal phalanges within the measured variable data: the most distal phalanges were not measurable and also are more likely than any other bones to be missing. Another possible explanation is that the measured variables more accurately detail the fragmentary nature of bones (specifically hind limb bones which are by far the most common) because partially complete bones were counted as present rather than partially present. In contrast, partially complete bones would only be partially counted (having some measured variables but not others) when counting percent of variables measured. The simplest explanation is that specimens with soft-bodied preservation are somehow easier to measure. The occurrence of soft-tissue preservation within the insect layer may be explained by a poisonous, in addition to anoxic, sediment-water interface. The abundance of clam-shrimp, conchostracans, (Tasch, 1969) and preliminary geochemical evidence all suggest increased levels of alkalinity within the insect layer as a potential cause.

Specimens preserved in passive body position (shorter carcass exposure) did not show the predicted pattern of increased completeness relative to specimens inferred to have experienced rigor mortis. There are two possible explanations for this result: (1) differences in sedimentation rate (duration of carcass exposure) are not significant factors in the taphonomic loss of skeletal elements in this assemblage, or (2) body position is a poor proxy for duration of carcass exposure in this case. Since lacustrine environments are characterized by slow sedimentation, it is reasonable to assume that all carcasses were exposed at the sediment-water interface for a period of time longer than that would be necessary to see the effects of rigor mortis, making relative duration of exposure impossible to constrain with taphonomic data alone. It is also possible that water-logged carcasses did not undergo dry enough conditions to experience rigor mortis.

Femora are by far the most common bones in this assemblage. This lends numerical support to the anecdotal claim that there are more posterior halves than anterior halves in the museum collection. It stands to reason that larger, more robust elements such as femora would have a greater preservation potential than the proportionally much smaller fore limb skeletal elements. An additional, but not mutually exclusive explanation may be that in a case such as this, where one is examining relatively small, black bones against black matrix, the much larger femora may be easier to recognize in the field.

Post-exhumation weathering has not significantly obstructed either the true biological or pre-burial taphonomic signal of the assemblage in terms of anatomical specimen completeness or articulation. This seems counter-intuitive and could be related to the small nature of the fossils themselves, the hard, meta-sedimentary nature of the rock matrix, or the relatively protected conditions within the quarry. This in no way excludes the possibility of significant post-exhumation alteration of fossil material by weathering processes at other localities or other types of vertebrate assemblages.

Multiple lines of taphonomic evidence, both quantitative and qualitative, suggest that the presence or absence of the paired heterotopic bones is a true biological signal and not a taphonomic artifact. If the taphonomic hypothesis were true, then all of these creatures did possess heterotopic bones during life but some specimens underwent post mortem loss of their heterotopic bones. Regardless of the cause of the post mortem loss, it is reasonable to assume that other skeletal elements would have been removed from the body by the same forces. The overall anatomical specimen completeness and articulation would reflect this loss of other elements and be lower (fewer numbers of bones preserved per specimen, larger number of disarticulated specimens and smaller number of articulated specimens) for specimens missing their heterotopic bones. However, this is not the case. One would also expect to find specimens with only one heterotopic bone removed if their absence was taphonomic, but no such specimens have been found. In addition, one of the best preserved specimens in the Virginia Museum of Natural History collection, which contains soft-bodied preservation of tendons, muscle blocks, and some skin impressions, does not contain heterotopic bones.

Uneven preservation frequencies of variables, in addition to low specimen completeness makes multivariate morphometric studies prohibitive in all but the most abundant vertebrate fossil assemblages. Many common multivariate morphometric analytical techniques, such as Principle Component Analysis (PCA), do not allow missing values. To maintain anatomical fidelity, a large number of skeletal elements (variables) must be included covering all regions of the body (restricting sample size by including rare variables). In order to get a statistically meaningful result, one needs a large sample size which forces the researcher to choose between excluding rare variables and excluding incomplete specimens. In this case, a study conducted on the morphology of the femur would not be limited in terms of sample size but such a study is likely to miss many important morphological aspects of the population. Thus, even in the case of such exceptional fossil Lagerstätten as Solite Quarry, one must collect (or have access to) a huge number of specimens in order to conduct statistically meaningful multivariate tests. However, an assemblage such as the Solite Quarry is ideal for qualitative analysis or description because one needs only a small number of excellently preserved specimens to carry out meaningful systematic analysis.

CONCLUSIONS

(1) Weathered and unweathered specimens do not differ significantly in terms of median anatomical specimen completeness implying that post-exhumation weathering has not had a significant impact on the skeletal completeness of this assemblage and, therefore, has not obscured the pre-burial taphonomic signal.

(2) Correction of fault induced anatomical specimen incompleteness significantly altered the outcome of one test (i.e., specimen completeness within lake cycle 2 versus lake cycle 16) and proved to be a crucial step in assessing accurately the biostratinomy and depositional environment of this locality.
(3) The combination of low anatomical specimen completeness and biased preservation frequency of variables from different anatomical regions (favoring hind limbs) makes multivariate morphometric analysis difficult, but is not likely to affect potential systematic or qualitative analyses.
(4) Absence of heterotopic bones does not correspond to significantly lower median anatomical specimen completeness and appears to reflect a true biological, rather than taphonomic, signal.
(5) Lower than expected anatomical specimen completeness and degree of articulation indicate moderate-depth lake environment of deposition (shallower than postulated by previous models) for the *Tanytrachelos*-bearing units, with subtle differences in depth and/or energy regime between lake cycle 2 and lake cycle 16.

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APPENDIX A - Presence/Absence Data Matrix for all 128 Skeletal Elements

Museum Id		.			.	Specimen Orientation	Soft-bodied Preservation	Weathering	Bone Material	Bones Split	Position	Articulation	Morphotype	Faulted	Slab Incomplete
Specimen Number	Collection Location	Personal ID	Number of Times Measured	Stratigraphic Information	Horizon	Dorsal 0/ Ventral 1	Present 1/ Absent 0	Weathered 1/ Unweathered 0	Present 1/ Absent 0	0=whole 1=Split	0=passive 1=rigor	0=fully art. 0.5=paritally art. 1=disart.	Het. Bones Present=1/ Absent=0	0=absent, 1=fault present	0=com, 1=incomp
2828	vp 8, 1	1	1	2	10	0	1	0	1	0	1	0	0	0	0
.	vp 8, 13	2	1	2	9	1	0	0	0	.	.	0	1	0	0
7484a	vp 8, 13	3	1	3	.	0	0	1	1	1	0	0	0	0	1
7484b	VP 8, 13	4	1	3	.	0	0	1	1	1	.	.	0	0	1
7622 a&**b**	vp 8, 14	5	1	2	8	1	0	0	0	.	1	0	0	0	1
30.322 (3220)	.	6	1	2	8	0	0	0	1	0	.	0	1	1	.
30.267	vp 8, 13	7	1	16	.	0	0	0	1	0	0	0	0	0	0
2829 (864)	VP 11, 4	8	1	2	10	0	0	0	1	0	1	0	1	0	0
7496A	vp 8, 11	9	1	2	8	0	0	0	1	0	1	0	0	1	.
3059	vp 8, 13	10	1	16	.	1	0	1	1	1	0	0	0	0	1
30.277 (334)	?	11	1	2	8	1	1	0	1	1	.	0	1	.	.
.	vp 8, 15	12	1	16	.	0	0	0	1	1	.	0	1	0	1
30.247 (987)	VP 8, 02	13	1	16	.	1	0	0	1	1	.	0	1	1	.
7621A	VP 4, 68	14	1	2	8	.	0	0	1	0	.	1	.	1	.
7621A	VP 4, 68	15	1	2	8	.	0	0	1	0	.	1	.	1	.
776 (249)	VP 8, 49	16	1	2	10	1	1	0	1	0	.	0	1	1	.
30.255	VP 8, 35	17	1	16	.	1	0	1	1	1	1	0	0	0	0
30.316 (998)	VP 8, 43	18	1	16	.	0	0	0	0	.	1	0	1	0	1
WS-02-2	VP 8, 13	19	1	16	.	0	0	0	0	1	0	0	0	0	0
no number	VP 8, 35	20	1	16	.	.	0	1	1	1	.	1	1	.	.
xxi handwritten	VP 8, 01	21	1	16	.	1	0	0	1	0	0	0	0	0	0
no number	VP 8, 04	22	1	16	.	0	0	0	0	.	0	0	0	0	0
30.299	vp 8, 42	23	1	16	.	0	0	0	1	1	0	0	0	1	.
30.594 (961)	VP 8, 50	24	1	2	9	0	0	0	0	.	0	0	1	0	0
30.767	VP 8, 47	25	1	2	8	0	0	0	0	.	.	0	1	0	1
30.766	VP 8, 49	26	1	16	.	0	0	0	1	0	.	.	0	0	1
30.394	VP 8, 42	27	1	2	10	0	0	0	0	.	.	0	0	1	.
30.647	VP 8, 41	28	1	2	10	0	0	0	0	.	.	1	1	1	.

30.258	vp 8, 38	29	1	16	.	0	0	0	1	0	1	0	1	1	.
30.315 (997)	VP 8, 13	30	1	16	.	1	0	0	1	0	0	0	0	0	0
30.218 (962)	VP 8, 08	31	1	2	10	.	1	0	1	0	.	0	.	1	.
30.228 (974)	vp 8, 14	32	1	2	1	1	0	0	0	.	0	0	.	1	.
30.322 (3221)	vp 8, 12	33	1	16	.	.	.	.	.	.	.	0.5	.	1	1
30.235 (3239)	vp 8, 14	34	1	16	.	0	0	0	1	0	.	0.5	.	0	0
30.318 (988)	VP 8, 11	35	1	16	.	0	0	0	0	.	1	0	1	0	1
30.318 (3230)	VP 8, 08	36	1	16	.	0	0	0	1	0	.	0.5	0	0	0
30.315 (995)	VP 8, 06	37	1	16	.	0	0	0	0	0	.	0	1	0	0
960	VP 8, 05	38	1	16	.	0	0	0	1	0	.	1	1	0	0
30.235 (3223)	VP 8, 27	39	1	16	.	0	0	0	1	0	.	0.5	0	0	0
30.232 (978)	VP 8, 10	40	1	2	1	1	0	0	0	.	.	0.5	.	0	0
1001	VP 8, 06	41	1	16	.	0	0	0	0	.	.	0.5	.	1	.
30.235 (3235)	VP 8, 08	42	1	16	.	0	0	0	1	0	.	1	0	0	0
30.742 (977)	VP 8, 05	43	1	2	9	1	0	0	1	0	.	0	1	1	1
30.293 (979)	VP 8, 10	44	1	16	.	1	0	0	1	0	.	0.5	.	0	0
30.318 (3048)	VP 8, 02	45	1	16	.	1	0	0	1	0	1	0.5	.	0	0
30.252 (984)	VP 8, 02	46	1	16	.	0	0	0	1	0	.	0	1	1	.
30.235 (3226)	VP 8, 07	47	1	16	.	0	0	0	1	0	.	0.5	.	0	1
30.647 (975)	VP 8, 05	48	1	2	10	0	0	0	0	.	.	0.5	0	1	0
30.235 (3228)	VP 8, 07	49	1	16	.	0	0	0	1	1	.	0.5	.	0	1
30.251	VP 8, 04	50	1	2	10	0	1	0	1	0	.	0	0	1	.
no number	.	51	1	16	.	1	0	0	1	0	.	1	.	0	0
2826	VP 8, 03	52	1	16	.	0	0	0	1	0	.	0	1	0	1
30.251 (986)	VP 8, 05	53	1	2	1	1	0	0	0	.	.	0	0	0	1
no number	.	54	1	.	.	1	0	0	1	0	1	0	0	0	0
YPM 8600A	VP 4, 72	55	1	51	.	1	0	0	0	.	1	0.5	0	0	1
30.235 (5B)	VP 8, 12	56	1	16	.	0	0	0	1	0	0	0.5	.	1	1
30.235 (6B)	vp 8, 12	57	1	16	.	.	0	0	0	.	.	1	.	0	0
2852	VP 8, 01	58	1	2	1	1	1	0	1	0	1	0	.	0	1
30.235 (3234)	VP 8, 08	59	1	16	.	.	0	0	1	1	.	0.5	.	1	.
30.318 (989)	VP 8, 09	60	1	16	.	1	0	0	0	.	0	0	0	0	1

30.779 (3217)	VP 8, 09	61	1	2	1	0	1	0	1	0	0	0	.	0	0
7541A/B	VP 4, 69	62	1	2	10	1	1	0	1	0	0	0	.	1	.
2768 (WS-9)	VP 7, 74	63	1	16	.	.	1	0	0	.	.	0	.	0	0
2781	U 58, 6	64	1	16	.	0	0	0	1	0	.	1	.	0	0
2997	vp 8, 14	65	1	2	10	0	1	0	0	.	.	0.5	.	1	.
30.235 (3184)	vp 8, 14	66	1	16	.	.	0	0	1	0	.	1	.	0	0
30.281 (342)	VP 8, 31	67	1	2	10	.	0	0	1	0	.	0	.	0	0
2572	VP 8, 15	68	1	16	.	1	0	0	0	.	.	0	1	0	0
672 written	VP 8, 57	69	1	2	8	0	0	0	0	.	.	0	.	1	.
2746	vp 8, 14	70	1	2	8	1	0	0	1	0	.	0	.	0	1
30.315	VP 8, 34	71	1	2	8	0	0	0	0	.	.	1	.	1	.
30.258	VP 8, 27	72	1	16	.	0	0	0	0	.	1	0	1	1	.
30.235	VP 8, 21	73	1	2	8	.	0	0	0	.	.	0.5	1	1	1
30.235	vp 8, 15	74	1	16	.	.	0	0	1	0	.	1	.	0	0
30.058 (181)	scan pile	75	1	2	10	1	0	0	0.5	0	.	0	.	1	1
967	VP 8, 02	76	1	2	10	0	0	0	0	.	.	0	.	1	.
30.288	VP 8, 37	77	1	12	.	1	0	0	1	0	.	0.5	0	0	0
30.279 (982)	VP 7, 27	78	1	2	8	0.5	0	0	1	0	1	0	.	1	.
30.234 (2850)	VP 8, 54	79	1	2	8	0.5	0	0	1	0	1	0	.	0	1
VMNH 1031	scan pile	80	1	2	9	1	0	0	0	.	1	0	0	1	.
30.755 (702)	VP 8, 24	81	1	2	9	0	0	0	1	0	0	0	0	0	1
30.756 (668)	VP 8,25	82	1	2	8	0	0	0	1	0	1	0.5	.	0	1
30.760 (689)	VP 8, 44	83	1	2	8	0	0	0	1	0	1	0	1	0	0
.	outside door case	84	1	16	.	0	0	0	1	0	.	0	1	0	0
WS02-41	VP 8, 35	85	1	16	.	0.5	0	1	1	1	.	0.5	.	0	0
VMNH 2811	scan pile	86	1	2	1	0	1	0	1	1	0	0	1	1	.
30.315	VP 8, 34	87	1	16	.	1	0	0	0	.	.	0.5	.	0	0
30.259	VP 8, 28	88	1	16	.	.	0	0	0	.	.	0.5	.	0	0
30.757	VP 8, 12	89	1	16	.	0	0	0	0	.	1	0	.	1	1
30.315 (1000)	VP 8, 06	90	1	16	.	0	0	0	0	.	.	1	.	0	1
30.235 (3244)	VP 8, 03	91	1	16	.	1	0	0	1	0	.	0.5	0	0	1
WS-02-131(3243)	VP 8, 03	92	1	16	.	1	0	1	0	1	.	0	0	1	.

30.238 (983)	VP 8, 01	93	1	.	.	0	1	0	1	0	.	0	.	1	.
30.242	VP 8, 39	94	1	2	8	0	0	0	1	0	.	0.5	.	1	.
558 handwritten	VP 8, 39	95	1	2	9	0	0	0	1	0	.	0.5	.	1	.
30.767 (92 1arrow)	VP 8, 47	96	1	2	8	0	0	0	0	.	.	0	1	1	.
30.767(92 2arrow)	VP 8, 47	97	1	2	8	1	0	0	0	.	1	0	1	1	.
no number	VP 8, 10	98	1	2	8	0	0	0	1	1	0	0	1	1	.
963	VP 8, 11	99	1	2	9	1	0	0	1	0	0	0.5	.	0	0
30.625 (466)	VP 8, 10	100	1	2	10	1	1	0	1	0	.	0	1	1	.

Presence/ Complete Cervical Package	Absence Complete Thoracic Package	Data Right Het. Bone	Left Het. Bone	Skull	1st Cervical	2nd cervical	3rd cerv	4th cerv	5th cerv	6th cerv	7th cerv	8th cerv	9th cerv	10th cerv	11th cerv	12th cerv	1st Caudal Vert.	2nd Caudal Vert.	3rd Caudal Vert.	4th Caudal Vert.	5th Caudal Vert.	6th Caudal Vert.	7th Caudal Vert.
1	1	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0
1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.
0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0	0	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
0	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
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0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1

1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	**1**	**1**	1	1	1
0	0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	**1**	**1**	**1**	**1**	1	1	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	**0**	0	0	0
1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	**0**	**0**	**0**	**0**	0	0	0
0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	**0**	**0**	**0**	**0**	0	0	0
0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	**0**	**0**	**0**	**0**	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	**1**	**1**	**1**	**1**	1	1	1
0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	**1**	**0**	**0**	**0**	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	**1**	**1**	**1**	**1**	1	1	1
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0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	**0**	**0**	**0**	**0**	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	**0**	0	0	0
0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	**0**	**0**	**0**	**0**	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	**1**	**1**	1	1	1
0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	1	1	**1**	1	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	**1**	**1**	**1**	1	1	1
0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	**1**	**1**	**1**	**1**	1	1	1
0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	**1**	**1**	**1**	1	1	1
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	**1**	**1**	**1**	1	1	1
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	**1**	**1**	0	0
0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	**1**	**1**	1	1
0	0	1	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	**1**	**1**	1	1	0	0
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0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	**0**	**0**	**0**	0	0	0	0
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1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0
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1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
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1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0
0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0

8th Caudal Vert.	9th Caudal Vert.	10th Caudal Vert.	11th Caudal Vert.	Left Femur	Left Tibia	Left Fibula	Left ankle bone	Left 1st meta (pes)	Left 2nd meta (pes)	Left 3rd meta (pes)	Left 4th meta (pes)	Left 5th reduced meta	Left 1st didit 1st phalanx (1d1p)	Left 1d2p	Left 2d1p	Left 2d2p	Left 2d3p	Left 3d1p	Left 3d2p	Left 3d3p	Left 3d4p	Left 4d1p
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
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0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
.	.	.	.	1	1	1	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.
1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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1	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
.	.	.	.	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left
4d2p	4d3p	4d4p	4d5p	5d1p	5d2p	5d3p	5d4p	Humerous	Radius	Ulna	1st meta (manus)	2nd meta (manus)	3rd meta (manus)	4th meta (manus)	5th meta (manus)	1st Digit 1st Phalanx (1D1P)	1D2P	2D1P	2D2P	2D3P	3D1P	3D2P
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
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.	.	.	.	.	.	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.
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Left 3D3P	Left 3D4P	Left 4D1P	Left 4D2P	Left 4D3P	Left 4D4P	Left 5D1P	Left 5D2P	Left 5D3P	Right Femur	Right Tibia	Right Fibula	Right ankle bone	Right 1st meta (pes)	Right 2nd meta (pes)	Right 3rd meta (pes)	Right 4th meta (pes)	Right 5th reduced meta	Right 1st digit 1st phalanx (1d1p)	Right 1d2p	Right 2d1p	Right 2d2p	Right 2d3p
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	**1**	1	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	1	0	0	0	0	0
.	.	.	.	.	.	.	.	.	1	1	1	0	.	.	.	.	.	.	.	.	.	.
0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	0	0	0	0	0	.
0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
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0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1	1	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	1	1	0	0	0	0	0	0

0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	1	1	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
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0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	**1**	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	**1**	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0
0	0	1	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0

0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	1	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	1	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Right 3d1p	Right 3d2p	Right 3d3p	Right 3d4p	Right 4d1p	Right 4d2p	Right 4d3p	Right 4d4p	Right 4d5p	Right 5d1p	Right 5d2p	Right 5d3p	Right 5d4p	Right Humerous	Right Radius	Right Ulna	Right 1st meta (manus)	Right 2nd meta (manus)	Right 3rd meta (manus)	Right 4th meta (manus)	Right 5th meta (manus)	Right 1st Digist 1st Phalanx (1D1P)	Right 1D2P
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	1	1	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	0	0	0	.	.
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
0	0	.	.	0	0	.	.	.	0	0	0	.	0	0	0	0	0	0	0	0	.	.
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0	0
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0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	1	1	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
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1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	0	0	0	0
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1

0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Right	Right	Right	Right	Right	Right	Right	Right	Right	Right	Right	Right	Right	Right	
2D1P	2D2P	2D3P	3D1P	3D2P	3D3P	3D4P	4D1P	4D2P	4D3P	4D4P	5D1P	5D2P	5D3P	Fault Corrected Denominator
1	1	1	1	1	1	1	1	1	1	1	1	1	1	128
1	1	1	1	1	1	1	1	1	1	1	0	0	0	128
1	1	1	1	1	1	1	1	1	1	1	1	1	1	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
1	1	1	1	1	1	1	1	1	1	1	1	1	1	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	.
1	1	0	1	1	0	0	1	1	0	0	1	1	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	73
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
.	.	.	.	.	.	.	.	.	.	.	.	.	.	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	94
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	.
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
1	1	1	1	1	1	1	1	1	1	1	1	1	1	128
.	.	.	.	.	.	.	.	.	.	.	.	.	.	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	75
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
0	0	0	0	0	0	0	0	0	0	0	0	0	0	69

0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
0	0	0	0	0	0	0	0	0	0	0	0	0	0	84
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
1	0	0	1	0	0	0	1	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	75
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
1	1	1	1	1	1	1	0	0	0	0	0	0	0	128
0	0	0	0	0	0		0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128

0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	95
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	19
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	61
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
1	1	1	1	1	1	1	1	1	1	1	1	1	1	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	61
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	.
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	141
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
1	1	1	1	1	1	1	1	1	1	1	1	1	1	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	61
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
1	1	1	1	1	1	1	1	1	1	1	1	1	1	61

1	1	1	1	1	1	1	1	1	1	1	1	1	1	91
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	27
0	0	0	0	0	0	0	0	0	0	0	0	0	0	.
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
0	0	0	0	0	0	0	0	0	0	0	0	0	0	128
0	0	0	0	0	0	0	0	0	0	0	0	0	0	.

APPENDIX B - Variable Measurement Data Matrix for all 136 Linear Dimensional Elements

Museum Id			Number of		.	Specimen Orientation	Soft-bodied Preservation	Weathering	Bone Material	Bones Split	Position	Articulation
Specimen Number	Collection Location	Personal ID	Times Measured	Stratigraphic Information	Horizon	Dorsal 0/ Ventral 1	Present 1/ Absent 0	Weathered 1/ Unweathered 0	Present 1/ Absent 0	0=whole 1=Split	0=passive 1=rigor	0=art.0.5=partially art.1=disart.
2828	vp 8, 1	1	1	2	10	0	1	0	1	0	1	0
2828	vp 8, 1	1	2	2	10	0	1	0	1	0	1	0
.	vp 8, 13	2	1	2	9	1	0	0	0	.	.	0
.	vp 8, 13	2	2	2	9	1	0	0	0	.	.	0
.	vp 8, 13	2	3	2	9	1	0	0	0	.	.	0
2827	VP 8, 13	2	4	2	9	1	0	0	0	.	1	0
7484a	vp 8, 13	3	1	3	.	0	0	1	1	1	0	0
7484b	VP 8, 13	4	1	3	.	0	0	1	1	1	.	.
7622 a&**b**	vp 8, 14	5	1	2	8	1	0	0	0	.	1	0
30.322 (3220)	.	6	1	2	8	0	0	0	1	0	.	0
30.267	vp 8, 13	7	1	16	.	0	0	0	1	0	0	0
2829 (864)	VP 11, 4	8	1	2	10	0	0	0	1	0	1	0
7496A	vp 8, 11	9	1	2	8	0	0	0	1	0	1	0
3059	vp 8, 13	10	1	16	.	1	0	1	1	1	0	0
30.277 (334)	.	11	1	2	8	1	1	0	1	1	.	0
.	vp 8, 15	12	1	16	.	0	0	0	1	1	.	0
30.247 (987)	VP 8, 02	13	1	16	.	1	0	0	1	1	.	0
7621A	VP 4, 68	14	1	2	8	.	0	0	1	0	.	1
7621A	VP 4, 68	15	1	2	8	.	0	0	1	0	.	1
776 (249)	VP 8, 49	16	1	2	10	1	1	0	1	0	.	0
30.255	VP 8, 35	17	1	16	.	1	0	1	1	1	1	0
30.316 (998)	VP 8, 43	18	1	16	.	0	0	0	0	.	1	0
WS-02-2	VP 8, 13	19	1	16	.	0	0	0	0	1	0	0
no number	VP 8, 35	20	1	16	.	.	0	1	1	1	.	1
xxi (handwritten)	VP 8, 01	21	1	16	.	1	0	0	1	0	0	0
no number	VP 8, 04	22	1	16	.	0	0	0	0	.	0	0
30.299	vp 8, 42	23	1	16	.	0	0	0	1	1	0	0
30.594 (961)	VP 8, 50	24	1	2	9	0	0	0	0	.	0	0
30.767	VP 8, 47	25	1	2	8	0	0	0	0	.	.	0

30.766	VP 8, 49	26	1	16	.	0	0	0	1	0	.	.
30.394	VP 8, 42	27	1	2	10	0	0	0	0	.	.	0
30.647	VP 8, 41	28	1	2	10	0	0	0	0	.	.	1
30.258	vp 8, 38	29	1	16	.	0	0	0	1	0	1	0
30.315 (997)	VP 8, 13	30	1	16	.	1	0	0	1	0	0	0
30.218 (962)	VP 8, 08	31	1	2	10	.	1	0	1	0	.	0
30.228 (974)	vp 8, 14	32	1	2	1	1	0	0	0	.	0	0
30.322 (3221)	vp 8, 12	33	1	16	.	.	.	.	.	.	.	0.5
30.235 (3239)	vp 8, 14	34	1	16	.	0	0	0	1	0	.	0.5
30.318 (988)	VP 8, 11	35	1	16	.	0	0	0	0	.	1	0
30.318 (3230)	VP 8, 08	36	1	16	.	0	0	0	1	0	.	0.5
30.315 (995)	VP 8, 06	37	1	16	.	0	0	0	0	0	.	0
960	VP 8, 05	38	1	16	.	0	0	0	1	0	.	1
30.235 (3223)	VP 8, 27	39	1	16	.	0	0	0	1	0	.	0.5
30.232 (978)	VP 8, 10	40	1	2	1	1	0	0	0	.	.	0.5
1001	VP 8, 06	41	1	16	.	0	0	0	0	.	.	0.5
30.235 (3235)	VP 8, 08	42	1	16	.	0	0	0	1	0	.	1
30.742 (977)	VP 8, 05	43	1	2	9	1	0	0	1	0	.	0
30.293 (979)	VP 8, 10	44	1	16	.	1	0	0	1	0	.	0.5
30.318 (3048)	VP 8, 02	45	1	16	.	1	0	0	1	0	1	0.5
30.252 (984)	VP 8, 02	46	1	16	.	0	0	0	1	0	.	0
30.235 (3226)	VP 8, 07	47	1	16	.	0	0	0	1	0	.	0.5
30.647 (975)	VP 8, 05	48	1	2	10	0	0	0	0	.	.	0.5
30.235 (3228)	VP 8, 07	49	1	16	.	0	0	0	1	1	.	0.5
30.251	VP 8, 04	50	1	2	10	0	1	0	1	0	.	0
no number	.	51	1	16	.	1	0	0	1	0	.	1
2826	VP 8, 03	52	1	16	.	0	0	0	1	0	.	0
30.251 (986)	VP 8, 05	53	1	2	1	1	0	0	0	.	.	0
no number	.	54	1	.	.	1	0	0	1	0	1	0
YPM 8600A	VP 4, 72	55	1	51	.	1	0	0	0	.	1	0.5
30.235 (5B)	VP 8, 12	56	1	16	.	0	0	0	1	0	0	0.5
30.235 (6B)	vp 8, 12	57	1	16	.	.	0	0	0	.	.	1

2852	VP 8, 01	58	1	2	1	1	1	0	1	0	1	0
30.235 (3234)	VP 8, 08	59	1	16	.	.	0	0	1	1	.	0.5
30.318 (989)	VP 8, 09	60	1	16	.	1	0	0	0	.	0	0
30.779 (3217)	VP 8, 09	61	1	2	1	0	1	0	1	0	0	0
7541A/B	VP 4, 69	62	1	2	10	1	1	0	1	0	0	0
2768 (WS-9)	VP 7, 74	63	1	16	.	.	1	0	0	.	.	0
2781	U 58, 6	64	1	16	.	0	0	0	1	0	.	1
2997	vp 8, 14	65	1	2	10	0	1	0	0	.	.	0.5
30.235 (3184)	vp 8, 14	66	1	16	.	.	0	0	1	0	.	1
30.281 (342)	VP 8, 31	67	1	2	10	.	0	0	1	0	.	0
2572	VP 8, 15	68	1	16	.	1	0	0	0	.	.	0
672 hand written	VP 8, 57	69	1	2	8	0	0	0	0	.	.	0
2746	vp 8, 14	70	1	2	8	1	0	0	1	0	.	0
30.315	VP 8, 34	71	1	2	8	0	0	0	0	.	.	1
30.258	VP 8, 27	72	1	16	.	0	0	0	0	.	1	0
30.235	VP 8, 21	73	1	2	8	.	0	0	0	.	.	0.5
30.235	vp 8, 15	74	1	16	.	.	0	0	1	0	.	1
30.058 (181)	scan pile	75	1	2	10	1	0	0	0.5	0	.	0
967	VP 8, 02	76	1	2	10	0	0	0	0	.	.	0
30.288	VP 8, 37	77	1	12	.	1	0	0	1	0	.	0.5
30.279 (982)	VP 7, 27	78	1	2	8	0.5	0	0	1	0	1	0
30.234 (2850)	VP 8, 54	79	1	2	8	0.5	0	0	1	0	1	0
VMNH 1031	scan pile	80	1	2	9	1	0	0	0	.	1	0
30.755 (702)	VP 8, 24	81	1	2	9	0	0	0	1	0	0	0
30.756 (668)	VP 8,25	82	1	2	8	0	0	0	1	0	1	0.5
30.760 (689)	VP 8, 44	83	1	2	8	0	0	0	1	0	1	0
.	outside door case	84	1	16	.	0	0	0	1	0	.	0
WS02-41	VP 8, 35	85	1	16	.	0.5	0	1	1	1	.	0.5
VMNH 2811	scan pile	86	1	2	1	0	1	0	1	1	0	0
30.315	VP 8, 34	87	1	16	.	1	0	0	0	.	.	0.5
30.259	VP 8, 28	88	1	16	.	.	0	0	0	.	.	0.5
30.757	VP 8, 12	89	1	16	.	0	0	0	0	.	1	0

30.315 (1000)	VP 8, 06	90	1	16	.	0	0	0	0	.	.	1
30.235 (3244)	VP 8, 03	91	1	16	.	1	0	0	1	0	.	0.5
WS-02-131(3243)	VP 8, 03	92	1	16	.	1	0	1	0	1	.	0
30.238 (983)	VP 8, 01	93	1	.	.	0	1	0	1	0	.	0
30.242	VP 8, 39	94	1	2	8	0	0	0	1	0	.	0.5
558 handwritten	VP 8, 39	95	1	2	9	0	0	0	1	0	.	0.5
30.767(92-1arrow)	VP 8, 47	96	1	2	8	0	0	0	0	.	.	0
30.767(92-2arrow)	VP 8, 47	97	1	2	8	1	0	0	0	.	1	0
no number	VP 8, 10	98	1	2	8	0	0	0	1	1	0	0
963	VP 8, 11	99	1	2	9	1	0	0	1	0	0	0.5
30.625 (466)	VP 8, 10	100	1	2	10	1	1	0	1	0	.	0

Morphotype Het. Bones Present/ Absent	. Neck Length	. Body Length	Heterotopic Bones **Left** Max. Length	. **Left** Width Wider	. **Left** Width Smaller	. **Right** Max.	. **Right** Width	. **Right** Width	**1st Caudal** Process Width	. Centrum Length	**2nd Caudal** Process Width	. Centrum Length	**3rd Caudal** Process Width	. Centrum Length	**4th Caudal** Process Width	. Centrum Length	**5th Caudal** Process Width	. Centrum Length	**6th Caudal** Process Width
0	45.83	70.27	.	.	.	.	.	.	12.65	3.97	14.17	4.3	13.8	4.37	12.37	4.3	10.7	4.3	.
0	.	.	.	.	.	.	.	.	12.76	4.2	14.3	4.6	13.5	4.3	12.8	4	10.87	4.2	.
1	37.77	44.27	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	.	.	14.13	.	2.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	.	.	.	.	.	.	.	.	.	4.1	**10.4**	4.46	**9.9**	4	.	4.33	.	.	.
1	44.8	45.6	14.07	.	.	14.57	.	.	14.2	4.83	**8.53**	.	12.3	.	9.43	4.07	.	.	.
0	.	53.33	.	.	.	.	.	.	**18.4**	.	**18.8**	.	.	.	.	.	.	.	.
0	.	.	.	.	.	.	.	.	17.07	4.56	16.4	5.3	16.3	.	14.7	.	12.1	.	.
0	49.6	58.7	.	.	.	.	.	.	.	3.7	.	3.9	.	3.87	.	.	.	.	.
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0	.	.	.	.	.	.	.	.	.	.	**12.86**	.	**13.26**	.	.	.	.	.	**10.6**
1	68.17	69.23	20.17	5.93	3.4	21.93	4.9	4.3	13.9	6.2	15.43	6.47	16.77	6.6	.	6.63	**14.4**	7.23	12.9
0	54.37	62.7	.	.	.	.	.	.	.	5.83	.	5.7	.	.	.	.	.	.	.
0	.	.	.	.	.	.	.	.	20.47	.	19.7	.	21.07	.	15.27	.	11.5	.	.
1	54.76	68	18.53	2.83	2.5	17.4	3.53	.	.	5.2	.	4.86	.	.	.	.	.	.	.
1	.	.	21.03	.	.	24.46	8.03	4.63	.	.	.	.	**13.13**	.	**12.87**	.	**13.3**	.	.
1	.	.	18.88	.	.	19.2	.	.	.	.	.	.	**12.73**	5.4	**15**	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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1	.	.	12.53	.	.	.	.	.	.	.	.	.	**13**	4.86	**16.4**	.	17.4	.	.
0	47.5	82.63	.	.	.	.	.	.	18.3	5.2	21.63	5	**22.76**	4.87	**23.67**	4.73	.	.	.
1	.	.	.	.	.	13.23	.	.	.	5.6	.	.	.	5.57	.	5.3	.	.	.
0	.	66.43	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	.	.	15.5	4.5	2.23	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0	.	.	.	.	.	.	.	.	.	.	.	5.33	.	.	.	.	.	.	.
0	.	.	.	.	.	.	.	.	.	5.6	.	5.7	.	5.67	.	.	.	.	.
0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	32.83	36.13	9.23	.	.	10.03	.	.	.	2.67	.	2.77	.	2.37	.	2.8	.	2.83	.
1	.	.	16.93	.	.	16.37	.	.	.	6.27	.	5.17	.	5.3	.	5.3	.	.	.

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1	.	.	.	.	.	15.13	.	.	.	5.53	.	5.5	.	5.6	.	5.53	.	.	.
1	50.83	48.23	.	.	.	.	.	.	.	5.33	.	5.2	.	5.43	.	4.23	.	.	.
0	.	.	.	.	.	.	.	.	**21**	6.6	**16.07**	5.9	.	5.53	.	6.33	.	6.13	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	40.63	53.77	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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1	54.87	73.03	17.07	.	.	17.63	.	.	.	.	.	.	.	.	.	.	.	.	.
0	.	.	.	.	.	.	.	.	**15.87**	.	.	.	.	.	.	.	.	.	.
1	47.7	59.07	13.7	.	.	.	.	.	**19.26**	7.57	.	6.27	.	7	.	.	.	.	.
1	.	.	11.57	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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1	.	.	13.23	4.43	1.83	11.6	.	.	**9.73**	3.63	10.27	3.4	10.67	3.93	.	.	.	.	.
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.	.	.	.	.	.	.	.	.	21.17	5	18.53	5.43	21.1	5.1	.	.	.	.	.
0	.	.	.	.	.	.	.	.	21.57	6.87	18.6	6.1	15.73	6.4	**17.73**	.	**15.4**	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	.	.	.	.	.	.	.	.	16.27	5.03	**23.4**	5.23	**31.13**	4.83	.	.	.	.	.
0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0	.	.	.	.	.	.	.	.	13.1	4.13	14.12	3.67	13.74	3.67	13.2	3.23	.	.	.
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0	.	.	.	.	.	.	.	.	20.03	5	20.03	5.47	.	.	.	.	.	.	.
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.	65.47	70.53	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	51.33	42.3	.	.	.	11.73	.	.	.	4.27	.	3.9	.	4.03	.	.	.	.	.
1	.	.	17.37	.	.	17.47	.	.	.	.	.	.	.	.	.	.	.	.	.
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.	47.8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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.	75.7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	50.4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0	.	.	.	.	.	.	.	.	.	3.07	.	3.13	.	3.17	.	3.23	.	.	.
.	57.5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	.	.	16	.	.	.	.	.	.	5.43	14.36	4.27	.	5.8	.	.	.	.	.
.	48.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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.	49.5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

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0	78.6	.	.	.	.	.	.	.	.	.	16.6	.	.	.	.	.	.	.	.
0	53.67	72.43	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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1	.	.	.	.	.	13.3	.	.	.	.	.	.	.	.	.	.	.	.	.
1	49.3	48.65	20.17	3.4	2	20.17	3.37	1.77	.	.	.	.	.	.	.	.	.	.	.
1	.	.	17.2	.	.	20.57	3.8	3	.	.	.	.	15.8	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	.	.	.	3.9	1.77	.	.	.	.	.	.	.	.	.	.	.	.	.	.

. Centrum Length	7th Caudal Process Width	. Centrum Length	8th Caudal Process Width	. Centrum Length	9th Caudal Process Width	. Centrum Length	10th Caudal Process Width	. Centrum Length	11th Caudal Process Width	. Centrum Length	LEFT femur legth	LEFT fem. prox. width	LEFT fem. distal width	LEFT fem. min. width	LEFT distance of min. width from prox end (if not=distal end)	LEFT Tibia length	LEFT t. prox. width	LEFT t. dist. Width	LEFT t. min. width
3.53	5.2	4.1	.	4.4	.	3.9	.	4.8	.	4.7	22.33	4.7	1.97	1.9	22.33	19.1	2.2	2.4	0.87
3.73	.	4.72	.	4.35	.	.	.	4.8	.	4.7	22.13	4.5	1.9	1.6	22.13	18.67	2.3	2.37	0.9
.	.	.	.	.	.	.	.	.	.	.	**16.4**	3.9	.	.	.	16.1	2.36	1.67	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4.4	.	.	.	.	.	.	.	.	.	.	18.2	4.13	2.47	2.47	18.2	16.07	.	1.6	1.2
.	.	.	.	.	.	.	.	.	.	.	18.2	4.77	2.77	2.77	18.2	15.33	2.43	2.4	1.23
.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	23.6	5.93	2.23	2.23	23.6	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	3.7	2.43	2.43	.	.	.	1.5	1.5
.	.	.	.	.	.	.	.	.	.	.	24.87	.	.	.	.	.	.	.	.
.	.	.	.	.	.	4.1	.	4.83	.	4.3	21.83	4.55	4.53	2.3	15.5	15.17	3.27	2.33	1.23
7.07	.	8.8	.	.	.	.	.	.	.	.	32.37	4.97	2.33	2.33	32.27	23.77	3.3	2.6	1.4
.	.	.	.	.	.	.	.	.	.	.	25.9	4.5	3.33	2.8	16.1	**19.53**	3	3.6	1.8
.	.	.	.	.	.	.	.	.	.	.	28.93	6.47	4.83	4.07	21.43	25.23	4.57	3.33	2.2
.	.	.	.	.	.	.	.	.	.	.	25.7	3.96	2.67	2.23	21	18.67	1.96	2.26	1.67
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
6.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	30.17	5.87	4	2	21.9	.	.	.	.
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.	.	.	.	.	.	.	.	.	.	.	30.9	5.3	3.2	3.2	30.9	.	.	.	.
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.	.	.	.	.	.	.	.	.	.	.	32.3	5.97	2.6	2.6	32.3	15.2	.	.	.
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6.83	.	.	.	.	.	.	.	.	.	.	24.97	5.9	3.03	2.6	16.8	.	2.23	.	.
.	.	.	.	.	.	.	.	.	.	.	16.93	5.03	2.77	2.77	16.93	17.17	2.43	.	1.8
.	.	.	.	.	.	.	.	.	.	.	26.37	5.53	3.2	3.2	26.37	20.07	3.37	.	.
.	.	.	.	.	.	.	.	.	.	.	**22.1**	4.83	2.13	2.13	22.1	**21.4**	.	3.1	1.2
.	.	.	.	.	.	.	.	.	.	.	25	3.83	2.33	1.7	15.6	.	2.6	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	30.97	4.87	3.4	2.4	25.9	23.43	3.53	3.83	1.93
.	.	.	.	.	.	.	.	.	.	.	25.63	5.93	4.43	3.03	17.1	19.17	4.6	5.33	3.33
.	.	.	.	.	.	.	.	.	.	.	22.17	5.67	3.73	2.6	15.9	14.53	2.87	3.47	1.63
.	.	.	.	.	.	.	.	.	.	.	21.8	4.1	2.7	2.7	21.8	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	22.63	4.7	2.73	2	14.5	.	.	.	.
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.	.	.	.	.	.	.	.	.	.	.	28.97	4.27	3.73	2.13	21.5	17.43	3.9	2.77	1.4
.	.	.	.	.	.	.	.	.	.	.	17.77	3.7	2.33	2.33	17.77	15.2	2.17	2.3	1.1
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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5.37	.	5.13	.	.	.	.	.	.	.	.	29	4.4	3.87	2.4	16.5	21.7	3.63	4.03	1.03
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	**31.13**	.	2.8	2.8	31.13	**20.5**	2.83	.	1.57
.	.	.	.	.	.	.	.	.	.	.	27.13	5.37	3.5	2.47	18.2	19.87	2.3	2.67	.
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.	.	.	.	.	.	.	.	.	.	.	24.43	5.13	2.93	2.03	10.7	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	28.8	4.73	3.9	2.57	19.4	.	.	.	.
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.	.	.	.	.	.	.	.	.	.	.	31.07	7.17	2.93	2.93	31.07	.	4.1	.	.
.	.	.	.	.	.	.	.	.	.	.	23.23	4.87	3.9	1.37	18.1	.	2.9	.	1.8
.	.	.	.	.	.	.	.	.	.	.	.	3.25	.	1.57	14.9	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	10.6	1.73	0.97	0.97	10.6	5.93	0.9	0.5	.
.	.	.	.	.	.	.	.	.	.	.	22.5	5.6	3.37	1.93	12.3	.	.	.	.
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.	.	.	.	.	.	.	.	.	.	.	15.93	3.2	2.67	.	.	16.7	2.2	2.47	1.23
.	.	.	.	.	.	.	.	.	.	.	22.3	3.93	2.17	2.17	22.3	20.07	2.43	2.77	1.57
.	.	.	.	.	.	.	.	.	.	.	31.23	6.13	6.47	3.9	5.4	26.9	5.83	3.2	1.93
.	.	.	.	.	.	.	.	.	.	.	30.57	3.23	2.32	.	.	18.73	1.7	1.76	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	21.53	3.83	3.43	2.23	14.7	.	.	.	.
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.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	17	4	2.3	2.3	17	11.6	.	.	.
.	.	.	.	.	.	.	.	.	.	.	22	4.4	2.57	.	.	.	.	.	.
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.	.	.	.	.	.	.	.	.	.	.	21.53	2.87	2.7	1.87	12.5	14.6	3.1	2.5	1.43
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.	.	.	.	.	.	.	.	.	.	.	.	.	3.7	2.8	.	24.4	4.5	3.07	1.97
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	20.8	5.3	2.7	2	14.6	.	3.1	.	1.53

LEFT min. width distance from prox end (if not=distal end)	LEFT fibula length	LEFT fib. Prox. Width	LEFT fib. Dist. Width	LEFT fib. Min. Width	LEFT min. width distance from prox end (if not=distal end)	LEFT Width ankle	LEFT Height ankle	LEFT 1st metatarsal	LEFT 2nd metatar	LEFT 3rd metatar	LEFT 4th metatar	LEFT 5th metatar	LEFT 1st pes digit 1st phlanx	LEFT 1st pes digit 2nd phlanx	LEFT 2nd pes digit 1st phlanx	LEFT 2nd pes digit 2nd phlanx
19.1	19.17	.	.	.	.	1.43	2	.	.	11.9	10.9	2.7	.	.	.	.
18.67	18.3	0.8	1.2	0.8	18.3	1.4	1.9	.	.	11.3	10.86	2.7	.	.	.	.
.	14.2	0.5	0.8	.	.	0.66	1.6	8.7	.	12.46	11.36	.	2.6	.	4.2	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16.07	15.43	0.5	0.77	0.5	15.43	1.07	1.63	8.55	.	12.1	11.13	.	2.6	.	3.9	2.6
5.1	14.77	1.13	1.37	0.9	4.7	1.37	1.9	8.83	11.07	11.8	12.63	2.83	.	.	3.4	2.9
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	0.93	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7.6	14.4	1.23	0.87	.	.	.	.	.	.	.	.	.	.	.	.	.
6.2	22.17	.	1.4	.	.	2	2.5	12.47	15.3	17.27	15.83	4.53	.	.	6.1	3.6
4.4	**19.6**	**0.6**	**1.3**	.	.	.	.	.	.	.	.	.	.	.	.	.
9.5	23.73	1.53	1.9	1.4	8.5	2.57	3.07	.	.	.	.	.	.	.	.	.
8.3	19.63	1.03	1.33	0.9	2.9	1.43	1.5	12.56	12.86	14.03	13.46	6.63	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	1.87	2.03	.	.	.	.	.	.	.	.	.
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.	.	.	0.63	.	.	2.33	2.2	.	14.56	.	.	.	.	.	.	.
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.	16.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	16.53	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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.	.	1.37	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4.6	17.37	0.93	1.3	.	.	2.2	1.83	.	.	.	.	.	.	.	.	.
.	19.13	3.87	1.4	1.4	19.13	.	.	.	.	.	.	.	.	.	.	.
.	20.93	1.2	1.57	0.83	4.6	1.6	2.17	.	.	12.73	12.93	4.83	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15.3	21.8	1.67	1.83	1.03	10.7	2.23	2.93	12.6	17.37	19.73	18.87	.	.	.	.	.
6.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5.8	11.63	.	0.97	.	.	.	.	.	.	.	.	.	.	.	.	.
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5.9	16.77	1.6	1.03	0.5	6.5	.	.	.	.	.	.	.	.	.	.	.
3.8	15.1	0.73	1.13	0.73	0	1.47	1.83	.	.	.	.	.	.	.	.	.
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.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5.5	**20.67**	1.57	.	0.7	5.8	.	.	**11.13**	**14.5**	.	.	.	4.7	2.53	6.27	4.3
.	20.3	.	1.63	.	.	.	.	.	.	.	.	.	.	.	.	.
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3.2	20.6	1.47	1	0.63	10.5	1.8	3.27	.	.	.	.	.	.	.	.	.	.	.
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4.8	15.1	1.3	1.6	0.7	2.2	.	.	.	.	.	.	.	.	.	.	.	.	.
3.9	17.4	1	1.57	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.
3.5	17.17	1.67	1.37	1	3.2	.	.	.	.	.	.	.	.	.	.	.	.	.
11.6	26.13	2.47	1.5	1.1	7.4	.	.	.	.	.	.	.	.	.	.	.	.	.
.	18.36	1.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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2.6	13.8	1.13	0.77	0.4	4.2	.	.	.	.	.	.	.	.	.	.	.	.	.
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6.1	13.7	1.5	1.47	.	.	.	.	.	.	.	.	.	.	.	.	.
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9.8	23.27	2.7	1.27	1.13	5.6	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5.2	.	1.53	.	0.77	5.4	.	.	.	.	.	.	.	.	.	.	.

LEFT 3rd pes digit 1st phlanx	LEFT 3rd pes digit 2nd phlanx	LEFT 4th pes digit 1st phlanx	LEFT 4th pes digit 2nd phlanx	LEFT 5th pes digit 1st phlanx	LEFT 5th pes digit 2nd phlanx	LEFT 5th pes digit 3rd phlanx	RIGHT femur legth	RIGHT fem. prox. Width	RIGHT fem. distal width	RIGHT fem. min. width	RIGHT min. width distance from prox end (if not=distal end)	RIGHT Tibia length	RIGHT t. prox. width	RIGHT t. dist. Width	RIGHT t. min. width	RIGHT min. width distance from prox end (if not=distal end)
.	.	.	.	8.7	.	.	22.9	4.17	2.03	1.8	22.9	19.16	2.2	1.8	0.8	19.16
.	.	4.7	2.8	8.7	3.3	.	22	4.06	2.03	2	22	19.3	2	1.8	1.1	19.3
4.96	.	.	.	8.6	.	.	17.7	3.2	2.2	.	17.7	14.76	3.16	1.65	.	14.76
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4.53	.	4.8	.	8.07	.	.	18.17	3.63	2.27	2.27	18.17	15.13	2.5	1	1.4	7.57
5	3.2	.	.	8.57	.	.	15.67	5.1	2.5	2.5	15.67	15.8	2.4	1.93	1.37	5
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	27.6	4.3	2.67	2.67	27.6	16	3.57	.	.	.
.	.	.	.	.	.	.	23	3.77	2.03	1.8	12	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7.13	4.1	5.63	4.1	8.77	4.13	.	32.33	4.57	3.1	2.9	19.5	21.3	2.5	3.5	1.37	6.4
.	.	.	.	.	.	.	**22.83**	4.63	2.9	2.9	22.83	20.67	3.4	.	1	20.67
.	.	.	.	.	.	.	34.15	4.93	3.73	3.3	24.45	24.57	5	4.63	2.13	8.3
.	.	.	.	8.7	.	.	23.53	4.5	2.6	2.6	23.53	18.16	3.5	2.56	1.43	8.8
.	.	.	.	.	.	.	23.37	6.1	2.2	2.2	23.37	21.47	3.4	2.83	1.53	10.85
.	.	.	.	10.17	.	.	19.7	4.33	2.33	2.33	19.7	15.07	3.3	2.93	2.03	6
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	31.37	5.9	2.67	1.9	23.8	19.27	3.87	4.53	1.97	7.8
.	.	.	.	.	.	.	.	.	2.07	1.73	.	21.3	3.26	2.8	2	5.2
.	.	.	.	.	.	.	28.85	4.2	2.9	2.9	28.85	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	24.07	4.8	3.1	3.1	24.07	20.6	4.2	3.5	2.1	7
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	24.83	3	1.87	.	.	17.33	2.77	1.83	1.83	17.33
.	.	.	.	.	.	.	29.93	5.07	2.67	2.67	29.93	16.35	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	21.2	3.93	2.03	1.5	13.7	13.67	2.43	.	.	.
.	.	.	.	.	.	.	22.1	4.95	2.9	2.9	22.1	16.03	2.23	3.67	1.67	5.3

.	.	.	.	.	.	.	25.37	4.17	3.43	2.67	15.4	.	.	.	.	.
.	.	.	.	.	.	.	.	.	2.67	2.67	.	.	.	.	.	.
.	.	.	.	.	.	.	29.97	4.63	2.53	2.2	15	19.8	3.37	2.3	1.33	8.7
.	.	.	.	.	.	.	16.33	3.3	2.3	2.3	16.33	19.1	3.2	2.77	2.03	6.7
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5.2	4	6	3.5	10.3	5.63	2.47	.	.	.	.	.	21.2	2.73	2.97	1.5	5.1
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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.	.	.	.	.	.	.	22.87	5.63	.	2.8	14	.	.	.	.	.
.	.	.	.	.	.	.	26.7	4.33	3.37	2.83	15.7	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	22.53	3.83	2.93	1.97	12.2	14.7	2.63	2.43	1.73	2.6
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.	.	.	.	.	.	.	19.77	4.03	2.2	2.2	19.77	13.03	2.47	2	1	4.8
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.	.	.	.	.	.	.	23.33	5.5	2.73	2.73	23.33	22.63	2.17	2.8	1.73	6.6
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	24.67	6.07	2.57	2.3	21.3	21.8	2.9	3.37	2.1	6.1
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7.57	4.5	9.83	4.67	11.13	6	4	**24.33**	6.03	2.73	2.73	24.33	.	.	.	.	.
.	.	.	.	.	.	.	**27.6**	5.3	3.5	2.27	17.9	.	.	.	.	.
.	.	.	.	.	.	.	33.3	5.17	4.27	2.77	20.6	18.97	3	3.87	1.5	5.9
.	.	.	.	.	.	.	24.67	4.93	3.1	3.1	24.67	.	.	.	.	.
.	.	.	.	.	.	.	.	5.2	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	21.83	3.5	1.76	1.7	15	16.73	2	2.13	1.33	5.3
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.	.	.	.	.	.	.	19.23	4.07	1.63	1.63	19.23	13.4	1.6	2.37	1.4	5
.	.	.	.	.	.	.	.	6.43	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	31.13	6.63	3.9	2.3	21.7	.	.	.	.	.
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.	.	.	.	.	.	.	9.26	1.3	0.76	0.76	9.26	5.7	0.9	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	19.77	4.97	2.63	2.17	13	.	.	.	.	.
.	.	.	.	.	.	.	28.03	5	3.53	3.13	15.9	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	27.53	3.17	2.7	2.3	16.7	18.8	3	2.6	.	.
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.	.	.	.	.	.	.	18.03	5.8	2.53	2.53	18.03	17.6	2	1.9	0.63	5.1
.	.	.	.	.	.	.	20.63	5.67	2.27	2.27	20.63	.	3.4	.	1.67	3.4
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.	.	.	.	.	.	.	21.03	4.03	3.47	2.4	11.8	.	.	.	.	.
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.	.	.	.	.	.	.	23.07	3.7	1.67	1.67	23.07	15.63	2.1	.	.	.
.	.	.	.	.	.	.	22.2	3.73	3.13	2.5	11.8	15.67	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	21.13	4.13	2.2	2.2	21.13	15.6	2.83	2.93	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	16.93	4.9	2.73	.	.	.	.	2.2	.	.
.	.	.	.	.	.	.	22.1	4.37	3.87	1.53	15.7	.	.	.	.	.
.	.	.	.	.	.	.	22.7	3.17	2.43	1.27	14	.	1.9	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

.	.	.	.	.	.	.	21.07	3.57	1.93	1.4	13.9	12.73	2.53	.	.	.
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.	.	.	.	.	.	.	25.53	5.07	3.67	2.37	16	.	3.87	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	20	2.73	4.43	1.4	6.3
.	.	.	.	.	.	.	21.9	4.83	2.7	2.4	14.9	13.1	2.57	.	1.63	6.3
.	.	.	.	.	.	.	.	.	3.8	.	.	23.17	.	3.73	.	.
.	.	.	.	.	.	.	26.4	4.8	4.07	2.37	18.7	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

RIGHT fibula length	RIGHT fib. Prox. Width	RIGHT fib. Dist. Width	RIGHT fib. Min. Width	RIGHT min. width distance from prox end (if not=distal end)	RIGHT Width ankle	RIGHT Height ankle	RIGHT 1st metatarsal	RIGHT 2nd metatar	RIGHT 3rd metatar	RIGHT 4th metatar	RIGHT 5th metatar	RIGHT 1st pes digit 1st phlanx	RIGHT 1st pes digit 2nd phlanx	RIGHT 2nd pes digit 1st phlanx	RIGHT 2nd pes digit 2nd phlanx	RIGHT 3rd pes digit 1st phlanx	RIGHT 3rd pes digit 2nd phlanx
18.3	.	.	.	.	1.4	2.1	7.8	9.8	11.3	10.5	2.1	3.1	.	3.5	.	4.3	.
18.2	0.4	1.3	0.8	18.2	1.6	1.9	7.73	9.93	11.33	10.9	2.2	3.4	.	4.1	.	4.5	.
11.8	.	.	.	.	1.2	1.33	.	10.7	11.7	.	2.3	.	.	.	.	5.2	.
13.8	0.97	1	.	.	.	.	.	10.7	11.7	.	2.2	.	.	.	.	5.2	.
14.5	0.67	0.7	0.7	14.5	.	1.4	8	10.7	11.5	12.43	2.6	.	.	4.6	.	5.1	2.8
17.2	1.27	1.4	0.8	4.3	.	.	8.5	10.73	11.47	11.87	3.5	2.87	.	4.07	2.7	4.6	3.07
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14.65	1.57	1.7	1.57	14.65	.	.	9.03	.	13	11.1	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	12.43	15.6	16.1	16.07	.	3.97	.	.	.	.	.
.	.	1.53	0.8	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22.63	1.7	1.93	1.43	5	.	.	.	.	.	.	.	.	.	.	.	.	.
19.36	1.16	1.03	0.43	4.6	.	.	.	.	.	.	.	.	.	.	.	.	.
22.33	1.73	1.03	1.03	22.33	2.13	2.93	10.3	12.47	13.06	12.17	.	.	.	.	.	.	.
14	1.7	1.43	1.13	3.8	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19.33	.	1.67	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20	1.1	.	0.43	4.7	.	.	.	.	.	.	.	.	.	.	.	.	.
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18.43	0.9	1.57	0.5	3.6	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16.7	1.53	0.97	0.97	16.7	.	.	.	.	.	.	.	.	.	.	.	.	.
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13.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14.87	0.83	0.97	0.83	0	1.4	1.07	.	.	.	.	.	.	.	.	.	.	.

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.	.	.	.	.	.	.	.	.	.	.	.	3.3	2.5	.	.	.	.
.	0.87	.	.	.	.	.	.	.	.	.	6.8	.	.	.	.	.	.
18.33	0.7	1.3	1.3	18.33	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21.4	1.27	1.4	0.53	11.5	1.77	2.47	.	.	.	.	.	.	.	.	.	.	.
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21.5	0.87	1.53	1.53	21.5	.	.	.	.	.	.	.	.	.	.	.	.	.
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12.83	1.33	1.43	0.83	2.9	.	.	.	.	.	.	.	.	.	.	.	.	.
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.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20.53	1.23	1.67	0.6	7	2.3	2.03	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21.3	1.07	1.6	1.07	0	.	.	.	.	.	.	.	.	.	.	.	.	.
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19.33	2.4	2.07	1.37	5.5	.	.	.	.	.	.	.	.	.	.	.	.	.
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16.47	1.36	1.6	0.7	4.5	.	.	8.57	10.96	11.26	12.06	2.7	3.23	.	4.03	2.9	4.97	3.27
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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13.87	0.53	1.3	0.5	5.3	2.17	2.3	7.8	11.07	12.03	11.13	2.33	8.8	.	.	.	.	.
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15.67	1.37	1.07	1.07	15.67	.	.	.	.	.	.	.	.	.	.	.	.	.
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18.97	1.2	2.03	0.7	8.3	.	.	.	.	.	.	.	.	.	.	.	.	.
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16.2	1.17	1.33	0.77	3.6	.	.	.	.	.	.	.	.	.	.	.	.	.
.	1.57	.	0.7	2.8	.	.	.	.	.	.	.	.	.	.	.	.	.
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13.47	1.23	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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14.5	1.97	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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12.67	1.87	1.7	1.13	3.1	.	.	.	.	.	.	.	.	.	.	.	.	.
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20.17	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
13.1	3.13	1.3	0.87	6.8	.	.	.	.	.	.	.	.	.	.	.	.	.
21.53	.	2.27	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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RIGHT 4th pes digit 1st phlanx	RIGHT 4th pes digit 2nd phlanx	RIGHT 5th pes digit 1st phlanx	RIGHT 5th pes digit 2nd phlanx	RIGHT 5th pes digit 3rd phlanx	LEFT humerous length	LEFT proximal width	LEFT distal width	LEFT minimum width	LEFT distance of min. width from proximal end	LEFT radius length	LEFT proximal width	LEFT distal width	LEFT mim. Width	LEFT distance of min. width from proximal end	LEFT ulna length	LEFT proximal width	LEFT distal width
.	.	8.8	3.8	.	**18.8**	2.97	3.13	1.67	11.6	10.23	1.8	1.47	0.83	5.5	9.73	.	1.5
.	.	8.86	3.8	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	8.2	.	.	.	3.07	.	.	.	.	.	.	.	.	.	.	.
.	.	8.43	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	8.57	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4.9	2.7	8.5	4.77	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	22.57	3.97	3.2	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	9.43	4.4	.	21.13	4	3.7	2.4	7.3	10.57	1.8	1.47	1.1	5.5	10.3	1.8	1.53
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	21.07	4.03	2.47	1.77	15.7	10.2	1.5	1.2	1.03	5.1	9.6	2.2	1.73
.	.	.	.	.	24.67	5.5	7	2.83	13.4	10.83	2.57	2.37	1.33	6.7	10.83	3.03	3
.	.	.	.	.	22.27	5.1	4.73	2.57	12.4	9.2	2.1	1.3	1.3	9.2	10.47	2.3	1.7
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	19.36	3.83	3.9	1.96	10.4	9.23	1.33	1.73	1.06	4.7	9.13	1.57	1.5
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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.	.	.	.	.	15.1	3.33	4.77	2.33	6.6	.	.	.	.	.	.	.	.
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.	.	.	.	.	25.63	4.9	3.73	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	22.5	4.1	2.8	2.1	16	.	.	.	.	.	.	.	.
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.	.	.	.	.	13.07	3.97	2.73	2.2	5.5	.	.	.	.	.	.	.	.
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3.87	2.9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5.07	.	8.8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	8.83	.	.	19.67	4.33	3.6	2.43	8.1	9.65	.	1.7	1.2	6.1	.	.	.
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.	.	.	.	.	.	.	2.43	.	.	9.5	2.3	.	.	.	11.2	2.53	1.43
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.	.	.	.	.	22.4	3.97	3.03	2.43	13.1	10.53	2	1.67	.	.	.	2.03	.
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3.7	.	8.07	4.27	.	17.1	2.67	2.9	1.2	9.5	9.07	1.6	1.4	0.77	4.6	9.23	1.9	1.6
.	.	.	.	.	21	6.43	4.7	2.6	10.7	16.9	3.9	2.6	1.9	7.7	17.3	3.4	4.17
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

.	.	.	.	.	19.23	3.03	3.3	1.47	11.6	7.7	1.47	.	0.7	4	7.2	1.6	1.3
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	4.63	1.47	.	15.93	2.2	1.83	1	2.6	15.7	2.7	3.3
.	.	.	.	.	23.07	3.5	3.2	1.57	13.7	8.8	1.83	1.3	0.83	5.5	9.7	2.3	.
.	.	.	.	.	18.9	2.7	2.27	1.23	6.7	.	.	.	.	.	.	.	.
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.	.	.	.	.	14.97	2.8	1.9	1.53	9.2	.	.	.	.	.	.	.	.
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.	.	.	.	.	14.5	2.77	4	1.77	5.7	.	.	.	.	.	8	2.43	1.87
.	.	.	.	.	18.15	3.33	2.17	1.57	11.8	.	.	.	.	.	.	.	.
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.	.	.	.	.	29.87	5.47	4.3	2.2	17.9	16	1.6	1.37	.	.	16	2.8	2.93
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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.	.	.	.	.	15.97	2.3	2.77	1.3	9.1	8.2	1.57	1.33	.	.	7.4	1.7	1.57
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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.	.	.	.	.	16.43	.	.	.	.	.	.	.	.	.	.	.	.
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.	.	.	.	.	21.2	5.53	4.2	2.77	15.8	.	1.7	.	0.97	5.2	.	2.8	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	18.1	4.57	4.03	2.6	5.5	9.53	2.23	2.03	.	.	10.4	3.1	3.1
.	.	.	.	.	19.93	2.6	4.03	.	.	8.6	1.87	1.23	0.8	4.8	8.7	2.37	2.13

LEFT min. width	LEFT distance of min. width from proximal end	LEFT 1st metacarpa	LEFT 2nd metacarpa	LEFT 3rd metacarpa	LEFT 4th metacarpa	LEFT 5th metacarpa	RIGHT humerous length	RIGHT proximal width	RIGHT distal width	RIGHT minimum width	RIGHT distance of min. width from proximal end	RIGHT radius length	RIGHT proximal width	RIGHT distal width	RIGHT mim. Width	RIGHT distance of min. width from proximal end	RIGHT ulna length
.	.	.	.	.	.	.	.	2.33	.	.	.	9.73	1.2	0.97	0.57	5.6	10.7
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	17.83	3.03	2.3	1.2	9.3	7.67	1.03	0.83	0.7	3.9	7.83
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	19.47	3.2	3.6	2	12.7	8.9	1.27	1.13	0.8	4.9	9.63
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0.87	5.7	.	.	.	.	.	24.47	3.53	3.1	2.13	15.2	9.97	2.1	1.3	0.95	7	9.87
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.17	5.4	.	.	.	.	.	20.27	4.6	3.2	1.67	12.1	9.13	2.37	2	1.07	4.9	10
1.47	5.1	.	5.1	5.33	4.7	.	28.07	4.1	4.73	.	.	14.83	2.8	2.03	1.23	6.2	.
0.9	8.6	.	.	.	.	.	18.87	3.23	4.37	2.3	6.3	.	.	.	.	.	10.7
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.36	4.9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	25.1	2.77	3.5	.	.	.	1.57	.	.	.	.
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.	.	.	.	.	.	.	15.7	3.13	3.33	1.93	6.8	11.17	2.37	1.83	1.33	4.2	11.1
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	25.33	3.63	4.5	1.83	13.2	13.37	1.7	1.5	1	4.4	13.47
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	21.7	4.8	4.33	2.33	11.9	.	.	.	.	.	.
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1.6	8.6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.1	6.9	.	.	.	.	.	18.5	5.9	2.7	1.8	14.3	14.77	2.13	1.7	.	.	14.8
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.	.	.	.	.	.	.	27.37	4.6	3.4	2.4	14.5	15.97	1.5	1.6	1.3	8	15.67
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0.77	4.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2.03	6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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0.83	3.6	.	.	.	.	.	.	.	3	1.6	.	8.8	1.5	1.17	0.53	4.6	8.75
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.2	5.4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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.	.	.	.	.	.	.	16.57	2.7	1.6	1.6	10.5	8.63	2.13	1.3	0.73	4.8	8.3
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1.2	3.9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	17.03	4.63	3.13	2.6	7.3	9.1	1.77	1.6	0.73	5	.
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1.2	6.6	.	.	.	.	.	.	6.77	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0.93	3.6	.	.	.	.	.	15.87	2.53	3.3	1.53	7.1	6.77	1.37	1.07	0.67	4.2	6.57
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.17	5.5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	16.9	.	.	.	.	8.43	.	.	.	.	8.9
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	20.87	4.37	2.7	.	.	.	.	.	.	.	10.5

.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	19.9	4.2	3.8	2.4	12.8	13.23	1.43	1.37	.	.	13.87
.	.	.	.	.	.	.	19.23	2.33	2.77	1.3	12.3	9.23	1.3	1.1	0.6	5.7	9.2
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.07	3.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

RIGHT proximal width	RIGHT distal width	RIGHT min. width	RIGHT distance of min. width from proximal end	RIGHT 1st metacarpa	RIGHT 2nd metacarpa	RIGHT 3rd metacarpa	RIGHT 4th metacarpa	RIGHT 5th metacarpa	. Date Measured
1.5	1	0.9	5.9	.	4.47	4.67	4.63	.	4/26/2004
.	.	.	.	.	.	.	.	.	5/10/2004
1.57	1.07	0.8	4.2	.	4.07	4.2	4.17	3.27	4/26/2004
.	.	.	.	.	.	.	.	.	5/10/2004
.	.	.	.	.	.	.	.	.	5/17/2004
.	.	.	.	.	.	.	.	.	7/19/2004
1.7	.	.	.	.	.	.	.	.	5/17/2004
.	.	.	.	.	.	.	.	.	5/17/2004
3	1.7	1.37	6.2	.	.	.	.	.	5/17/2004
.	.	.	.	.	.	.	.	.	2/3/2005
2.83	2.33	0.8	5.3	.	.	.	.	.	5/20/2004
.	.	.	.	.	.	.	.	.	5/29/2004
2.97	1.63	1.2	5.9	.	.	.	.	.	5/24/2004
.	.	.	.	.	.	.	.	.	5/27/2004
.	.	.	.	.	.	.	.	.	8/5/2004
.	.	.	.	.	.	.	.	.	5/28/2004
20.3	.	1.17	4.3	.	.	.	.	.	5/31/2004
.	.	.	.	.	.	.	.	.	5/31/2004
.	.	.	.	.	.	.	.	.	5/31/2004
.	.	.	.	.	.	.	.	.	6/23/2004
3.3	.	.	.	.	.	.	.	.	7/6/2004
.	.	.	.	.	.	.	.	.	7/6/2004
2.77	2.53	0.9	8.1	.	.	.	.	.	7/6/2004
.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	8/5/2004
.	.	.	.	.	.	.	.	.	7/6/2004
.	.	.	.	.	.	.	.	.	7/6/2004
.	.	.	.	.	.	.	.	.	7/6/2004
.	.	.	.	.	.	.	.	.	7/7/2004

.	.	.	.	.	.	.	.	.	7/7/2004
.	.	.	.	.	.	.	.	.	7/7/2004
.	.	.	.	.	.	.	.	.	7/7/2004
.	.	.	.	.	.	.	.	.	7/8/2004
.	.	.	.	.	.	.	.	.	7/8/2004
.	.	.	.	.	.	.	.	.	7/14/2004
.	.	.	.	.	.	.	.	.	7/14/2004
.	.	.	.	.	.	.	.	.	7/14/2004
.	.	.	.	.	.	.	.	.	7/14/2004
1.87	2	.	.	.	.	.	.	.	7/15/2004
.	.	.	.	.	.	.	.	.	7/15/2004
.	.	.	.	.	.	.	.	.	7/15/2004
.	.	.	.	.	.	.	.	.	7/15/2004
.	.	.	.	.	.	.	.	.	7/15/2004
.	.	.	.	.	.	.	.	.	7/16/2004
.	.	.	.	.	.	.	.	.	7/16/2004
.	.	.	.	.	.	.	.	.	7/16/2004
.	.	.	.	.	.	.	.	.	7/16/2004
.	.	.	.	.	.	.	.	.	7/16/2004
.	.	.	.	.	.	.	.	.	7/16/2004
.	.	.	.	.	.	.	.	.	7/16/2004
.	.	.	.	.	.	.	.	.	7/19/2004
.	.	.	.	.	.	.	.	.	7/19/2004
.	.	.	.	.	.	.	.	.	7/19/2004
.	.	.	.	.	.	.	.	.	7/19/2004
.	.	.	.	.	.	.	.	.	2/3/2005
2.4	.	.	.	.	.	.	.	.	7/19/2004
.	.	.	.	.	.	.	.	.	7/19/2004
.	.	.	.	.	.	.	.	.	2/3/2005
.	.	.	.	.	.	.	.	.	2/1/2005
.	.	.	.	.	.	.	.	.	7/20/2004
.	.	.	.	.	.	.	.	.	7/20/2004

1.83	1.5	0.9	4.5	.	.	.	.	.	7/20/2004
.	.	.	.	.	.	.	.	.	7/20/2004
.	.	.	.	.	.	.	.	.	7/20/2004
.	.	.	.	.	.	.	.	.	7/20/2004
2.47	1.67	1.17	5.3	.	.	.	.	.	2/1/2005
.	.	.	.	.	.	.	.	.	8/5/2004
.	.	.	.	.	.	.	.	.	9/1/2004
.	.	.	.	.	.	.	.	.	9/1/2004
.	.	.	.	.	.	.	.	.	9/1/2004
.	.	.	.	.	.	.	.	.	9/1/2004
.	.	.	.	.	.	.	.	.	9/1/2004
.	.	.	.	.	.	.	.	.	9/1/2004
.	.	.	.	.	.	.	.	.	9/1/2004
.	.	.	.	.	.	.	.	.	9/6/2004
.	.	.	.	.	.	.	.	.	9/8/2004
.	.	.	.	.	.	.	.	.	9/9/2004
.	.	.	.	.	.	.	.	.	9/8/2004
.	.	.	.	.	.	.	.	.	2/1/2005
.	.	.	.	.	.	.	.	.	10/22/2004
.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	12/17/2004
.	.	.	.	.	.	.	.	.	12/19/2004
.	.	.	.	.	.	.	.	.	2/1/2005
1.57	1.47	0.73	3.3	.	.	.	.	.	9/10/2004
.	.	.	.	.	.	.	.	.	9/10/2004
.	.	.	.	.	.	.	.	.	2/1/2005
.	.	.	.	.	.	.	.	.	9/22/2004
.	.	.	.	.	.	.	.	.	12/15/2004
.	.	.	.	.	.	.	.	.	2/1/2005
.	.	.	.	.	.	.	.	.	12/14/2004
.	.	.	.	.	.	.	.	.	12/14/2004
.	.	.	.	.	.	.	.	.	12/14/2004

.	.	.	.	.	.	.	.	.	12/14/2004
.	.	.	.	.	.	.	.	.	12/20/2004
3.3	2.1	1.23	8.1	6.7	7.6	6.9	.	.	12/19/2004
1.67	1.27	0.7	4.9	5.4	4.83	5.73	.	.	12/19/2004
.	.	.	.	.	.	.	.	.	12/17/2004
.	.	.	.	.	.	.	.	.	12/19/2004
.	.	.	.	.	.	.	.	.	12/15/2004
.	.	.	.	.	.	.	.	.	12/15/2004
.	.	.	.	.	.	.	.	.	12/20/2004
.	.	.	.	.	.	.	.	.	12/20/2004
.	.	.	.	.	.	.	.	.	.