**Appendix 1. Measurements.**

**A1.1. Introduction.**

The main measurement system employed in this study was that of Eisenmann *et al*. (1988). Additional measurements for the teeth were taken from Driesch (1976) and the Musil system (e.g. Musil 1969a). Some of these measurements can also be taken at various heights down tooth crowns e.g. mid-height lengths and widths including cement. Measurements intended to be taken at the occlusal surface can also be taken at various points on the crown from CT-scans and upon broken or sectioned specimens.

For post-cranial remains, Eisenmann *et al*. (1988) was again the main measurement system employed. Further measurements from Driesch (1976) and the Eisenmann system (available online: http://www.vera-eisenmann.com/astragales-systeme-de-mesures), alongside the addition of some additional measurements based upon these systems, were also recorded.

All measurements were taken using the techniques and equipment described in Chapter 4.

**A1.2. Cheek Teeth Measurements.**

The following measurements are as described in Chapter 4.

**Upper Cheek Tooth Measurements**

Available as Figures 6B and C in Eisenmann, V., Alberdi, M.T., De Giuli, C. and Staesche, U. 1988. *Studying Fossil Horses. Volume I: Methodology*. E.J. Brill: Leiden.

Appendix Figure 1.1. Measurements taken on the upper cheek teeth of *Equus*. Left (B) = Buccal view of an upper left cheek tooth. Right (C) = Occlusal view of a left upper cheek tooth (from Eisenmann *et al*. 1988). Measurements: 1. Tooth Height; 2. Occlusal Length; 3. Occlusal Protocone Length; 4. Occlusal Breadth.

Available as Figure 6b in Driesch, A. von den. 1976. *A Guide to the Measurement of Archaeological Bones from Archaeological Sites*. Peabody Museum Bulletin 1. Peabody Museum of Archaeology and Ethnology, Harvard University: Cambridge, Massachusetts.

Appendix Figure 1.2. Occlusal views of left upper cheek teeth of *Equus* showing the length and breadth measurements recorded including the cement (from Driesch 1976).

**Lower Cheek Teeth Measurements**

Available as Figure 1 in Musil, R. 1969. Die Pferde der Pekárna-Höhle. Ein Beitrag zur Problematik der Evolution von Equiden. *Zeitschrift für Tierzüchtung und Züchtungsbiologie*. **82**(2): 147-193.

Appendix Figure 1.3. Measurements taken by Musil on the upper cheek teeth (e.g. Musil 1969a): 1. Tooth Length (without cement). 2. Tooth Breadth (without cement). 3. Mesostyle Length (along enamel). 4. Parastyle Length (along enamel). 5. Occlusal Protocone Length. 6. Anterior Protocone Length (‘Heel’). 7. Posterior Protocone Length. 7a. Isthmus Breadth (along enamel). 8. Posterior Protocone Greatest Breadth. 9. Breadth of Mouth of Inner Valley. 10. Pli Caballin Length (along enamel). 11. Prefossette Length. 12. Postfossette Length. 13. Greatest Breadth of the Mouth of the Front Bay.

Available as Figures 8B and 8C in Eisenmann, V., Alberdi, M.T., De Giuli, C. and Staesche, U. 1988. *Studying Fossil Horses. Volume I: Methodology*. E.J. Brill: Leiden.

Appendix Figure 1.4. Measurements taken on the lower cheek teeth of *Equus*. Left = Lingual view of a right lower molar. Right = Occlusal view of a left lower cheek tooth (from Eisenmann *et al*. 1988). Measurements: 1. Tooth Height; 2. Tooth Length; 3. Preflexid Length; 4. Double Knot Length; 5. Postflexid Length; 6. Maximal Breadth (Anterior in this specimen).

Available as Figure 19b in Driesch, A. von den. 1976. *A Guide to the Measurement of Archaeological Bones from Archaeological Sites*. Peabody Museum Bulletin 1. Peabody Museum of Archaeology and Ethnology, Harvard University: Cambridge, Massachusetts.

Appendix Figure 1.5. Occlusal views of left lower cheek teeth of *Equus* showing the length and breadth measurements recorded including the cement (from Driesch 1976).

Available as Figure 2 in Musil, R. 1969. Die Pferde der Pekárna-Höhle. Ein Beitrag zur Problematik der Evolution von Equiden. *Zeitschrift für Tierzüchtung und Züchtungsbiologie*. **82**(2): 147-193.

Appendix Figure 1.6. Measurements taken by Musil on the lower cheek teeth (e.g. Musil 1969a): 1. Tooth Length (without cement). 2. Tooth Breadth (without cement). 3. Tooth Breadth (with cement). 4. Double Knot Length. 5. Hypoconulid Length. 6. Ectoflexid Length. 7. Ectoflexid Breadth. 8. Pli Caballinid Length. 9. Isthmus Breadth.

The measurements taken upon the teeth, and their source measurement systems are shown in Appendix Tables 1.1 and 1.2.

Appendix Table 1.1. Measurements taken on lower cheek teeth and their source measurement systems.

|  |  |  |
| --- | --- | --- |
| **Number** | **Measurement** | **Source** |
| 1 | Height | Eisenmann *et al*. (1988) |
| 2 | Occlusal length | Eisenmann *et al*. (1988) |
| 2a | Occlusal length  including cement | Driesch (1976) |
| 2b | Mid-height length  including cement | Based upon Driesch (1976) |
| 3 | Preflexid length | Eisenmann *et al*. (1988) |
| 4 | Double knot length | Eisenmann *et al*. (1988) |
| 5 | Postflexid length | Eisenmann *et al*. (1988) |
| 6a | Greatest occlusal  anterior width | Based upon Eisenmann *et al*. (1988) |
| 6b | Greatest occlusal posterior width | Based upon Eisenmann *et al*. (1988) |
| 6c | Maximal occlusal width including cement | Driesch (1976) |
| 6d | Width including cement  at mid-height | Based upon Driesch (1976) |
| Musil 5 | Hypoconulid length | Musil (e.g. 1969a) |
| Musil 6 | Ectoflexid length | Musil (e.g. 1969a) |
| Musil 7 | Ectoflexid width | Musil (e.g. 1969a) |
| Musil 8 | Pli caballinid length | Musil (e.g. 1969a) |
| Musil 9 | Double knot isthmus width | Musil (e.g. 1969a) |

Appendix Table 1.2. Measurements taken on upper cheek teeth and their source measurement systems.

|  |  |  |
| --- | --- | --- |
| **Number** | **Measurement** | **Source** |
| 1 | Height | Eisenmann *et al*. (1988) |
| 2 | Occlusal length | Eisenmann *et al*. (1988) |
| 2a | Occlusal length  including cement | Driesch (1976) |
| 2b | Mid-height length  including cement | Based upon Driesch (1976) |
| 3 | Occlusal protocone length | Eisenmann *et al*. (1988) |
| 3a | Mid-height protocone  length including cement | Based upon Eisenmann  *et al*. (1988) |
| 4 | Width | Eisenmann *et al*. (1988) |
| 4a | Occlusal width  including cement | Driesch (1976) |
| 4b | Mid-height width  including cement | Based upon Driesch (1976) |
| Musil 3 | Mesostyle length  (along enamel) | Musil (e.g. 1969a) |
| Musil 4 | Parastyle length (along enamel) | Musil (e.g. 1969a) |
| Musil 6 | Anterior protocone  (‘Heel’) length | Musil (e.g. 1969a) |
| Musil 7 | Posterior protocone length | Musil (e.g. 1969a) |
| Musil 7a | Protocone isthmus breadth (along enamel) | Musil (e.g. 1969a) |
| Musil 8 | Posterior protocone  greatest breadth | Musil (e.g. 1969a) |
| Musil 9 | Width of opening  of inner valley | Musil (e.g. 1969a) |
| Musil 10 | Pli caballin length  (along enamel) | Musil (e.g. 1969a) |
| Musil 11 | Prefossette length | Musil (e.g. 1969a) |
| Musil 12 | Postfossette length | Musil (e.g. 1969a) |
| Musil 13 | Greatest width of the  opening of the front bay | Musil (e.g. 1969a) |

**A1.3. Post-Cranial Element Measurements.**

The measurements for the post-cranial elements included in this study are listed below. For ease of reference, the post-cranial elements considered are listed below in alphabetical, rather than anatomical, order.

**Astragalus**

Appendix Table 1.3. Measurements recorded on the astragalus of *Equus*. VE = The Eisenmann System (http://www.vera-eisenmann.com/astragales-systeme-de-mesures) and AVD = Driesch (1976).

|  |  |  |
| --- | --- | --- |
| **Measurements (numbered after Eisenmann *et al*. [1988])** | **VE** | **AVD** |
| 1: Maximal length | 1’ | GH |
| 2: Medial condyle maximal diameter | 2 | LmT |
| 3: Trochlea breadth (at the apex of each condyle) | 4 | - |
| 4: Maximal breadth | 3 | GB |
| 5: Distal articular breadth | 5 | BFd |
| 6: Distal articular depth | 6 | - |
| 7: Maximal medial depth | 7 | - |
| **Measurement(s) additional to Eisenmann *et al*. (1988)** | | |
| 8: Maximal length from the medial condyle to the most distant point on the lateral part of the distal articular surface | 1 | - |

Available as Figures 23A-C in Eisenmann, V., Alberdi, M.T., De Giuli, C. and Staesche, U. 1988. *Studying Fossil Horses. Volume I: Methodology*. E.J. Brill: Leiden.

Appendix Figure 1.7. Measurements recorded on the astragalus of *Equus* (from Eisenmann *et al*. 1988). A: Anterior view. B: Medial view. C: Distal view. Measurement details in Appendix Table 1.3.

Available online as the first figure at:

http://www.vera-eisenmann.com/astragales-systeme-de-mesures

Appendix Figure 1.8. Anterior view of an astragalus of *Equus* showing Measurement 1, Oblique Length (Measurement 8 of this study), of the Eisenmann system (from http://www.vera-eisenmann.com/astragales-systeme-de-mesures).

**Calcaneum**

Appendix Table 1.4. Measurements recorded on the calcaneum of *Equus*. VE = The Eisenmann System (http://www.vera-eisenmann.com/astragales-systeme-de-mesures) and AVD = Driesch (1976).

|  |  |  |
| --- | --- | --- |
| **Measurements (numbered after Eisenmann *et al*. [1988])** | **VE** | **AVD** |
| 1: Maximal length | 1 | GL |
| 2: Length of the proximal part | 2 | - |
| 3: Minimal breadth | 4 | - |
| 4: Proximal maximal breadth | 5 | - |
| 5: Proximal maximal depth | 6 | - |
| 6: Distal maximal breadth | 3 | GB |
| 7: Distal maximal depth | 7 | - |
| **Measurement(s) additional to Eisenmann *et al*. (1988)** | | |
| 8: Maximal diameter of sustentaculum tali | 8 | - |
| 9: Articular diameter of sustentaculum tali | 9 | - |

Available as Figure 22 in Eisenmann, V., Alberdi, M.T., De Giuli, C. and Staesche, U. 1988. *Studying Fossil Horses. Volume I: Methodology*. E.J. Brill: Leiden.

Appendix Figure 1.9. Measurements recorded on the calcaneum of *Equus* (from Eisenmann *et al*. 1988). A: Anterior view. B: Medial view. Measurement details in Appendix Table 1.4.

Available online at:

https://vera-eisenmann.com/calcaneum-system-of-measurements

Appendix Figure 1.10. Further measurements on the calcaneum of *Equus* (from http://www.vera-eisenmann.com/astragales-systeme-de-mesures). Medial view (left) showing Measurement 8 and anterior view (right) showing Measurement 9 of the Eisenmann system.

**Femur**

Appendix Table 1.5. Measurements recorded on the femur of *Equus*. VE = The Eisenmann System (http://www.vera-eisenmann.com/astragales-systeme-de-mesures) and AVD = Driesch (1976).

|  |  |  |
| --- | --- | --- |
| **Measurements (numbered after Eisenmann *et al*. [1988])** | **VE** | **AVD** |
| 1: Maximal length | 1 | GL |
| 2: Length from caput femoris to lateral condyle | - | - |
| 3: Minimal breadth (oblique) | 3 | SD |
| 4: Diameter perpendicular to, and at the level of, 3 | - | - |
| 5: Proximal maximal breadth | 4 | Bp |
| 6: Proximal maximal depth | 5 | - |
| 7: Distal maximal breadth | 7 | Bd |
| 8: Distal maximal depth (not at right angle with the long axis of the bone) | 9 | - |
| 9: Maximal breadth of the trochlea | 8 | - |
| 10: Maximal depth of caput femoris | 6 | DC |
| **Measurement(s) additional to Eisenmann *et al*. (1988)** | | |
| GLC: Medial length from caput femoris to medial condyle | 2 | GLC |
| BTr: Greatest breadth of the region of the trochanter tertius |  | BTr |

Available as Figure 19 in Eisenmann, V., Alberdi, M.T., De Giuli, C. and Staesche, U. 1988. *Studying Fossil Horses. Volume I: Methodology*. E.J. Brill: Leiden.

Appendix Figure 1.11. Measurements recorded on the femur of *Equus* (from Eisenmann *et al*. 1988). A: Lateral view. B: Anterior view. C: Cross section at the level of arrows 3 and 4. D: Distal views. E: Medial view. Measurement details in Appendix Table 1.5.

Available as Figures 35a and c in Driesch, A. von den. 1976. *A Guide to the Measurement of Archaeological Bones from Archaeological Sites*. Peabody Museum Bulletin 1. Peabody Museum of Archaeology and Ethnology, Harvard University: Cambridge, Massachusetts.

Appendix Figure 1.12. Further measurements on the femur of *Equus* (from Driesch 1976). Caudal view of *Equus* femur (left) showing Measurement GLC and cranial view of a *Lepus* femur (right) showing Measurement BTr.

**Humerus**

Appendix Table 1.6. Measurements recorded on the humerus of *Equus*. VE = The Eisenmann System (http://www.vera-eisenmann.com/astragales-systeme-de-mesures) and AVD = Driesch (1976).

|  |  |  |
| --- | --- | --- |
| **Measurements (numbered after Eisenmann *et al*. [1988])** | **VE** | **AVD** |
| 1: Maximal length | 1 | GL |
| 2: Maximal length from caput | 2 | GLC |
| 3: Minimal breadth (oblique) | 3 | SD |
| 4: Diameter perpendicular to, and at the level of, 3 | - | - |
| 5: Proximal maximal breadth | 4 | Bp |
| 6: Proximal depth at the level of the median tubercule | 5 | - |
| 7: Maximal breadth of the trochlea | 6 | BT |
| 8: Distal maximal depth | 7 | - |
| 9: Minimal trochlear height (medial) | - | - |
| 10: Maximal trochlear height (in the middle) | 8 | - |
| 11: Trochlear height at the sagittal crest (near the condyle) | - | - |
| **Measurement(s) additional to Eisenmann *et al*. (1988)** | | |
| GL1: Greatest Lateral Length | - | GL1 |
| Dp: Proximal Depth | - | Dp |
| Bd: Distal Breadth | - | Bd |

Available as Figure 12 in Eisenmann, V., Alberdi, M.T., De Giuli, C. and Staesche, U. 1988. *Studying Fossil Horses. Volume I: Methodology*. E.J. Brill: Leiden.

Appendix Figure 1.13. Measurements recorded on the humerus of *Equus* (from Eisenmann *et al*. 1988). A: Proximal view. B: Anterior view. C: Medial view. D: Cross section at the level of arrows 3 and 4. Measurement details in Appendix Table 1.6.

Available as Figures 32a, 32d and 32f in Driesch, A. von den. 1976. *A Guide to the Measurement of Archaeological Bones from Archaeological Sites*. Peabody Museum Bulletin 1. Peabody Museum of Archaeology and Ethnology, Harvard University: Cambridge, Massachusetts.

Appendix Figure 1.14. Further measurements on the humerus of *Equus* (from Driesch 1976). Caudolateral view of an *Equus* humerus (left) showing Measurement GL1, cranial view of a distal *Cervus* humerus (centre) showing Measurement Bd and lateral view of a proximal *Canis* humerus showing Measurement Dp (from Driesch 1976).

**Patella**

Appendix Table 1.7. Measurements recorded on the patella of *Equus* (Driesch 1976).

|  |
| --- |
| **Measurements (Driesch 1976)** |
| GL: Greatest Length |
| GB: Greatest Breadth |

Available as Figure 36 in Driesch, A. von den. 1976. *A Guide to the Measurement of Archaeological Bones from Archaeological Sites*. Peabody Museum Bulletin 1. Peabody Museum of Archaeology and Ethnology, Harvard University: Cambridge, Massachusetts.

Appendix Figure 1.15. Measurements recorded on the patella as illustrated on the cranial view of a *Bos* patella (from Driesch 1976). Measurement details in Appendix Table 1.7.

**Pelvis**

Appendix Table 1.8. Measurements recorded on the pelvis of *Equus* (Driesch 1976).

|  |
| --- |
| **Measurements (Driesch 1976)** |
| GL: Greatest length |
| LA: Acetabulum length including lip |
| LAR: Acetabulum length on the rim |
| LS: Length of symphysis |
| SH: Minimum height of ilium shaft |
| SB: Minimum breadth of ilium shaft |
| SC: Minimum circumference of ilium shaft |
| LFo: Foramen obturator inner length |
| GBTc: Tubera Coxarum Greatest Breadth |
| GBA: Acetabula Greatest Breadth |
| GBTi: Tubera Ischiadica Greatest Breadth |
| SBI: Minimum Breadth of Ischial Bodies |

Available as Figures 34a, 34b and 34d in Driesch, A. von den. 1976. *A Guide to the Measurement of Archaeological Bones from Archaeological Sites*. Peabody Museum Bulletin 1. Peabody Museum of Archaeology and Ethnology, Harvard University: Cambridge, Massachusetts.

Appendix Figure 1.16. Measurements recorded on the pelvis as illustrated on the dorsal view of an *Ovis* pelvis (top), lateral view of a *Sus* pelvis (centre) and the acetabulum of *Equus* (bottom) (from Driesch 1976). Measurement details in Appendix Table 1.8.

**Phalange I**

Appendix Table 1.9. Measurements recorded on the first phalange of *Equus*. VE = The Eisenmann System (http://www.vera-eisenmann.com/astragales-systeme-de-mesures) and AVD = Driesch (1976).

|  |  |  |
| --- | --- | --- |
| **Measurements (numbered after Eisenmann *et al*. [1988])** | **VE** | **AVD** |
| 1: Maximal length | 1 | GL |
| 2: Anterior length | 2 | - |
| 3: Minimal breadth | 3 | SD |
| 4: Proximal breadth | - | - |
| 5: Proximal depth | 4 | Bp |
| 6: Distal breadth of the tuberosities | 6 | Bd |
| 7: Distal articular breadth | 14 | BFd |
| 8: Distal articular depth | 15 | - |
| 9: Minimum length of the trigonum phalangis | 8 | - |
| 10: Medial supratuberosital length | 10 | - |
| 11: Lateral supratuberosital length | 11 | - |
| 12: Medial infratuberosital length | 12 |  |
| 13: Lateral infratuberosital length | 13 |  |
| **Measurement(s) additional to Eisenmann *et al*. (1988)** | | |
| BFp: Maximal breadth of the facies articularis proximalis | - | BFp |

Available as Figures 27A-D in Eisenmann, V., Alberdi, M.T., De Giuli, C. and Staesche, U. 1988. *Studying Fossil Horses. Volume I: Methodology*. E.J. Brill: Leiden.

Appendix Figure 1.17. Measurements recorded on the first phalange of *Equus* (from Eisenmann *et al*. 1988). A: Proximal view. B: Lateral view. C: Anterior view. D: Posterior view. Measurement details in Appendix Table 1.9.

Available as Figure 46a in Driesch, A. von den. 1976. *A Guide to the Measurement of Archaeological Bones from Archaeological Sites*. Peabody Museum Bulletin 1. Peabody Museum of Archaeology and Ethnology, Harvard University: Cambridge, Massachusetts.

Appendix Figure 1.18. Further measurement on the first phalange of *Equus* (from Driesch 1976). Proximal view showing Measurement BFp.

**Phalange II**

Appendix Table 1.10. Measurements recorded on the second phalange of *Equus*. VE = The Eisenmann System (http://www.vera-eisenmann.com/astragales-systeme-de-mesures) and AVD = Driesch (1976).

|  |  |  |
| --- | --- | --- |
| **Measurements (numbered after Eisenmann *et al*. [1988])** | **VE** | **AVD** |
| 1: Maximal length | 1 | GL |
| 2: Anterior length | 2 | - |
| 3: Minimal breadth | 3 | SD |
| 4: Proximal maximal breadth | 4 | Bp |
| 5: Proximal maximal depth | 5 | Dp |
| 6: Distal articular maximal breadth | 6 | Bd |
| **Measurement(s) additional to Eisenmann *et al*. (1988)** | | |
| BFp: Maximal breadth of the facies articularis proximalis | - | BFp |

Available as Figures 28A and B in Eisenmann, V., Alberdi, M.T., De Giuli, C. and Staesche, U. 1988. *Studying Fossil Horses. Volume I: Methodology*. E.J. Brill: Leiden and Figure 45a in Driesch, A. von den. 1976. *A Guide to the Measurement of Archaeological Bones from Archaeological Sites*. Peabody Museum Bulletin 1. Peabody Museum of Archaeology and Ethnology, Harvard University: Cambridge, Massachusetts.

Appendix Figure 1.19. Measurements recorded on the second phalange of *Equus* A: Proximal view (left). B: Anterior View (centre) (both from Eisenmann *et al*. 1988). Proximal view showing Measurement BFp (right, from Driesch 1976). Measurement details in Appendix Table 1.10.

**Phalange III**

Appendix Table 1.11. Measurements recorded on the third phalange of *Equus*. VE = The Eisenmann System (http://www.vera-eisenmann.com/astragales-systeme-de-mesures) and AVD = Driesch (1976).

|  |  |  |
| --- | --- | --- |
| **Measurements (numbered after Eisenmann *et al*. [1988])** | **VE** | **AVD** |
| 1: Tip to posterior articular surface length | - | - |
| 2: Anterior length | 1 | LD |
| 3: Minimal breadth | 3 | GB |
| 4: Articular breadth | 4 | BF |
| 5: Articular depth | 5 | LF |
| 6: Maximal height | 6 | HP |
| 7: Angle between the sole and dorsal line | - | - |
| 8: “Circumference” of sole | 7 | - |
| **Measurement(s) additional to Eisenmann *et al*. (1988)** | | |
| GL: Maximal depth | 2 | GL |

Available as Figures 29A-C in Eisenmann, V., Alberdi, M.T., De Giuli, C. and Staesche, U. 1988. *Studying Fossil Horses. Volume I: Methodology*. E.J. Brill: Leiden.

Appendix Figure 1.20. Measurements recorded on the third phalange of *Equus* (from Eisenmann *et al*. 1988). A: Proximal view. B: Anterior view. C: Lateral view. Measurement details in Appendix Table 1.11.

Available online at:

https://vera-eisenmann.com/ph-iii-system-of-measurements

Appendix Figure 1.21. Further measurement on the third phalange of *Equus* (from https://vera-eisenmann.com/ph-iii-system-of-measurements). The illustration on the right shows Measurement 2 of the Eisenmann system/Measurement GL of the Driesch system (1976).

**Radius** (See also Ulna/Radius and Ulna)

Appendix Table 1.12. Measurements recorded on the radius of *Equus*. VE = The Eisenmann System (http://www.vera-eisenmann.com/astragales-systeme-de-mesures) and AVD = Driesch (1976). See also Ulna/Radius and Ulna (Appendix Table 1.17).

|  |  |  |
| --- | --- | --- |
| **Measurements (numbered after Eisenmann *et al*. [1988])** | **VE** | **AVD** |
| 1: Maximal Length | 1 | GL |
| 2: Medial length | - | - |
| 3: Minimal breadth | 3 | SD |
| 4: Diaphysis depth at level of 3 | - | - |
| 5: Proximal articular breadth | 5 | BFp |
| 6: Proximal maximal depth | 6 | - |
| 7: Proximal maximal breadth | 4 | Bp |
| 8: Distal articular breadth | 8 | BFd |
| 9: Distal articular depth | 9 | - |
| 10: Distal maximal breadth | 7 | Bd |
| 11: Breadth of the radial condyle | 10 | - |
| 12: Breadth of the ulnar condyle | 11 | - |
| **Measurement(s) additional to Eisenmann *et al*. (1988)** | | |
| PL: Physiological length | - | PL |
| L1: Lateral length | 2 | L1 |

Available as Figure 13 in Eisenmann, V., Alberdi, M.T., De Giuli, C. and Staesche, U. 1988. *Studying Fossil Horses. Volume I: Methodology*. E.J. Brill: Leiden.

Appendix Figure 1.22. Measurements recorded on the radius of *Equus* (from Eisenmann *et al*. 1988). A: Proximal view. B: Anterior view. C: Lateral view. D: Distal view. Measurement details in Appendix Table 1.12.

Available as Figure 33a in Driesch, A. von den. 1976. *A Guide to the Measurement of Archaeological Bones from Archaeological Sites*. Peabody Museum Bulletin 1. Peabody Museum of Archaeology and Ethnology, Harvard University: Cambridge, Massachusetts.

Appendix Figure 1.23. Further measurement on the radius of *Equus*. Dorsal view of the radius and ulna of *Equus* showing Measurements PL and L1 of the Driesch system (from Driesch 1976).

**Scapula**

Appendix Table 1.13. Measurements recorded on the scapula of *Equus*. VE = The Eisenmann System (http://www.vera-eisenmann.com/astragales-systeme-de-mesures) and AVD = Driesch (1976).

|  |  |  |
| --- | --- | --- |
| **Measurements (numbered after Eisenmann *et al*. [1988])** | **VE** | **AVD** |
| 1: Maximal length: measured parallel to the spina | 5 | DHA |
| 2: Maximal breadth at the neck | 4 | SLC |
| 3: Maximal breadth of the articular process | 3 | GLP |
| 4: Articular maximal breadth | 1 | LG |
| 5: Articular maximal depth | 2 | BG |
| 6: Maximal depth of the spina | - | - |
| **Measurement(s) additional to Eisenmann *et al*. (1988)** | | |
| HS: Height | - | HS |
| Ld: Dorsal length | - | Ld |

Available as Figures 1A-C in Eisenmann, V., Alberdi, M.T., De Giuli, C. and Staesche, U. 1988. *Studying Fossil Horses. Volume I: Methodology*. E.J. Brill: Leiden.

Appendix Figure 1.24. Measurements recorded on the scapula of *Equus* (from Eisenmann *et al*. 1988). A: Lateral view. B: Cross section at the highest point of the spina. C: Distal view. Measurement details in Appendix Table 1.13.

Available as Figure 31a in Driesch, A. von den. 1976. *A Guide to the Measurement of Archaeological Bones from Archaeological Sites*. Peabody Museum Bulletin 1. Peabody Museum of Archaeology and Ethnology, Harvard University: Cambridge, Massachusetts.

Appendix Figure 1.25. Further measurements on the scapula of *Equus* (from Driesch 1976). Lateral view of a *Bos* scapula showing Measurements HS and Ld of the Driesch system.

**Third Metacarpal**

Appendix Table 1.14. Measurements recorded on the third metacarpal of *Equus*. VE = The Eisenmann System (http://www.vera-eisenmann.com/astragales-systeme-de-mesures) and AVD = Driesch (1976). Measurements “13 Maximal” and “14 Minimal” are based upon measurements 13 and 14 of Eisenmann *et al*. (1988).

|  |  |  |
| --- | --- | --- |
| **Measurements (numbered after Eisenmann *et al*. [1988])** | **VE** | **AVD** |
| 1: Maximal length | 1 | GL |
| 2: Medial length | - | - |
| 3: Minimal breadth (near the middle of the bone) | 3 | SD |
| 4: Diaphysis depth at the level of 3 | 4 | - |
| 5: Proximal articular breadth | 5 | Bp |
| 6: Proximal articular depth | 6 | - |
| 7: Maximal diameter of the articular facet for the third carpal | 7 | - |
| 8: Diameter of the anterior facet for the fourth carpal | 8 | - |
| 9: Diameter of the articular facet for the second carpal | 9 | - |
| 10: Distal maximal supra-articular breadth | 10 | - |
| 11: Distal maximal articular breadth | 11 | - |
| 12: Distal maximal depth of the keel | 12 | Dd |
| 13 Minimal: Distal minimal depth of the lateral condyle | - | - |
| “13 Maximal”: Distal depth of the lateral condyle’s lateral edge | - | - |
| 14 Maximal: Distal maximal depth of the medial condyle | 14 | - |
| “14 Minimal”: Distal minimal depth of the medial condyle | 13 | - |
| 15: Angle measuring the dorso-volar development of the keel | - | - |
| 16: Diameter of the posterior facet for the fourth carpal | 8’ | - |
| **Measurement(s) additional to Eisenmann *et al*. (1988)** | | |
| GL1: Greatest lateral length | - | GL1 |
| L1: Lateral length | 2 | L1 |
| Dp: Greatest proximal depth | - | Dp |
| CD: Minimal diaphysis circumference | - | CD |
| DD: Minimal diaphysis depth | - | DD |
| Bd: Greatest distal breadth i.e. measurement 10 or 11 | 10 or 11 | Bd |

Available as Figures 18A-D in Eisenmann, V., Alberdi, M.T., De Giuli, C. and Staesche, U. 1988. *Studying Fossil Horses. Volume I: Methodology*. E.J. Brill: Leiden.

Appendix Figure 1.26. Measurements recorded on the third metacarpal of *Equus* (from Eisenmann *et al*. 1988). A: Proximal view. B: Anterior view. C: Lateral view. D: Distal view. Measurement details in Appendix Table 1.14.

Available as Figures 44a, 44b, 44d and 44e in Driesch, A. von den. 1976. *A Guide to the Measurement of Archaeological Bones from Archaeological Sites*. Peabody Museum Bulletin 1. Peabody Museum of Archaeology and Ethnology, Harvard University: Cambridge, Massachusetts.

Appendix Figure 1.27. Further measurements on the third metacarpal (from Driesch 1976). Top left shows Measurements GL1, L1 and Bd; top right shows Measurement CD, bottom left shows Measurement DD and bottom right shows Measurement Dp.

**Third Metatarsal**

Appendix Table 1.15. Measurements recorded on the third metatarsal of *Equus*. VE = The Eisenmann System (http://www.vera-eisenmann.com/astragales-systeme-de-mesures) and AVD = Driesch (1976). Measurements “13 Maximal” and “14 Minimal” are based upon measurements 13 and 14 of Eisenmann *et al*. (1988).

|  |  |  |
| --- | --- | --- |
| **Measurements (numbered after Eisenmann *et al*. [1988])** | **VE** | **AVD** |
| 1: Maximal length | 1 | GL |
| 2: Medial length | - | - |
| 3: Minimal breadth (near the middle of the bone) | 3 | SD |
| 4: Diaphysis depth at the level of 3 | 4 | - |
| 5: Proximal articular breadth | 5 | Bp |
| 6: Proximal articular depth | - | - |
| 7: Maximal diameter of the articular facet for the third tarsal | 7 | - |
| 8: Diameter of the anterior facet for the fourth tarsal | 8 | - |
| 9: Diameter of the articular facet for the second tarsal | 9 | - |
| 10: Distal maximal supra-articular breadth | 10 | - |
| 11: Distal maximal articular breadth | 11 | - |
| 12: Distal maximal depth of the keel | 12 | Dd |
| 13 Minimal: Distal minimal depth of the lateral condyle | - | - |
| “13 Maximal”: Distal depth of the lateral condyle’s lateral edge | - | - |
| 14 Maximal: Distal maximal depth of the medial condyle | 14 | - |
| “14 Minimal”: Distal minimal depth of the medial condyle | 13 | - |
| 15: Angle measuring the dorso-volar development of the keel | - | - |
| **Measurement(s) additional to Eisenmann *et al*. (1988)** | | |
| GL1: Greatest lateral length | - | GL1 |
| L1: Lateral length | 2 | L1 |
| Dp: Greatest proximal depth | 6 | Dp |
| CD: Minimal diaphysis circumference | - | CD |
| DD: Minimal diaphysis depth | - | DD |
| Bd: Greatest distal breadth i.e. measurement 10 or 11 | 10 or 11 | Bd |

Available as Figures 25A-D in Eisenmann, V., Alberdi, M.T., De Giuli, C. and Staesche, U. 1988. *Studying Fossil Horses. Volume I: Methodology*. E.J. Brill: Leiden.

Appendix Figure 1.28. Measurements recorded on the third metatarsal of *Equus* (from Eisenmann *et al*. 1988). A: Proximal view. B: Anterior view. C: Lateral view. D: Distal view. Driesch (1976) measurements as per Appendix Figure 1.27. Measurement details in Appendix Table 1.15.

**Tibia**

Appendix Table 1.16. Measurements recorded on the tibia of *Equus*. VE = The Eisenmann System (http://www.vera-eisenmann.com/astragales-systeme-de-mesures) and AVD = Driesch (1976).

|  |  |  |
| --- | --- | --- |
| **Measurements (numbered after Eisenmann *et al*. [1988])** | **VE** | **AVD** |
| 1: Maximal length | 1 | GL |
| 2: Medial length | - | - |
| 3: Minimal breadth | 3 | SD |
| 4: Minimal depth of the diaphysis (around level of 3) | 4 | - |
| 5: Proximal maximal breadth | 5 | Bp |
| 6: Proximal maximal depth | 6 | - |
| 7: Distal maximal breadth | 8 | Bd |
| 8: Distal maximal depth | 7 | Dd |
| 9: Length of the fossa digitalis | 9 | - |
| **Measurement(s) additional to Eisenmann *et al*. (1988)** | | |
| L1: True lateral length | 2 | L1 |
| CD: Minimal diaphysis circumference | - | CD |

Available as Figure 20 in Eisenmann, V., Alberdi, M.T., De Giuli, C. and Staesche, U. 1988. *Studying Fossil Horses. Volume I: Methodology*. E.J. Brill: Leiden.

Appendix Figure 1.29. Measurements recorded on the tibia of *Equus* (from Eisenmann *et al*. 1988). A: Proximal view. B: Anterior view. C: Distal view. D. Cross section at the level of Measurement 3 (arrowed). Measurement details in Appendix Table 1.16.

Available as Figure 37a in Driesch, A. von den. 1976. *A Guide to the Measurement of Archaeological Bones from Archaeological Sites*. Peabody Museum Bulletin 1. Peabody Museum of Archaeology and Ethnology, Harvard University: Cambridge, Massachusetts.

Appendix Figure 1.30. Further measurements on the dorsal view of a tibia of *Equus* showing Measurements L1 and CD (from Driesch 1976).

**Ulna/Radius and Ulna**

Appendix Table 1.17. Measurements recorded on the ulna, and combined radius and ulna, of *Equus*. VE = The Eisenmann System (http://www.vera-eisenmann.com/astragales-systeme-de-mesures) and AVD = Driesch (1976). See also Radius (Appendix Table 1.12).

|  |  |  |
| --- | --- | --- |
| **Measurements (numbered after Eisenmann *et al*. [1988])** | **VE** | **AVD** |
| 1: Maximal length | - | GL |
| 2: Olecranon length | - | LO |
| 3: Maximal articular breadth | - | BPC |
| 4: Minimal depth of the olecranon | - | SDO |
| 5: Depth across the processus anconaeus | - | DPA |
| **Measurement(s) additional to Eisenmann *et al*. (1988)** | | |
| GL1: Greatest lateral length | - | GL1 |

Available as Figure 14 in Eisenmann, V., Alberdi, M.T., De Giuli, C. and Staesche, U. 1988. *Studying Fossil Horses. Volume I: Methodology*. E.J. Brill: Leiden.

Appendix Figure 1.31. Measurements recorded on the ulna/radius and ulna of *Equus* (from Eisenmann *et al*. 1988). A: Anterior view. B: Lateral view. C. Proximal end, anterior view. Measurement details in Appendix Table 1.17.

Available as Figure 33a in Driesch, A. von den. 1976. *A Guide to the Measurement of Archaeological Bones from Archaeological Sites*. Peabody Museum Bulletin 1. Peabody Museum of Archaeology and Ethnology, Harvard University: Cambridge, Massachusetts.

Appendix Figure 1.32. Dorsal view of a radius and ulna of *Equus* showing Measurement GL1 (from Driesch 1976).